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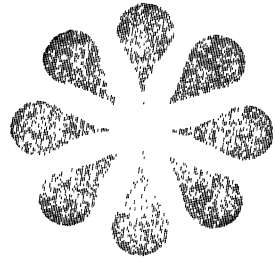
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CURRICULUM IN AMERICA



CURRICULUM IN AMERICA

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PREFACE

DOMESTIC AND INTERNATIONAL PROBLEMS are becoming increasingly difficult to solve. Disputes arising among peoples made freshly self-conscious by the spreading tides of the industrial revolution can no longer be ignored. In America, social uncertainty, especially since our technology has unleashed the force of nuclear energy, seems to be accelerating.

To the extent that reason and intelligence can be expected to help, we must turn to the schools and to education. Knowledge of the past and of the present must be acquired by each new generation. But the question arises with particular seriousness today: what sort of knowledge will be most helpful, and to whom? All of the children and young people must learn certain things, and some of them must learn much more.

It is the theme of *Curriculum in America* that because the world faces entirely new problems, and because the extent of man's knowl-

edge has increased so enormously, the emphasis in education, both of the many and of the few, must be increasingly upon process and method. These, our most significant cultural tools, are the techniques of getting hold of information, of representing the information by means of symbols, of thinking about it, of grasping and creating ideas, of working with others to formulate these ideas more perfectly, and finally, of sharing them with others. We must remember that underlying these techniques are the basic values which serve to guide the judgment of men.

The first chapter is an imaginative flight which seeks to break with tradition and, building on those facts about children and learning of which we are reasonably sure, develop a curriculum whereby children not only acquire bases for judgment, but also develop their power to judge by making choices.

The next part of the book seeks the sources of the purposes of education: in American society in general, in the way children learn, in the ways of teachers, and in the institutional characteristics of schools. A number of philosophical points of view are discussed, and the significance of decision-making is seen, subsuming as it does the processes of communicating, thinking, working with others, and using values. The theoretical position thus developed is then applied to a discussion of the various subjects taught in the nation's schools.

Finally, the question of the evaluation of education is explored, by listening first to the criticism, then by going abroad for a look at the schools of two other nations, and ending by briefly considering the ways in which schools and their products may be measured.

This volume is principally designed to prove useful to student teachers and to teachers in service as well as to those educationists entrusted with positions of leadership in the schools. The style of writing is deliberately non-technical. It is hoped that others concerned with educational matters may find this book of interest.

In the preparation of a book of this kind, help comes from many, many sources. No possible list of acknowledgments could ever be complete. A few of the writers whose ideas have been appropriated are listed in the annotated bibliographies that follow each of the chapters. But attribution to the original source of all

the clues picked up in general reading, in listening to lectures, in talking to colleagues is of course impossible.

The authors are grateful to Professor Theodore L. Reller for initiating the project and for being constantly ready with advice and comfort. Mr. John T. Hawes of the Thomas Y. Crowell Company has long provided helpful encouragement.

The authors cannot praise too highly the skill and understanding of Mr. Philip Winsor, college editor of the same publishing company. He has caught the ambiguities and the awkward sentences and has rendered many of these intelligible. We are profoundly grateful for the considerate and gracious manner in which he has gone about his task. For all errors of fact or judgment that remain, the authors alone must be held responsible.

A series of skillful women have done the typing: Mrs. Gertrude Funkhouser, Miss Josette Landsberger, Mrs. Elmer Stepanek, and Mrs. David Edwards.

We are most grateful.

J . C . P .

T . B . E .

W . H . S .

January, 1962

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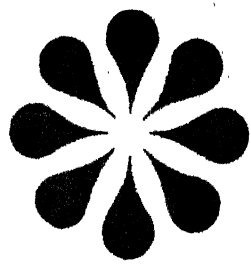
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PART I



CHAPTER 1

A New Kind of School

EDUCATION AND MAKING CHOICES

THROUGHOUT THIS BOOK we will proceed on the assumption that schools next year, and in the foreseeable future, will be modifications of what they are at present. Acceptable goals of education can be reached by institutions far different, not only in degree, but in kind. An imaginative excursion may perhaps be permitted in this, the first chapter, not in the hope that a daring community will follow such revolutionary suggestions completely, but simply to give direction to minor changes that are already contemplated.

Curriculum-workers frequently are slow to realize that both schools and teachers are resistant to change and that both must be recognized as sources of aims along with children and society. Hence, what we shall do in this chapter, and what we will carefully avoid doing in subsequent sections of this book, is to ignore the institutionalized character of both schools and teachers.

For a few moments, we shall assume that there is no such thing as a school and that we are free to arrange buildings, organize sched-

ules, and plan for administration and supervision with no past to bind us. We also assume that we will be able to staff our educational program with people prepared to make full use of the opportunities provided.

Key chapters of this book on curriculum in the schools will be labeled "Science in the Schools," "Mathematics," "The Fine Arts," and so on. These are either the names of standard school subjects, or else they are names used to indicate groups of subjects. Traditionally, curriculum in the schools has been organized as the range of subjects to be taught, and teachers have been trained so as to be able to teach these subjects. However, if education in American democratic society is best thought of as "learning to make decisions," an entirely different kind of school may be a more efficient way of moving toward this goal. Organization of the curriculum according to subjects seems to mean that the content of these subjects, apart from any learning that may take place, will be uppermost in the minds of the teachers.

We realize that only the most imaginative teachers will check their procedures to make sure that pupils are developing skill in process. The ability of a pupil to parrot back the content of a standard subject is far easier to measure than the quality of decision-making exhibited by the pupil. In this chapter we shall try to work out the consequences of organizing the curriculum according to process in the hope that when the curriculum is so organized, process, rather than content, will be in the forefront of the teacher's mind, and the evaluation of the quality of the student's decision-making will be used.

Decision-making will be analyzed in subsequent chapters. This analysis will show that decision-making is a useful concept for bringing together and emphasizing the importance of certain processes which must be learned by the future citizens of a self-governing society. The processes themselves are seen as communicating, thinking, working with others, studying, and creating. Each of these processes will be examined sufficiently to demonstrate the existence of vast complexities.

The sight of these complexities, though sobering, need not be a cause for panic. Fortunately, the curriculum-worker is not required to solve all his problems at once. However, if his theory is

good, it should order his material so that he can manipulate it, and it should also serve to keep his eye on major purposes so that the energy of teachers and learners is not dissipated hopelessly in a confused mass of irrelevant behavior.

PROCESSES

COMMUNICATION MEANS reading, writing, speaking, thinking, and listening. But the acquisition of these skills in isolation can be completely without meaning and with no indication of educational progress. The crook, the charlatan, and the shyster can make as much use of these skills for wicked purposes as can the wisest statesman working for the good of many. When communication skills are considered in relation to the making of choices, not only is the acquisition of these skills infused with meaning, but also criteria are immediately available for a selection of the knowledge, skills, attitudes, habits, and values that are to be communicated.

In order to think, there must be something to think about, and this extremely difficult process is not undertaken unless the person supposed to do the thinking wants to think. When the learner is faced with a problem that he must solve, he has something to think about as well as the desire to think. Thinking, or deliberation, reaches a climax when a choice is made.

It is difficult to see how children can learn to work with others except by actually doing so. Teachers can exhort the children to be thoughtful, considerate, and cooperative. They can hold up to scorn villains who do all they can to thwart the desires of others, or they can expose to praise heroes who are kind to their wives and their in-laws. But unless children practice in the "heat of battle," they are not apt to learn tact or to acquire gentility.

We will see that "creativity" is doubly helpful. Creative experience itself can be therapeutically satisfying, and the world is in desperate need of social invention. In later chapters it will be shown that creativity, whether essentially an intellectual matter or not, demands contact with phenomena if it is to produce inventions that work. Further, creativity is unlikely to appear in a regimented environment.

This brief review of the processes that can be subsumed under the topic of choice-making underlines the significance of a number of characteristics of the curriculum of our brave new school. Primarily, we say that the curriculum should be such that pupils are constantly being faced with the need to make choices. These decisions must be constantly related to consciously directed behavior. Hence, there must be a degree of emphasis on situations to be met rather than on subjects to be mastered. Activities provoked by these situations will provide the pupils with practice in communication, thinking, working with others, and creating. Instead of describing at this point ways in which an educational program can be built around the making of choices, we will first search for clues to additional characteristics of the proposed new school.

PROVISION FOR MAKING CHOICES

EVIDENTLY, if the children are to communicate with others and with nature, they will need to be provided with ready access to a number of resources. Among these should be a well-equipped library; shops and laboratories in which opportunities for firsthand experiences are offered; facilities for field trips, television, projection of slides and motion pictures, tape and disc recording equipment; access to museums and such centers of natural interest as local topography affords. A site near a lake, many of which have been created by the building of dams, or near a fiord or an ocean beach, may well be considered. Resource persons (adults with special skills valuable to children, such as an airline pilot or a social worker) other than professional educators must be used and either they or a personal recording should be made available for specific purposes.

Bridges to the community are not to be regarded as one-way streets. Many of the situations that pupils will be called upon to meet must be genuine community problems. By meeting these problems it is assumed the pupils will build the habits of social service that are so important in a functioning democracy, and that in most communities are shared by far too few self-sacrificing citizens.

Basic to the operation of the school as it is to the operation of any social group is the health and welfare of the members. Provisions

for the maintenance of physical and mental health of scholars and teachers are therefore ultimately significant.

Sports are related not only to health but also to the wise use of leisure. Together with music and art, games of all kinds can be expected to contribute their fair share of situations to be met in the school curriculum, and the offering of alternative ways of spending time can provide practice in deciding how to use this priceless gift to best advantage.

Finally, before attempting to etch details in the picture, we should emphasize that the organization of the school as well as its administration can be expected to provide a wealth of choices that the pupils might reasonably be expected to share in making.

ADMINISTRATIVE PROCEDURES

PERHAPS WE ARE READY now to suggest one or two administrative procedures demanded by the curriculum hinted at in the preceding pages.

First, systems of keeping records of pupils become of even greater importance than in the subject-centered school. In a limited number of school systems, at the present time, the keeping of an individual record has been made a learning experience for the pupil himself. Obviously, he must have reached a certain stage of maturity before he is able to accomplish this important task. The records envisaged for our proposed school would include photographs, name, parents, family status, and similar personal data, together with a complete listing of test results including achievement, intelligence, personality, aptitude, and attitude scores. The health record should be there, and also a wealth of notes concerning the pupil's educational experiences. A hierarchy of officials could easily oversee the keeping of these records, many of the roles being assigned more or less permanently to students of proved responsibility. These records should be regarded not only as the responsibility of the pupil, but also, to a large extent, as his personal property. They must be accessible to teachers at all times and be stored in such a way that reference is both quick and simple.

The role of the school is primarily to teach children to deliberate prior to choice-making. This view of the purpose of education

is diametrically opposed to that which calls upon the teacher to provide stock answers to standard questions. Hence, neither the teacher nor the counselor should presume to tell the child what vocational choice to make. But this does not mean that they should step aside and leave the child to struggle with the problem all by himself.

First, the child needs to know himself. Choice of a vocation is one of the most momentous decisions that he is called upon to make. By giving each child the job of taking care of his own record, the importance of vocational choice would be emphasized, and at the same time he would be assigned the major responsibility for making this choice. Hence, he would record evidence of his mental abilities, his personality, his aptitudes, and his attitudes. The full meaning of this evidence, the chance of error, and especially the possibility of change would be carefully pointed out. As he sought a more complete understanding of himself, he would read, listen, speak, and write. Especially he would think, and because of his intense interest in the subject, he could be led to think carefully. As he practiced the processes of communication and thinking he would receive guidance from the teachers and counselors concerning effective use of these processes.

Next, the child needs to know what vocational opportunities are available and what special qualities are demanded of people who are successful in the various vocations. At this point, the teacher would have an exceptionally fine opportunity to set the stage for character development. As the requirements of various vocations were discussed, the child could be led to see that certain social responsibilities are consistent with his view of himself as a maturing individual. Hence, choice of a vocation includes practice in moral and ethical judgment. Such practice should result in the adoption of a realistic decision by the child. That is to say, the level of aspiration should be such that the child's reach and grasp would be far enough apart to stimulate development, but not far enough apart to doom the child to an unremitting pattern of failure.

A wise vocational choice is in itself a creative activity. The one who makes it is helping to generate a harmonious existence that will be satisfying to himself and a source of help and inspiration to others. Successful preparation for the vocation is highly creative.

The child is quite literally making something of himself. Those rare individuals able to work out a completely new activity must be exceptionally creative.

An equally efficient arrangement is demanded for the storage of instructional materials. Teaching could be made much more efficient than it is now by a more enlightened use of instructional aids. Suppose, for example, that a mysterious disease has played havoc with some of the ornamental shrubs that surround the school building. One or two of the boys and girls are interested in this problem and wish to solve it. From their reading, they find that certain sprays are needed, but with this piece of information they are faced with two more problems. First, what is the technique used in applying the spray, and second, how does the spray actually operate to destroy the pest without destroying the host plant? In our new school, the boys and girls concerned, and they only, can go to the television library and check out two tapes, one on how to spray and the other on the science of pest control. Taking these two tapes to a booth, they can run them off once, or as many times as they wish, listening to the recorded voice of a specialist in this line of work through individual headphones, and watching the actions of the same specialist as he works away on the screen in front of them. Best of all, the rate at which the lesson proceeds is under their control. They can stop the recording wherever they want and play it over again. They can go out in the yard, try out the job, come back in and play it again, correcting flaws in their technique and in their understanding. At all times there is a teacher in the background helping to plan, telling where to find resources, ordering more if needed, supervising behavior, and making sure that each pupil is provided with a breadth of experiences.

Activities of this kind would not be introduced just to keep the children happy, nor simply to keep them busy. They would be introduced so that the pupils would be provided with opportunities to practice processes which precede the making of wise choices. If children are to practice making choices, they need to work much of the time either as individuals or in small groups. Further, they must be taught to accept more and more responsibility for planning their own activities. An educational program in which the children spend most of the day carrying out activities at the behest of the

teacher provides little opportunity for the children to make up their own minds. It really is no wonder that children rebel in such a mentally constricting environment.

It would perhaps be enlightening for the reader to examine for process the spraying activities previously described.

Further, it can be seen that the spraying activities and the materials are potentially interesting to certain adults in the community. There seems to be no reason why adults cannot learn about spraying in evening classes. When they do, they can leave samples of diseased plants to provide laboratory opportunities, during the day, for children who are also interested in the problem. Such links between the school and the community should be forged wherever possible.

An illustration could be provided with an entirely different kind of situation. Here is a group of students who have just finished reading *Moby Dick*. They are stimulated by Melville's description of life aboard a whaler, of the New England background of the men, and they sense, perhaps vaguely, the deep and to some extent mystical significance of the novel. Some of them will want to see the complete film of the novel and this should be available to those who do. Perhaps nearly all the children who read the book will wish to see this film. Many of them will be interested in pictures and descriptions of life aboard a whaler. These still or moving pictures with their accompanying narrative could be watched and listened to and then other instructional aids could be used to contrast the life on the whaler with that of other sailing ships of the period, or with the operation of a modern floating factory serving as a mother ship in the Antarctic to a swarm of diesel-operated scouting and hunting vessels which, with their swivel-type harpoon guns, are so nearly like swift naval vessels that the whale no longer has anything like an equal chance with his hunters.

As for the deep underlying significance of the novel, there is no reason that the voice and speech of one who is highly qualified for this subtle and difficult task should not be available to those pupils who are ready to listen. In ways such as have been described, a great part of the potential of this great novel, for enjoyment and for the development of background, could be realized. By the use of instructional aids the teacher may completely individualize the

instruction, and the depressing picture of works of art being violated through attempts to force them upon children unprepared to receive them can be largely erased.

The storing and cataloguing of the quantities of instructional materials that should be available to both teachers and students is again no easy task, and might well present an educational challenge to an interested group. For such a tedious task machines are available to relieve the teacher of clerical duties.

With the vastly increased flexibility of personnel and materials that is envisaged come unusual problems of communication as well as of logistics. No longer would all the classes change precisely at the ringing of a bell; no longer could the busy administrator count on finding a teacher in a specific classroom or laboratory. Modern communication systems using wires or even short-wave radios could be adapted easily to meet the requirements, so that the administrator could talk with teachers or with groups of students at the flick of a switch.

BUILDINGS

EUROPEANS SOMETIMES point with pride to a school building that has been in continuous use since A.D. 1500. Apart from the satisfaction that derives from such a patriotic gesture, the social benefits are sometimes slight. Ancient, ivy-covered walls of stone with narrow windows filled with tiny leaded panes provide a picturesque attraction for romantic tourists but may easily prevent some of the characteristics of a good educational program from being established. A number of the public school buildings erected in this country in past decades are far from adequate today, yet citizens are reluctant to knock down structures of brick and concrete that evidently can be expected to stand erect for many years to come. In times of rapid social change, educational buildings can easily be so permanent that they outlive their period of usefulness. Further, permanent buildings seem to emphasize a curriculum in which all the interesting decisions were made long ago. Buildings for education there must be, but just possibly civic pride should be diverted from a contemplation of the buildings themselves to the programs of education conducted in and around the buildings.

Rooms protected from the elements must be provided for a number of purposes. With a curriculum that permitted maximum opportunity for pupils to practice making the choices needed to meet new situations, rows and rows of formal classrooms would no longer be needed. Instead, rooms of widely varying sizes and for widely varying purposes should be available. Wings so constructed that the interior walls could be inserted, removed, or shifted about almost at will seem most appropriate. In them, small committee rooms, offices, larger seminar rooms, tiny listening and viewing booths, and shelf-lined reference rooms could be screened off. Large sections of these screens could be of glass or transparent plastic so that pupil supervision could be facilitated at all times, for pupils are not by any means to be left to their own devices.

More permanent structures would no doubt be needed for shops, laboratories, and the central library. Instead of students being assigned in blocks to these buildings for forty- or fifty-minute periods, the length of time a particular student is in the library or in one of the laboratories or shops would be much more flexible. Student A might be engaged in an extensive piece of research which kept him in the library for periods of several hours extending over days or even weeks. Student B might easily find himself similarly engrossed in an activity in laboratory or shop. Surely, our children deserve something better than to be drilled to become butterflies, constantly flitting from task to task.

Where there are farm buildings, greater flexibility would seem to be necessary. Large, open sheds, with floors of concrete and with roof and walls of corrugated aluminum, would be used in vocational programs to meet a variety of requirements.

AN EMERGING PICTURE

A PICTURE is beginning to emerge of our imaginary school, envisaged as a single educational institution in a given community operating sixteen or eighteen hours a day, 365 days in the year. It would be attended by all the children and youth of the area for six or seven hours a day, five days a week, thirty-six weeks in the year.

THE SITE

THE SITE FOR THE SCHOOL should cover several hundred acres (assuming an enrollment of 1,500 to 2,000) and should be suitably varied. Part should front on a body of water, part be flat land, suitable for agriculture, part be forest, and part be rugged territory with as much geological interest as possible (excavations revealing sedimentary deposits, minerals, evidence of glaciation, volcanic deposits, etc.). Ideally, the various parts of the campus would be contiguous.

The central building would be that housing the instructional materials with the wings for offices, committee rooms, seminar rooms, and booths radiating from it. Shops, laboratories, and gymnasia should be within five minutes walking distance from this center, and the administration building could either be connected to the library as one of the wings or could stand by itself close by.

A cafeteria capable of serving a meal to the entire school population at one sitting should be available. Although a single large dining hall would be appropriate at times, sliding partitions should be provided so that numbers of small rooms could be blocked off quickly to permit discussion. In temperate zones, outside informal eating areas served by a food dispensary might be provided.

Buildings for the farm and for heavy machinery that is required should be set somewhat apart, although near enough to be easily accessible. Near the water, there should be wharfs, floats, and buildings for the care and maintenance of such surface vessels as are in use, as well as for diving equipment and the necessary dressing rooms. Somewhere close to the water would be a choice location for the cafeteria. With artistic assignment of playing fields, farm area, and forest lot, the natural beauty of the site could be so enhanced as to set off to perfection the functionally placed buildings.

PROFESSIONAL STAFF

ALTHOUGH MANY OPPORTUNITIES for choice-making on the part of students would derive from the operation and main-

tenance of the school itself, an adequate professional staff should be employed. Otherwise, the energies of teachers and students will be diverted from their legitimate purposes, which are wholly educational. Schemes for providing pupils with direct experience often fail because the various operations are not provided with professional directors, so that the students and teachers wear themselves out administratively and have little or no energy for their educational concerns. On the other hand, where the professional workers are permitted by the administration of the school to usurp a proprietary interest, the educational goals are missed because the children are not permitted to meddle. Whether or not such professionals as the farmer or the forest ranger should have teaching certificates, we are not prepared to say, but certainly they should at least be willing to keep uppermost in their minds at all times the educational purposes of the facilities they operate.

There ought to be one full-time counselor for each three hundred students. With no rigid schedule and with modern methods of data processing, there would be little or no need for the counselor to spend time programing students. In the teaching scheme that will be outlined later, most of the educational guidance will be supplied by individual teachers. Hence the role of the counselor becomes more that of one who advises and works through teachers with most of the children, but directly with difficult ones.

As they rightfully should be, the teachers are the key professionals in the imaginary school now being described. Numbers of them are specialists in different subjects, the following specialties being clearly envisaged: kindergarten and primary, reading, writing, English literature, dramatics, physical science, life science, mathematics, foreign languages, woodshop, metal-shop, auto-shop, art, vocal music, instrumental music, health, games, history, geography, other social sciences such as sociology, electronics, mechanic arts, graphic arts, home arts, drafting, metal and ceramic arts, forestry, agriculture, landscaping, engineering, and quite possibly others as the need arises.

In addition to these specialists, there are a number of teachers who are generally well educated and who possess a flair for organizing experiences for individual students and for groups of students. This second group should be specialists in the theory and practice

of such educational matters as the psychology of learning, group dynamics, educational philosophy, history of education, the sociology and psychology of attitudes, tests, and measurements, growth and development, and individual differences. Above all, they should be able to grasp clearly what it means to be educated. They should be able, moreover, to pass along their insights in this respect not only to the pupils, but also to the teachers who are specialists in the subjects taught. Another way of saying the same thing is to refer to the second group of teachers as specialists in process, or even in a particular process. All of them should be skilled in the arts of communication and able to teach reading, writing, speaking, and listening. There are almost no limits to which these skills can be developed. Hence, children should learn these skills all through school. The idea that communication skills are "tools" to be acquired in the elementary grades for use in high school and college is a misleading half-truth. Growth in these skills should be looked for all through life.

All teachers should be skilled in human relationships. But whereas the teachers who are specialists in particular subjects may be expected to work well with others more or less instinctively, the general teachers must have consciously thought through their social behavior in order that they may teach appropriate social behavior to others. Those who "play by ear" can produce music that is satisfactory for certain limited purposes, but the successful music teacher makes explicit use of musical training and concepts. In the same way, the teacher who knows and understands the principles of human relationships can talk about them intelligently and communicate with others on an explicit basis.

Insight into the philosophy of knowledge is required, familiarity with the rules of logic and with inductive and deductive modes of thought, and an understanding of the precise way in which the use of instruments enables an observer to obtain reproducible measurements. In addition, the expert in critical thinking must be familiar with library research to the extent that he is able to locate reliable sources of information in many fields of endeavor.

Each of these homeroom teachers, as they may be referred to rather loosely, would be responsible for fifty pupils. The ages of these pupils would range from six to eighteen or more. They would

be assigned, on trial, on the basis of mutual compatibility, and if the trial period indicated success, would remain under the guidance of this teacher throughout their school careers. As a teacher lost one or more pupils through graduation, or other reasons, others would be assigned to him to take their places. The overriding theme of the curriculum would be the making of choices. This group of students would make many of their decisions under the guidance of their teacher. In addition to his role as homeroom teacher, this staff member would spend part of his time teaching process directly.

Now, having seen a purposely sketchy picture of the site, and listened to the qualifications of the professional staff, let us join a student for a day to try to get the feel of the school. To fill in this picture, we will turn you over to Henry Jones.

A DAY IN THE LIFE OF A STUDENT

My name is Henry. I have been attending this school since I was five, and I am now sixteen years old and expect to continue here for at least two more years, after which I shall go to the State University to study anthropology. My sponsor, Miss McSwain, tells me you are interested in seeing our unusual school and would like to accompany me for a typical day. I hasten to say that though the school seems unusual to you, it is not at all strange to me. As I said before, I have been to no other. What is that you ask, do I find the school day exciting? Well, there are times when I get quite excited. My heart pounds and I feel thrilled and happy. There are also times when I feel tired of myself and of life. But both these feelings are rare. Most of the time, I go along moderately content. I have learned not to worry very much about whether I am enjoying myself or not. Anyway, I very seldom get bored since there is such a variety of things to do around here, as you will see.

It is now ten minutes past eight and Miss McSwain likes us all to meet with her at a quarter past, so we had better go to my homeroom. This way, please. Not all the sponsors meet daily with all their pupils. It is not really necessary as many of us have tasks lined up for weeks. The younger ones spend part

of every day in their homeroom because they still have a lot to learn about planning and basic skills.

This is the card of my day's activities. I worked it out in detail last night. You notice that each half-hour is planned and that the day includes a number of different activities. I usually make two copies, one for myself and one for Miss McSwain, but last night I put in an extra carbon so you could have one. Here is our room. Isn't it pleasant and comfortable? Without getting too sentimental, I should like to say that it is a sort of headquarters we can come back to when the going gets really too much for us in some respect. Notice that the chairs and tables are of different sizes; each of us has his own as well as a locker in which he can store books and materials. As we get bigger we move to a chair and table of a different size, and we make quite a ceremony of "growing day," as we call it. All of us dress in our best clothes for the occasion, we start out by singing the school song, and through long practice, our teacher is able to establish just the right atmosphere. I believe ours is the only room that does this.

Attendance is checked automatically when we turn in our cards. No other general check is made throughout the day, but you accept the responsibility for being where you say you are going to be, and if someone happens to come looking for you and you are not in the place your card says you intended to be, you have some explaining to do.

Some of the little ones are a bit noisy, but they soon skip off to spend the day with Miss Queen, the primary teacher, so we see them here for only a few minutes in the morning. Some of the older students who intend to become primary teachers take turns going along with them. If we don't happen to have any prospective primary teachers in our group, we get them from other groups. Those younger children who have finished primary spend a good part of the day here with Miss McSwain, working away at various projects, though individuals or even small groups are excused to go to the shops or to the library from time to time.

I guess we can leave now. As you see on my card, I shall spend the first hour in the math lab. There will be about forty of us there, each engaged in some specific study. I am making an anthropological study of the physical characteristics of all of the boys and girls in the school. I use the card-punching ma-

chine to transfer the data which I obtained from the personal records of the students to IBM cards. Mr. Switzer, the math teacher, has shown me how to run the countersorter and I shall try to work out some interesting relationships between physical and mental characteristics. I shall also link as many of these as possible with occupation of father, status of the family, and so on. Yesterday, I was excited to find out that, in this school, the children of professional parents are taller than the children of manual workers.

Afterwards, I have a couple of hours scheduled for the library where I am searching the various indexes to see whether anyone has published data elsewhere on this finding. You would find it dull staying with me longer than the first few minutes in the math lab, so I guess you could wander over to the farm for a while, and I will meet you at the northeast entrance to the cafeteria for lunch. How about a horseback ride, or a swim, or a game of handball? Fifteen minutes of handball and then a swim will suit me fine, so let's meet at the boy's entrance to the gym at 11:30. I am sure they can fit you with some play clothes. Goodbye, then, until half-past eleven.

At first reading, this sounds like country-club activity rather than education. True, it is relaxed. But Americans could easily afford an environment such as this for their children. Actually, although the program as envisaged suggests far more freedom for the children, it would be less costly than a number of prison programs now current. The question to be decided upon is not, can we afford it, but is this the best program that can be developed and does it meet our objectives?

At this point we will turn over the guidance of the visitor to the school principal. The following guide paragraphs are assumed to have been written by him.

REMARKS BY THE PRINCIPAL

Instead of trudging laboriously all over the campus, a visit to one or two of the specialties may provide the necessary insights. We must keep in mind that each activity is arranged to provide practice for the pupils to make decisions.

First, we will visit the natural science department. Strict separation of this department into physics, chemistry, and biology has long since been discarded as too restricted; hence we will find pupils of nearly all ages working on problems that involve transformations of matter and energy, animal experimentation, microscopy, meteorology, the study of minerals, of volcanoes, and so on, throughout the entire range of natural science. At first, we thought of a separate building, partly because of the radiation hazards of experimentation with isotopes, and from the miniature cyclotron, but we have solved the shielding problem for the special rooms where these activities are under way, and we find that ready access through a pair of double doors separated by a short passage to the instructional materials center is the answer. This is primarily an educational program, the research always being regarded from the point of view of its contribution to the education of the researcher; hence all except a few very advanced students spend well over half their time mastering the fundamentals of the various sciences that are basic to the solution of the problems they have under way. This means they must discipline themself to resist the temptation to experiment with the apparatus, since they can save enormous amounts of time by searching the library for tapes on basic concepts. Hence, the science wing presents a scene of extraordinary activity which we must break down if the educational significance of the various parts is to be clear.

In general, we see a large, comfortable central room which presents much of the appearance of a well-planned factory. There are individual workbenches, some with varnished surfaces, some with metal, some with formica, and some with carpet. One is covered with a soft, short-pile velvet. This is for special work in electronics where use is made of tiny parts of jewel-like precision. Some of the benches are low enough for even the smaller pupils to work sitting down, while others are high enough to accommodate a six-footer in a standing position. Others range in height between these extremes. We had considerable difficulty with bench height at first for it seemed we were always short of one particular height each month and unfortunately the demand proved very difficult to gauge, even though one student kept an accurate check and tried to plot our needs. Eventually, one of the ten-year-old boys worked out

a plan for hydraulic legs with electric-eye control and he and a committee made an experimental model in the machine shop. When we got the bugs out of it, we were able to get the benches manufactured quite reasonably in a local factory. As it turned out, those busy on a long job can work for a while standing, lower the bench, and then work for a while sitting down.

Surrounding this large central area are rooms of various kinds. A detailed description is neither necessary nor even worth while; I need only say that in a very few minutes we can shift a wall by undoing six wing nuts and moving the wall to a new position.

There are six instructors in this department. Each is a specialist with an advanced degree, and each has published original research in his particular subject. They conduct scholarly activity on their own, but their interests are primarily educational. One very good man with a doctor's degree in cybernetics was a most successful teacher here for a few years, but he became so engrossed in a problem that he was working on with some of the senior boys that when they graduated to the university, he went along with them. If I mentioned his name you would probably recognize it, for he and one of his students shared one of the science prizes last year.

Children usually begin spending time in this department when they are nine years old. We may have an exceptional seven- or eight-year-old, but only occasionally. At first they want to work on the scientific aspect of a problem they are carrying on mainly under the direction of their individual teacher. Suppose, for example, that a group is studying scientific thinking. In part, they are helped by coming over here and observing the activities of some of the more advanced students, but once they get the general idea, it is important for them actually to carry out an investigation for themselves. Quite often, this study is one that has recently been completed by a more advanced group. Checking their results with those previously obtained provides a useful test. On one occasion, the juniors were adamant concerning the quality of their work when they failed to reach the same conclusions as had a group of seniors. Subsequent recalculation by an informal committee of the homeroom teacher, the mathematics teacher, and the science teacher in favor of the juniors was much to their delight and to the chagrin of the seniors.

Needless to say, the science instructors are extremely busy supervising the activities of approximately 150 students, but the organization is such that students can easily give assistance to each other and, because of the abundance of instructional materials, the instructors do not find it necessary to give long explanations themselves or to spend hours setting up demonstrations. The very great importance in a free society of the individual's freedom to acquire skills and his control over his own use of time is recognized from the outset, and pupil decisions with respect to time budgets are constantly reviewed. Pupils are checked from time to time to see that they stick reasonably close to the work budgets they have set up.

Activities in the science wing provide an interesting illustration of the way students realize their varying potentialities. One of the most exciting projects last year was the construction of a cyclotron. The variety of decisions that had to be made during the long planning period can well be imagined. This was interspersed with much study of such basic problems in physics as inertia, wave motion, and electrical resonance. Eventually, one of the boys jumped far ahead of the others with his understanding and became a natural leader for the project. Others found their niches as draftsmen, chemists, mathematicians, and technicians, and because there were several good machinists in the original group, they were very helpful once the plans were finished. Trips to the local university were especially helpful, and the head of the university's physics department himself sent over an associate professor when we had the thing actually running but nobody here seemed able to get the beam in focus.

General descriptions of various other parts of the campus will now be provided.

THE FARM

IN A MODERN INDUSTRIAL SOCIETY such as ours, a large segment of the urban population spends much of its time in an artificial environment. Many city people rarely come in contact with trees or grass. The blue of the sky is generally discolored by smog. The only animals seen are dogs and cats. Despite assurances from some of those born and bred in the city that the only air fit

to breathe is that flavored with automobile exhaust, the way those who manage to become financially independent rush to the country points to a need on the part of human beings for contact with a more natural environment than the city affords. Many people find reassurance in the contemplation of living and growing things other than people.

A farm provides a unique educational laboratory. The study of biology can be made alive and interesting when children work with living animals and know the satisfactions of seedtime and harvest. Statements of profit and loss acquire a new significance when words and figures can be related to gallons of foaming milk, bulging sacks of grain, frisky calves, and sensitive horses. In the feeding of animals, in the use of fertilizers, fungicides, and insecticides, and in the selection and application of paint, decisions are called for that provide the student with ample opportunity to apply and relate the principles of chemistry and biology. Farm machinery has always provided one of the clearest ways to demonstrate the principles of physics. Pulleys are used to raise hay and grain in the barn; gears drive the blades that cut and chop the crops; glass lets in the light and then holds the heat. Now that farms are becoming extensively mechanized, electronic eyes, radios, and other complex electrical tools are being used so that practically all the topics treated in a standard high school physics course can be purposefully illustrated and applied.

During most of the historical development of this country, man worked closely with the land. With a farm available, early East Coast settlements can readily be depicted, as well as many aspects of the westward movement. A life-sized covered wagon pulled by living horses or oxen can be vastly more exciting to the child than either pictures or tiny models.

The usefulness of a farm to teachers of vocational courses need scarcely be pointed out. Woodshop, metal shop, and vehicle shop are invariably included in a vocational-agriculture program in high school, because these shops and the skills represented are indispensable to the modern farmer. Hence, teachers of industrial arts can use the school farm to show the value and meaning of the things they teach.

Most modern farms today tend toward a high degree of specialization, but to be most useful as a part of a school, several kinds of animals and many different crops should be raised. Among the animals should be sheep, pigs, cows, horses, and beef cattle. Among the crops should be hay, several kinds of grain, corn, and root vegetables. Chickens, ducks, geese, and game birds might well be raised. With animals, poultry, and field crops, the diversification is reasonably complete.

As we stated earlier, a staff will be required to operate the farm, much as a professional faculty is employed to teach classes in a demonstration school associated with an institution for teacher education, or a staff of doctors and nurses employed to operate the hospital of a medical school. Students will then make use of the farm to observe, experiment, solve problems, and receive training.

Teachers of children in the third or fourth grade often set up an incubator. Some even bring a broody hen into the classroom so that children can observe at first hand the miracle of birth as the chicks emerge bedraggled and feeble from the shell. With the resources of a farm available, opportunities for similar observation in a more natural setting may be anticipated.

Older children can experiment, under supervision, with the feeding of animals, cross-pollination of plants, effects of various mixtures of soils on growth, use of a variety of fertilizers, and so on through an almost endless list. One of the major advantages of the real-life experimentation possible on a farm is the discipline imposed by the medium itself. If a child waters a treasured hybrid faithfully for three weeks and then forgets on the fourth week, the lesson he learns is long remembered. Without the need of another human personality to point them out, the simpler relationships among brute phenomena become unmistakably clear. The choices made can be realistic. However, farming has become complex in recent decades, and agricultural researchers find it necessary to use the most advanced experimental design and the most sophisticated of statistical comparisons. Hence, educationally speaking, there is no limit to the demands that the problems of agriculture may be permitted to make.

Finally, a farm is a social community. Civic problems can be

examined in a simplified yet realistic setting. The need for the age-old virtues of courage, honesty, justice, integrity, and consideration for the welfare of others can be made immediately apparent.

TREE FARMS

MUCH OF THE TALK about the educational possibilities of the farm is applicable to the school forest. Recently, the expression "tree farm" has been used increasingly to refer to a cultivated forest lot. The school forest offers specialized advantages to the children.

Primarily, the forest is even closer to natural conditions than the farm. Since the animals are usually wild, control over life and death depends pretty much on the activities of the animals themselves. It is true that man exercises a measure of control, but usually by dealing with large numbers. He may, for example, combat the depredations of one species of insect by introducing a rival species. Because the forest is closer to natural conditions, it becomes the ideal classroom for the study of conservation.

There are other lessons for which the forest provides a unique laboratory. The "web of life" is revealed by studies of birds and insects, the growth of soil, water storage, and above all, the need of many living things for sunlight. The dignity of a tree is largely the direct result of what the student will learn is the scientific process of "phototropism." But this simple explanation need not detract from the feeling of awe and wonder that comes from treading softly through an aromatic grove of lofty pines.

ROCK GARDENS

NOT ALL THE FARM FIELDS will be flat and the forest lot can well include slopes that are too steep for cultivation. Let us look toward those barren crags where only the chaparral and the succulents can gain a foothold. Even here, either close to the beach, or high in the hills, a specialized yet abundant life can be studied. Some students will welcome the opportunity of studying the crust of the earth itself.

Almost certainly, each of the three great classes of rocks, igne-

ous, sedimentary, and metamorphic, will be represented. There will be either granite, diorite, andesite, or some other rock formed deep within the earth's crust. There will be sandstone, conglomerate, limestone, or some other common example of a rock laid down by the action of water. There will be slate, marble, gneiss, schist, or some other common rock formed by the distortion of heat and pressure on sedimentary deposits.

Many minerals will be available. Quartz, feldspar, and mica certainly, and, in all probability, color provided by metallic compounds will be showing. Fossils are much more common than is usually suspected. When a child sees evidence right in his own schoolyard that the world has been in existence for thousands of millions of years, and that whole species of plants and animals have developed and disappeared during the history of this planet, his view of the world and his relationship to it will become enlarged and more alive. When fossil sea shells are discovered thousands of feet above sea level, the concept of the inevitability of change needs no reinforcement. That which during early childhood has seemed completely stable can now be seen as modifiable under the destructive forces of erosion and the constructive forces of sedimentation.

STAR OBSERVATIONS

SOMEWHERE UP AMONG THE ROCKY EMINENCES of the school grounds, there ought to be an observatory for the study of other planets and other suns. Even without a telescope, a guided observation of the heavens at night can be inspiring. With the help of one who knows, the confused sprinkling of stars can take on order, movement, and great significance. It is in this "sky garden" that newer and higher mathematics finds its use. Just as the rocks of the earth can be used to open the mind of the child to events that happened so long ago, the sight of the stars can remind him of things that are far away. It is here, also, that he can learn to read his map and plan his trip for outer space.

WATER

WHEN A BODY OF WATER is available to the school, in addition to the farm, the forest, and the mountain, the natural en-

vironment of the child is complete. People who love the sea—and this applies to most of us—find it difficult to explain the appeal of a splashing wave, a swirl of tide, the smell of seaweed, or the cry of a gull. The pleasure most people take from swimming may well indicate that all animal species, including mankind, are descendants of living forms that originated in the sea. Hence, with a body of natural water available, the teacher can arrange learning and pleasurable activities in a unique combination. Hiking along the beach or scrambling over rocks can be fun, but it can also be highly instructive. Living forms abound, rocks and sand can be studied, and the position of sun and moon can be seen with respect to the tide.

Although mammals like seals, whales, and porpoises have made the biological adaptations needed to make their home in the sea, man has never done this. Perhaps he envies the seal. Certainly he derives pleasure from watching these brilliant swimmers. As in so many other ways, man has made use of his superior intellect to invent devices that keep him from drowning and that enable him to move under as well as over the water.

In mastering the water environment, man has found it necessary to solve many difficult problems. One of these is to counteract, by moving arms and legs, the tendency of the human body to sink. The generations of random attempts that were needed before people were able to master the intricacies of the six-beat crawl need not be imagined, for it is only recently that this type of efficient swimming has been developed. As for swim-fins, face-masks, tanks of air, and exposure suits, these are all definitely post-World War II. Before someone thought of strapping a tank of air on the diver's back, it was necessary to provide him with an air hose through which air was pumped from a surface vessel, and many divers lost their lives when this umbilical cord was accidentally severed.

The history of boats and ships can be fascinating to many boys and girls, and the stories are made far more real and vivid when the children have some contact themselves with the problems involved. Perhaps the age-old urge for a ten-year-old to build a raft is an unconscious manifestation of this hunger for meaning. Recently, fiberglass hulls and push-button motors have enabled people to by-pass, rather quickly, the long apprenticeship needed be-

fore feeling at home upon the sea. With the U.S. Coast Guard riding herd on them and ready to pluck them to safety at the first sign of danger, people have literally swarmed over our inland waterways. But a mere buzzing up and down soon grows insipid and so we find the great majority of outboard boats towing water skiers, trailing fishing lines, or serving as home base for skin divers. These arts are difficult to master and therefore hold the interest for a longer period. On the other hand, those willing to master the art of sailing usually find the task of moving a vessel quickly and efficiently from one place on the surface of the ocean to another, solely by making use of the energy of the wind, a never-ending challenge and a constant source of satisfaction.

Hiking, swimming, diving, rowing, canoeing, fishing, sailing, or just plain lolling on the beach, children can be helped to acquire tastes and choose activities that will enable them to live at peace with themselves and others in a world of increasing artificiality. At the same time they learn to apply what science they have acquired.

CULTURAL CENTERS

ONE OF THE MOST INTERESTING FEATURES of our imaginary school campus is the section which contains tiny replicas of other countries. Visitors from abroad are particularly delighted when they are permitted to view this modern development. No attempt is made at world coverage. Instead, two or three countries are represented at one time, depending upon the interests of the students, the faculty, and the community. At present we find Italy, Denmark, and Japan. Only one of these will be described, Japan.

Japan was the first center to be established on campus, chiefly because of the enthusiasm of Mr. Shapiro, a teacher of foreign languages. He was stationed in Japan as a soldier during the postwar years and developed a passion for the study of the culture of this ancient land. He soon acquired some facility with the Japanese language, and has maintained his studies to the point where he is generally recognized as a Far East scholar. He was able to marshal heavy support from the large number of Japanese-Americans in this community, and undoubtedly the wave of interest in Japanese culture during the past few years in America helped considerably.

Like many new ventures, the establishment of a miniature Japanese center on the campus was opposed at first and the only site made available was a disused quarry which had embarrassed the administration because of both its unsightly appearance and its tendency to harbor clandestine activities. In this discouraging location, Shapiro and his volunteers went to work. Inside a year, they had a beautiful garden with a goldfish pool, a high-arched bridge (painted red), sloping lawns, and an authentic Japanese house.

So far as possible only Japanese is spoken in this area so that the students learn that communication is a process that can be carried on in more than one language. Further, they learn that the ideas communicated are to some extent limited by the words and grammatical structures that are available. Hence, by familiarizing themselves with the language, students can learn to understand the Japanese culture and the relation between Japanese language and thought. A rather unexpected outcome of this center has been the opportunity to discuss not only the obvious problems of civilization such as family organization and religious belief, but also the way in which society is divided into sharply segregated groups or classes. The children seem to find little difficulty in applying their fresh insights to an examination of their own attitudes with respect to status and power among Americans generally.

Mr. Shapiro happens to be skilled in a number of the arts. He and one of the art specialists in the school have found a common interest in Japanese brush painting, and have been able to lead quite a development in this respect not only among the children who attend the school, but also among the adults who come in the evenings and on Saturdays.

In passing, it should be pointed out that, although we have a number of art centers convenient for the assembly and storage of specialized materials and equipment, much of the art practice, like much of the shop and home-making practice, crops up in activities that are spread widely over the campus. For example, students in the Japanese center often practice cooking over the *habachi* and they engage in the tea-drinking ceremony. In this way the manner in which national customs serve to heighten the delights of the palate is vividly represented and seems to be a more effective way of persuading children to improve their table manners than by

constantly asking them to sit up straight, or keep their fingers out of the food.

Japan has an extensive literature, of course, and the *tanka* and *hokku* (Japanese literary forms) are certainly more readily appreciated by children than some of the more obscure of the modern poets who write in English. Through the study of language, a number of the students are led to new literary and musical forms for creative expression, and in the novels and plays of the Japanese they find themselves face to face with the same social and personal problems that confront human beings the world over. Undoubtedly, the popularity of the Japanese culture makes study in this realistic setting continuously rewarding.

ATHLETICS

To SOME EXTENT, athletic activities are widely disseminated over the campus. In the Japanese center, boys practice Japanese-style fencing and wrestling. The marine section with its boating, swimming, and hiking permits both boys and girls to practice coeducational activities that will be suitable throughout their lives. Physical activity that is equally appropriate can be enjoyed in connection with the farm, the forest, and the mineral area. While some will think there is no activity to be compared with a ride on a fast horse, others will find delight in sawing and chopping wood.

Despite these diffuse activities, our school also has an imposing stadium where the football teams can practice, a field for baseball and track events, and a gymnasium of the standard variety. Pupils are not denied the pageantry and excitement of interscholastic sports, but it is earnestly hoped and anticipated that with a wide variety of activities in which pupils can engage, most of the evils that arise through an overemphasis on highly competitive games can be avoided.

Hence, those who enjoy less active games such as bridge and chess are provided for. With the link established between intellectual pursuits and life itself, the difficult art of intelligent conversation also can be practiced as old and young alike probe the ancient problems of politics, religion, and philosophy.

SCHOOLS AND IDEAS

AN IDEAL SCHOOL needs a place where increasing numbers of children can think seriously and deeply about social problems. Such thinking does not, perhaps, mean the study of separate subjects. For life is not history, geography, economics, and the rest of the scholarly disciplines. Life is living together in the family, studying and communicating together in order to make political choices, keeping interested in various activities so as to maintain good mental health, inventing new contributions to the arts and sciences, and learning constantly to understand the world and one's relationship with people and things.

The disciplines have developed as man has sought to do these things, and perhaps this is the approach that must always be taken at colleges and universities where great ideas are to be nurtured and developed. But in the community schools the subjects have become ends in themselves, all too often, and their connection with life perilously attenuated. Nevertheless, the most important and significant duty of the community school is to introduce young people to the great ideas that lie at the basis of civilization.

To a great extent, the devices so far described can be expected to contribute heavily to this, the major role of the community school. But something more is needed—some hallowed ground, perhaps, where the student washes his hands and takes off his shoes, so to speak, as he engages in the privilege of communion with the learned. This must be an environment in which the life of the moment recedes as the student is stimulated and guided to think long, deep thoughts of the present and the future.

Now what is it like, this place where the pupil learns to think? It is not a church, for there should be no religious overtones. The teachers should primarily explain and illustrate, rather than exhort and interpret, allowing the pupils to rework the ideas into their own view of the world. Perhaps the old-style auditorium for lectures, surrounded by smaller seminar rooms for discussion, is a survival justified on rational and functional grounds and not only because of ancient tradition.

Attendance at these lectures and participation in the discus-

sions that follow should be treated as a privilege rather than a duty. For teachers with highly developed skill, a peremptory sense of responsibility for the transmission of learning, and a dedication toward the need of succeeding generations for enlightment, have too long suffered from the indignities consequent upon shouting into ears that are willfully deaf or that have not yet learned to listen.

Architecturally, the rooms and buildings set aside for this purpose could show a much greater degree of permanence than other parts of the campus. They should be aesthetically satisfying and compellingly suitable. Together with the school library they might well provide a nucleus for both the school and the community that is symbolic of serious educational aspirations.

SUMMARY

IN THIS CHAPTER we have attempted to show how in a somewhat different kind of school the objectives of education set forth in the following chapters of this book can be more directly pursued. Just as the aims of education in a free society are neatly subsumed by the concept of choice-making, or decision-making, so the teaching methods in our imaginary school, as well as the content, were chosen to provide the students with an abundance of daily practice in the processes of communicating, thinking, working with others, studying, and creating.

In part, especially with the younger children, skill in process is to be taught directly. The curriculum will be organized not into the traditional disciplines or subjects, such as science, mathematics, literature, history, and art, but around the skills of communicating, thinking, working with others, studying, and creating. Hence, the long period of association with a single "homeroom" teacher, provision for ready access by individual pupils or small groups of pupils to a wide and abundant source of instructional materials, the availability of such professionally operated adjuncts as the farm, the forest, the mineral and the marine areas.

Because each of us has his own rate and his unique motivation for learning, many of the situations in which learning is expected to take place are arranged for individual and small group activity. Through making efficient use of video tapes and other mechanical

aids, as well as exploiting to the full opportunities of providing learning experiences to large numbers of children simultaneously, teachers will be free more of the time to plan, supervise, and increase their own knowledge, skills, and understandings.

Most importantly, the emphasis will always be on acquiring ideas relevant to the culture that are useful rather than inert. Certainly, such hard-won fruits of civilization as we possess are not to be jettisoned. When he is ready, each pupil is expected to take over and to make his own, great blocks of information and large areas of understanding. But in passing the information and understanding through the sieve of his own personal needs and characteristics, each child not only can be expected to preserve and develop his interest in study, but also by adding each new idea to his own permanent collection, by steadily building his own rich personality, each child can achieve maximum growth.

Here, finally, let us reaffirm our belief in American democracy, the political system that strives nobly to provide for the best choices to be made with a minimum of coercion. Other political systems attempt to meet the dilemma of conflict and consensus in other ways. But ours is the way that offers each one freedom—and responsibility.

If citizens are to develop responsibility in the exercise of rights and privileges such as these, the education of children and youth must be conceived with imaginative insight and carried out with dedicated purpose.

The type of school envisioned here may not be realized in our lifetime, but the basic needs and the basic principles which it illustrates have clearly emerged and stand as a challenge to the creative imagination and skills of educators and citizens in every American community. We believe that copying the educational pattern of the "good old days" or of another nation is not the answer. What really is needed is to build a better and stronger school for the future than has as yet been developed. This necessitates creative thinking and the building of schools based on the best we know and the best we can conceive.

EXERCISES

1. Write a short essay giving your immediate reaction to the eight proposals set forth in this chapter. Save your essay carefully until the end of the course; then either state that your views are unchanged, or write a fresh essay.

2. Much comment is being made recently concerning the use of teaching machines. Could teaching machines fit into the school described? How would this be done?

3. A revolutionary school such as the one described could scarcely be established immediately on a full-fledged basis. What steps could be taken?

4. What features of the proposed new school are already in operation in one school or another?

5. Discuss the proposal of choice-making or decision-making as a focus for the varied activities of an American school. Would the concept serve as a focus for the aims of schools in an authoritarian society or nation?

6. What provisions are established for meeting individual differences among children in the foregoing description of a new kind of school?

7. What provisions are made in the descriptions included in the preceding chapter for the socialization of children?

8. Few people will deny the possibility of teaching children to read and write; but many deny the possibility of teaching children to think. Discuss this possibility.

9. What evidence is available concerning the teaching of creativity?

10. What information about the world of work is relevant to vocational choice? How is this information to be made available to the child? How reliable is it?

11. What information about himself is relevant for one making a vocational choice? How is this information to be made available to the child? How reliable is it?

12. Should schools select teams to engage in athletic competition with teams representing other schools?

13. Describe a form of activity that would be appropriate in this imaginary school but which has not been treated at all fully in the preceding chapter.

14. What should a child be expected to gain from a study of a work of art? Would the expectations vary as between the study of a painting and a symphony, for example?

TOPICS FOR DISCUSSION

1. Schools are places in which children should learn to play as well as to work.

2. The curriculum should be determined in part by the interests expressed by the children.

3. School buildings should be constructed to last only ten or fifteen years.

4. School children should spend more time out of doors.

5. Some revolutionary school buildings have been designed and tried out.

6. Ideally, a school should have no more than *N* pupils in a given grade.

7. The purposes of the school described could never be reached if the campus were divided into separate parts separated by distances of a mile to five miles.

8. Division of the staff into operators and teachers could never work smoothly.

9. Evaluation in the new school.

10. Memory training as a teachable process.

11. What provisions can be built into this school for the development of persistent effort?

12. To what extent do schools adopt practices that are congenial (a) to teachers, (b) to students?

ADDITIONAL READING

Brameld, Theodore, CULTURAL FOUNDATIONS OF EDUCATION (New York: Harper & Brothers, 1957). *A well-known philosopher of education has woven the basic concept of anthropology, "cul-*

ture," into his educational theory. His theory is subsumed under the concepts of human order, human process, and human goals.

Caudill, William W., and Associates, "A School for Tomorrow," SCHOOL EXECUTIVE, 76 (Feb., 1957), 53–68. *A description of a revolutionary set of school buildings. To quote, "We see Tomorrow's School as having the timeless quality—a certain dynamics—which allows it to be adapted to any educational program, any age group, any designated period of learning. This must be, because education, like the American way of life, is ever changing, never static."*

Clinchy, Evans, PROFILES OF SIGNIFICANT SCHOOLS (New York: Educational Facilities Laboratories, Inc., January and February, 1960). *Educational Facilities is a new agency devoted to the study of the physical problems of education. It is financed by the Ford Foundation. Copies of reports are available from E.F.L., 477 Madison Avenue, New York 22, N.Y.*

Morse, Arthur D., SCHOOLS OF TOMORROW (New York: Doubleday & Company, Inc., 1960). *Through a grant from the Fund for the Advancement of Education, the New York State Department of Education was able to commission a professional journalist to describe ten current and controversial programs. The list includes examples of team teaching, ungraded primary schools, teacher aides, television, programs for the gifted and for teacher recruitment.*

Shaw, Archibald, and Reid, John Lyon, "A New Look at Secondary Education: The Random Falls Idea," SCHOOL EXECUTIVE, 75 (March, 1956), 47–86. *Twenty-five educators and a dozen architects met together for five years and produced a complete description of a new kind of secondary education.*

Trump, J. Lloyd, IMAGES OF THE FUTURE: COMMISSION ON THE EXPERIMENTAL STUDY OF THE UTILIZATION OF THE STAFF IN THE SECONDARY SCHOOL (200 Gregory Hall, Urbana, Ill.: The Commission, 1959). *This pamphlet is widely known. The part of the plan that assigns 100 students to one teacher makes a strong appeal to financially concerned school boards. The idea is in grave danger of misapplication. Many teachers have rejected the idea completely. The full use of the plan calls for students to spend one-third of their time in groups of ten to fifteen.*

CHAPTER 2

Philosophies and Aims of Education

TWO TERMS must be understood if the emphasis of the present book is to be clear. These, *content* and *process,* relate to a curricular subject. Much of the discussion in the present volume can be expected to add meaning to the two terms, but to assist the reader at the outset, the following comments are offered.

CONTENT

1. *Content* is sometimes referred to as the collection of facts and principles included in one or another of the academic disciplines.
2. *Content* includes so-called laws that describe nature and society. These laws are under constant scrutiny and continuous modification.
3. The various theories that have been proposed by scholars to help men to manage their natural and social environment are a part

of *content.* The theories are also modified from time to time; sometimes a theory is discarded.

PROCESS

1. *Process* with respect to a particular discipline refers to the method of inquiry by which the facts and principles were first established.
2. If knowledge is to be useful as a guide in daily activity and in the solution of the numerous problems that confront each of us, the facts and principles learned must be freshly applied. We maintain that this *process* is exceedingly complex and that people need to learn to do it. *Process* also refers to the modification of laws and theories.
3. Among man's more significant *processes* are those related to the use of language. To the extent that a language is static, the rules regarding the use of language (spelling, meaning of words, grammar, syntax) may be thought of largely as content. But to emphasize the vitality of language, the use of language to reflect the thoughts and feelings of living persons, the concept of *process* may be helpful.
4. *Process* includes the manner in which man makes use of values in dealing with his fellows.
5. In our opinion, the more permanent effects of education can be thought of as improvements in the *process* of decision-making.

It is essential that educational programs for the years ahead be planned and developed by people who know the facts, have clear educational goals, and take a careful look at the enormous problems already encountered. The attempt to get the facts and to understand the problems is greatly complicated by the absence of a common American educational philosophy. Instead, there are fifty separate state systems of education. Some states exert considerable influence over the schools; others provide only token leadership, loose control, and limited support.

Within the limits of leadership and control by the separate states, the schools are under the leadership and control of local boards of education which govern units ranging in size from a few

pupils in a one-room school to more than a million pupils in thirty thousand classrooms. There are fifty thousand of these separate school boards and each is a policy-making body.

Among these separate districts are wide ranges in basic guiding philosophy, from none at all to widely differing specific philosophies. No other nation has so much local control of education and so little expression of common philosophy. As a result of this vast diversity, any statement or criticism of American educational philosophy is probably true in some schools and quite false in others. Despite all the criticism and loose-jointed organization, it does not seem likely that much change will be made in the foreseeable future. The system, or lack of system, coincides too closely with the general concept of democracy, freedom, and local self-determination.

Many Americans believe in the doctrine of progress, that the world is getting better all the time, especially if we all lend our efforts to the right cause. They display an almost touching faith that one road to improvement lies in more and better education. These underlying beliefs, however, offer little in the way of guidance or philosophical direction. This means that the educational program, due to lack of or conflicting philosophies, must be based upon a set of clearly defined aims of education, developed in each school and community.

EXISTING PHILOSOPHIES

FUNDAMENTALLY, philosophy is concerned with the ultimate nature and purpose of man's relationship to the universe. It must give purpose to man's life, if his life is to have purpose. With respect to the education of man, philosophy again must supply the purpose.

A systematic philosophy gets at the problem from at least four points of view: (1) The metaphysics of philosophy is a theory of reality. It attempts to answer the question, "What is real, or true?" (2) Epistemology, or a theory of knowledge, answers the question, "How do we know?" (3) Axiology, or a theory of values, deals with the question, "What is worth while?" (4) Logic, or a theory of reasoning, develops a method of reaching conclusions.

A philosophical orientation is also required in order for man to explore the nature of beauty and the nature of right conduct, including awareness of the extent to which he is free to choose. Philosophical aesthetics deals with the first of these and ethics with the second.

Major philosophical differences may be classified with respect to their metaphysics. For example, three distinct attitudes with regard to the nature of reality identify three major philosophical positions: (1) realism, (2) idealism, (3) pragmatism.

Any simplified discussion of metaphysical ideas such as that which follows undoubtedly does violence to the various philsophical schools, but it will serve to illustrate the classification of opinion.

To the *realist,* reality exists in the objective world of nature. While the process of nature is continually undergoing change, there is permanency in the laws descriptive of this process. The realist would accept the laws of nature as absolutes, applicable in any time or place. Human nature is a constant in the world of change. To the realist, reality is to be found in the nature of things.

To the *idealist,* reality exists not in the nature of *things,* but in the nature of the *mind.* Reality is subject-centered. Ideas only, are real. Man's life on earth is a part of a changing temporal order, but all is embraced by a changeless eternal order. The divine mind possesses the permanent, changeless, idea. By eliminating inconsistencies in thinking, and through divine knowledge and will, man should eventually understand this great eternal idea. Herman H. Horne implies a dual reality when he says, "The category of ultimate reality is being; of temporal reality, and so of education, is becoming. Through education the individual becomes in time what he eternally is." [1]

To the *pragmatist,* reality exists in the interaction between the subject and the object. Here and now experience constitutes the only reality. There is no ultimate or eternal reality. Reality requires man; there is no absolute, for reality is modified by time and place. In essence, this is a denial of any metaphysical position.

Boundaries between metaphysical attitudes toward reality and epistemological attitudes toward truth are somewhat indistinct.

[1] Herman Horne, *The Philosophy of Education,* The Macmillan Company, New York, 1927, p. 286.

Some philosophers include the nature of truth along with that of reality, in their metaphysical position. Paul Woodring,[2] commenting upon the philosophical conflict in education, speaks of epistemology as dealing with the nature of truth and methods of knowing. He implies that a study of the nature of knowledge is impossible without consideration of the sources of truth. Since the source of truth would seem logically to lie in what is real, the connection between epistemology and metaphysics is easy to see. But one cannot get very far with consideration of the nature of knowledge without answering the questions, "How do we know? What can we know? What is the nature of the thing we know?" These questions are related and may be stated simply, "What is truth and how do we know?"

Any classification of philosophic thinking with regard to epistemology requires that the realists be separated into at least two schools. The *naturalists* hold that all truth can be found in nature. We know truth by observation of and experimentation with the natural order of things, plus an analysis by which ultimate constituents are found.

The *deistic realist* derives truth from two sources, the natural order by scientific method and analysis, and the supernatural order through divine revelation. Both *deistic realists* and *natural realists* hold that there is truth in nature which is independent of what man or men think about it, and that it remains constant. Hutchins[3] asserts that "if men were perfectly rational . . . they would no longer disagree on matters of knowledge." To all realists, there is some knowledge which is absolute and permanent.

To the *idealist,* truth consists in the coherence of ideas and is arrived at by a dialectic method of pure reasoning whereby inconsistencies in thinking are eliminated and ultimate truth is finally derived. Truth is dependent upon our knowledge of it, and eternal truth is dependent upon divine knowledge and will. An eternal law embraces the changing temporal order and this eternal law governs all things. The duality of man is rested in the epistemology of the idealist, who holds that there is discontinuity between the

[2] Paul Woodring, *Let's Talk Sense About Our Schools,* McGraw-Hill Book Co., Inc., New York, 1953.

[3] Robert M. Hutchins, *The Philosophy of Education,* John S. Brubacher (ed.), Prentice-Hall, Inc., Englewood Cliffs, 1958.

spiritual and physical realms. The nature of the mind remains essentially the same in all times and places, and man's ability to acquire knowledge and to reason is his distinguishing characteristic. The idealist holds that there are eternal truths and eternal knowledge which are absolute and not subject to change, but which man can discover or determine.

To the *pragmatist,* truth is man-made and can be, and is, modified by man. John Dewey regarded truth as warranted assertability and both Dewey and Peirce agreed that truth is whatever, in the long run, is agreed upon by those who investigate. To Dewey, ideas are instruments whereby man establishes a working relationship with his environment. He says, "Mind is not a name for something complete by itself; it is a name for a course of action. . . ." [4] The pragmatist recognizes no eternal, unchanging truth, and holds that knowledge is found by use of the scientific method, for the purpose of designating an intelligent course of action.

Conflicting philosophical positions may be identified through examination of their several axiologies, or theories of values. The *natural realist* holds that values are found in the natural order of things. They are absolute and permanent, pertinent in any time or place. What is valuable for man is that which aids in the development of his natural tendency. Mortimer J. Adler writes that ". . . human nature . . . is bettered or perfected in the course of life only through the formation of good habits." [5] He holds that a habit may be regarded as good if it conforms to the natural tendency in man, bad if it violates this tendency. The intellectual tendency to know requires a habit of knowledge of truth, not one of error.

The *deistic realist* accepts the concept of values of the naturalist, but holds that there is a hierarchy of such values. If a conflict arises between values, first things must come first. Values derived from divine revelation take precedence. Both realist schools maintain that there is an unchanging yardstick of values, suitable for all ages and all countries.

The *idealist,* also, holds that there are values which apply in

[4] John Dewey, *Democracy and Education,* The Macmillan Company, New York, 1916, p. 155.

[5] Mortimer J. Adler, "In Defense of the Philosophy of Education," N.S.S.E., Part 1, *Philosophies of Education,* University of Chicago Press, Chicago, 1942, p. 243.

any time or place. Horne insists that man does not create value so much as discover pre-existent value by realizing values already inherent in the universe of reality.[6] This is done as man grows toward an ideal of human character by constantly having admirable models, patterns, and associations.

The *pragmatist* holds that values are subject to modification as the circumstances in which man finds himself dictate. Dewey writes of two kinds of values, intrinsic and instrumental. Intrinsic values are not matters of judgment, therefore no hierarchy can be set up for them. Instrumental values are the result of evaluation, leading to choice. Since the choices must always be made in terms of a situation which is local in time and place, valuation must always be made according to the specific situation in which they are to be used. Dewey insisted that a real hierarchy of values was impossible. Whether or not a moral value is correct can be determined only by observing its effects in the lives of individuals, or in society. Dewey's pragmatism had a strong social emphasis. His value system was less irresponsible than this simplified explanation would imply. Man's choice of value implied the prediction of consequences of the choice, and acceptance of responsibility for the decision, not only as to its effects for himself as an individual, but also as to its effects upon other individuals in society and upon society as a whole. A sound value is one which, if accepted, enables the individual to establish a satisfactory working relationship with his world and his fellow-man.

The characteristic emphasis of *realism,* as it applies to education, is to teach the pupil to conform to the laws of nature, and, in the case of *deistic realists,* to the laws of God. Education is habit formation; a habit of systematic thinking is formed by mental discipline—study in order to learn to think. Teachers should have, and exercise, authority. Educational institutions belong to society and had better serve society's needs. Everyone should have certain training termed essential to his own, and society's welfare. The individual had best learn to fit into the solid scheme of things. Cultural heritage is highly important, and man should learn to master his

[6] John S. Brubacher, *Eclectic Philosophy of Education,* Prentice-Hall, Inc., New York, 1958, p. 53.

traditions. *Educational realism* is subject-matter centered. The pupil had better meet society's educational standards.

Characteristic of *idealism* is an emphasis upon the development of individual personality. Schools still belong to society, but society's needs can best be served through the development of individual potential. The process of education, and of life, for the individual is a preparation for immortality. The pupil should develop ideals, and should imitate those worthy of imitation. Study of cultural heritage is important in that it reveals many great men and women who fit into this category. Educationally, idealism is teacher-centered; the teacher should be worthy of imitation. Man has freedom of choice. He should not allow either his own limitations or those set by circumstances to become an excuse for not developing his personality and character.

Characteristic of *pragmatism* is educational emphasis upon human creativity. Man and society should learn to appreciate the variety in human existence. The pupil should learn to solve problems leading to a satisfactory adjustment to his environment. His choices are limited by his environment and his own biological limitations. Life is a process of resolving the conflict between his own biological urges and the limitations set by society. Knowledge is an instrument to be used for this purpose (Dewey preferred the term "instrumentalism" or "experimentalism" to pragmatism), and the scientific method is the way to solving life's problems. Education is the reconstruction of experience. The method is all-important; the teacher is on the periphery, guiding the pupil into suitable experiences.

THE PHILOSOPHIC CONFLICT

IT IS EASILY SEEN that when people with different philosophies reach such different conclusions with respect to education, conflict must arise. People have a strong emotional attachment for their own system of values. Hence the conflict often becomes heated. Such conflict is part of the American scene and it is generally regarded as one of the great strengths of our particular brand of democracy. Elements of realism, idealism, and pragmatism can be

found in different school systems throughout the United States, and indeed in any particular school system. A realist can criticize the idealist elements, an idealist can criticize the realist elements, and both can unite in condemning the pragmatical elements.

In the nature of things, the pragmatical elements are most clearly in evidence. Faced with the conflict of values just described, and prevented by law from adopting the viewpoint of a particular religious group, the schools in America are denied access, as a body, to the philosophies of realism, or of idealism. They are also denied access to pragmatism as a philosophical system because the great majority of Americans, both in and out of schools, hold metaphysical beliefs, and pragmatism holds that a metaphysical position is not necessary for the conduct of a good life. Along with their metaphysical beliefs, but neatly compartmentalized, the majority of Americans hold a firm belief in the efficacy of science as a method of investigation. Schools and school people use the scientific method to solve problems. They also use methods of teaching that have proved themselves when investigated scientifically. These methods are consonant with empirically tested facts in psychology and sociology. They are different from methods in use half a century ago. From the viewpoint of an idealist or a realist they are therefore suspect. But the methods cannot be attacked directly, for this can only be possible scientifically, that is, by introducing the results of empirical investigation or, if necessary, by conducting fresh investigations. They are therefore seen as pragmatical and are attacked indirectly by an attack on the axiology of pragmatism. Hence, the school people enter battle with their hands tied, and the critics of the school have a gun in each hand. School people cannot jump to the defense of pragmatism for they themselves are not, generally speaking, motivated by the axiology of pragmatism. And the critics refuse to discuss scientific evidence.

Critics of pragmatism say that the pragmatic rejection of absolute truth, and refusal to accept a body of knowledge which can be regarded as indispensable to man anywhere, anytime, is destroying the curriculum. Pragmatic axiology is attacked on the grounds that it places values in dependence upon expediency and provides no stable and suitable aims for education; and that while the scientific method does an admirable job of describing "What is?" it

completely begs the question, "What ought to be?" They say that the concept of change and relativity, as applied to education, provides no stable standard by which to judge progress, and that Dewey's concept of education as growth fails to answer the question, "Growth toward what?" All of which is largely irrelevant when directed specifically at pragmatism, for the questions of the pragmatists leave intact those ideals about which most men agree, and it is irrelevant when directed specifically at the schools, for the schools are not dominated by the axiology of pragmatism.

Currently, the schools, and the American people generally, are attempting to survive the effects of a social earthquake brought about through the application of an extremely powerful method—the method of science—with the aid of various axiologies which do not incorporate that method into their system. Unfortunately, motives derived from a metaphysical position and acceptance of the results of scientific investigation cannot remain in watertight compartments. Sooner or later, parts of the metaphysical position are undermined by the scientific investigation, and either the metaphysical position must be modified, or the findings of science rejected. These two poles provide a dimension that is clearly evident in the present philosophic conflict. A system of education which is free from domination by a particular sect needs to devote much of its attention to the development and retention of a strong moral position. We are of the opinion that an emphasis in schools on the processes involved in the making of choices is the only device possible whereby free men can develop and retain a strong morality.

Much of the current criticism of educational practice in the United States stems from an attitude of philosophic realism. This attitude produces a demand for more emphasis upon subject matter and higher standards of intellectual discipline, and accordingly the charges that today's schools do not maintain discipline and develop good work habits, that the schools are turning out individuals who lack respect for authority, and that society is not getting its money's worth from its educational institutions. The launching of "Sputnik" drew forth the demand that the schools produce more scientists and mathematicians, because society has great need for such. This is characteristic of a philosophy of social realism, which holds that man exists to serve society and should be

fitted for that purpose above all else. Oddly enough, this is the philosophy underlying the ideology which we, as a nation, fear most, that of Soviet Communism.

Three major criticisms of current educational practices seem to stem from philosophical idealism. The contention that teachers need to be thoroughly educated individuals and that this education should include mastery of subjects they are teaching in order to inspire pupils to learn seems to derive from the philosophy that the teachers should be imitated. The demand for better treatment of individual differences seems to come from the idealist concept that the purpose of education is to develop individual personality. And the criticisms of inadequate attention to moral and spiritual values appear to be derived from the idealist axiology which holds that the purpose of this life and of all education is preparation of the individual for immortality.

The solution to the philosophic conflict seems to be found in developing a curriculum for decision-making, wherein the students learn through the application of critical thinking to make decisions that are compatible with democratic society's many conflicting philosophies. By learning to make decisions in a variety of contexts, it is believed that students later will be in a position to solve future problems of society in the best interests of themselves and society.

Basic to a curriculum for decision-making is the development of educational aims and purposes. Upon these basic aims, the curriculum can then be planned and implemented.

SOURCES OF AIMS

THOSE WHO HAVE NOT THOUGHT DEEPLY about problems of education often become impatient with any discussion of aims. They are apt to break in with the statement that the schools have a single aim and that is the transmission of learning. Although the statement is true to the extent that the transmission of learning is the chief aim of the school, like all oversimplifications, the statement leaves much more to be discussed.

Among other things, the problems of selection are left unexplored by such a statement. Throughout the ages there has been

such a steady expansion of learning that no single personality is able to contain all of it. We must therefore divide areas of learning among specialists and rely upon their knowledge and understanding. This division can be left to a combination of chance and individual initiative, but here as elsewhere on the educational scene, a rational, orderly approach which yet leaves a reasonable area of freedom to the individual seems desirable. From this point of view, selection refers to the selection of individuals for training as specialists. What kind of people shall we choose as doctors, teachers, lawyers, accountants, and so on and how shall we educate them? Because society generally will be asked to foot the bill for much of the preparation required, it seems that those entrusted with curriculum planning at one level or another have at least part of the responsibility for selecting those who will best profit from the preparation thus provided. At one time, the education of a physician was thought to be expensive in comparison with the education of other specialists. The training of a jet fighter pilot, however, takes nearly a quarter of a million dollars. By way of comparison, a year in elementary school for an individual student costs approximately $250, a year in high school nearly twice as much, and a year in college or university nearly ten times as much. A thousand elementary school children can go to school for a year for what it costs to train one jet fighter pilot.

Problems of selection can be discussed from a different point of view. If a society is to display cohesion, all the members of that society must share certain learning in common. But what is this common learning? And surely some degree of variation is to be permitted here as between one individual and another. A boy can be quite taken with the theories and concepts of science and yet have no thought of becoming a scientist. A girl can be thrilled with the study of language, and yet place a future as wife and mother far higher in her scale of values than a future as a language scholar.

From still a third basis for analysis, selection can mean choices of subject matter for elementary, secondary, and higher education. Most of the subjects taught in schools at one level or another display an inner logic. To a great extent, subsequent learning must be based on other learning that is antecedent to it. More importantly, there are some things elementary children can understand and like, and

equally there are other things they will be able to understand and like only when they mature.

Thus we see that while the proposition that schools exist for the purpose of transmitting learning has the merit of brevity, it is by no means a simple proposition and is in need of much analysis if it is to be of value to teachers seeking wise curriculum choices. Before a selection is made of either the ones to be educated, or the media used to produce the education, an examination of the aims of education seems to be in order.

To inquire thoroughly into the purposes of education is to inquire into the purposes of life itself. It is beyond the scope of this book to sustain such an inquiry in all its ramifications. Nevertheless, the sources of the purposes or aims of education will be marked out and guidelines will be established for further progress in this direction by local groups of teachers and citizens as they develop a suitable curriculum for the schools of their community.

SOCIETY AS A SOURCE OF AIMS

SCHOOLS ARE ESTABLISHED in order that a society can perpetuate itself. In all past civilizations that have flourished and decayed, as in many contemporary societies, control was in the hands of comparatively few individuals. Not all Americans share equally in the control of modern American society, but the value placed on every human life is steadily increasing and more and more the schools are becoming schools for all the children of all the people.

The primary source of aims for the school is the society that the school is created to serve. In part, those responsible for the curriculum must do their best to seek an expression of the will of society. They must search for effective and appropriate procedures to formulate that will, and theirs is, in part, the responsibility of delineating consequences that may be anticipated from the nature and purposes of the society.

In the United States of America in the mid-twentieth century, an expression of the will of the people is not easily heard. Until now, the assumption has been taken that a very large number of administrative units, each with a high degree of autonomy, permits the clearest expression of the people's will. The loudest and

clearest of expressions is but empty sound unless the resources, financial and otherwise, are available to put into operation an educational system in accord with those expressions. Hence, we note in recent years a tendency for more and more of the cost of education to be borne by larger and larger governmental units, first the county, then the state, and to some extent the federal government. In California, for example, half the cost of education is paid for by the state treasury. Vigorous attempts have been made to resist the intrusion of state control along with the state money. However, unless building plans are approved by the state, no money for building is forthcoming. Most of the textbooks for use in elementary schools are printed by the state, and the state publishes an approved list of textbooks for use in high schools. There is now a separate state board which is responsible for the system of state colleges, a system which serves as many students as do the numerous campuses of the state university. Although the state university is controlled by an autonomous Board of Regents, a large proportion of the funds needed must be voted by the state legislature. This same legislature has passed so many laws concerning education that these laws have been collected and published separately in a volume inches thick known as the Education Code. A number of these laws deal specifically with the curriculum. Others state the minimum number of days that schools must be in operation each year, and the minimum length of time a school must be open each day if state funds are to be supplied on the basis of daily attendance. Salaries of county superintendents are set by state law, as is the amount of the county service fund, a special fund supplied by the state to the counties for the supervision of rural education. Teacher certification is largely controlled by the state, or by state-appointed groups. Presumably the will of the people is heard through all of this. But, in general, the larger the administrative unit, the more remote is the influence of a purely local group.

Recently we have witnessed the sorry spectacle of the government of the state of Arkansas fighting a section of the federal government on the matter of school integration. What is the will of the people, and which are the people? Did this mean that the people of the state of Arkansas were overwhelmingly in favor of separate and inferior schools for Negro children, or did it mean they were

overwhelmingly opposed to the intrusion of a larger governmental unit in what they regarded as strictly their own affair? What is the voice of the people? What are they saying?

Whatever the merits or demerits of the Arkansas governor's actions, these actions certainly lowered American prestige in foreign countries, many of whose citizens have dark skins. In a cold war, a measure of prestige is to a large extent a measure of safety. The curriculum-maker has accepted the responsibility of serving faithfully the society that has appointed him. Where does he throw whatever influence he possesses as he tries his best to live up to his responsibility?

Some people in a community talk louder than others. Is this the voice of the people? A few years ago, the Los Angeles School Board, in response to what it thought to be an expression of the will of the community, placed a ban on any discussion of the United Nations in the classrooms under its jurisdiction. After much noisy argument which got nowhere, the California Teachers Association authorized a door-to-door canvass of adult opinion. A majority of the citizens said they were in favor of a discussion of the United Nations, so the ban was lifted.

Some people in a community are listened to with greater respect than others. Where this respect has been won through diligence in the study of educational problems, school people should probably join the audience. Where the respect has been won by achievement in other fields, teachers should be ready to examine statements from these individuals about the schools with the utmost care.

Although class distinctions are emphasized less in American society than in many other societies, sociologists of the Warner and Hollingshead school have pointed out that class distinctions do exist. Those sociologists who reject the theory of class accept the fact that there are differences in power and status among American citizens, a fact which most of us would accept on the basis of common experience. Groups with different status, or from different classes, are not always unanimous in their educational opinions. According to Hollingshead [7] people of the middle class place the

[7] A. B. Hollingshead, *Elmtown's Youth,* John Wiley & Sons, Inc., New York, 1949.

greatest faith in public education, believing it to be the key to upward social mobility for them. People in the lowest class feel that it is no use sending their children to school for they will fail to pass anyway, and upper-class people are sometimes opposed to public financing of free education for all. Even where people of approximately equal status agree concerning the desirability of education for their children, differences of opinion over the curriculum can occur—practical subjects versus college preparatory subjects, for example.

With such great diversity of American opinion over education, haphazard methods of using the community as a source of educational aims can be most misleading. A method which is quite popular at the present time is the use of a large representative citizen's committee. For this committee, eighteen or twenty citizens are appointed by the school board, in consultation with teacher groups, and these citizens, as widely representative of community as possible, hold a series of regular meetings with teachers, administrators, and other school personnel, over a period of several months or even years.

A school board, or a superintendent, with an axe to grind, may find the temptation to pack this group with friends and supporters well-nigh irresistible. This tactic will merely make trouble later. The disgruntled opposition will be even more recalcitrant and will now be armed with a very strong weapon for propaganda.

Once the citizen's committee has been chosen, by far the best initial procedure is to help its members find out as many facts about the schools as they are able, by studying test results, by listening to teachers describe their courses, by hearing from counselors of their own activities, by visiting the schools, and by attending classes. Collection of the data and summarization of the data can well constitute the work of the first year. Once this learning has been achieved, subsequent discussion will at least be based on fact rather than fancy.

All of the foregoing seems to indicate that educational practices must follow expressions of opinion from the community and that school people have little or no responsibility to lead opinion in any given direction. This is a touchy point. During the depression of the thirties when events seemed so very hopeless, a number of

educational theorists came out boldly with blueprints for social change. "Dare the schools build a new social order?" was perhaps one of the most honest and forthright titles. Since that time, the general feeling among educational theorists has been that such out-and-out attempts at social planning by educators alone are completely out of place. Nevertheless, because schoolteachers generally represent within themselves such a unique combination of social theory and social practice, their special skills should be available to the public forum. That is to say, teachers have the right, and the responsibility, to say, as private citizens, what social, legislative, political, and economic modifications seem to them to be appropriate.

However, and this is most important, the right to thump the tub for an idea not yet generally approved does not extend to the classroom. Here, the emphasis must always be on teaching children *how* to think about unsolved problems and not *what* to think. Teachers have the responsibility of pointing out flaws in the logic of their pupils, of indicating their unstated premises, or suggesting other alternatives, and of pointing out the consequences of alternatives. But they must be extremely careful to let the children reach their own conclusions. More than this, they should permit plenty of discussion in the classroom and they should make scrupulously sure their pupils hear more than one side of an argument.

A number of principles can, however, be stated for the guidance of teachers who wish to use society as a source of aims:

1. Curricular modifications should be made only in response to lay educational opinions that are widely held. Rules and regulations inserted from time to time by pressure groups should be resisted with all possible vigor.
2. Suggestions for curricular modifications should be examined carefully for their effect upon children from all social and economic groups.
3. Teachers must learn not to be disturbed by irresponsible criticism. Thoughtful statements based on well-known facts are worth studying and answering. Statements that are obvious examples of special pleading are best ignored.
4. Citizen's committees, regularly appointed, form one of the safest and widest bridges between the school and its com-

munity. Fact-finding should be the initial activity of a newly appointed citizen's group.

5. Schoolteachers and other school personnel have a responsibility to voice their opinions concerning needed social change, but only outside the classroom. Inside the classroom they must stick to objectively established facts so far as possible, although discussion of matters of opinion is in order so long as the teacher is careful not to influence the children in the direction of a minority opinion which he happens to hold.

Chiefly the emphasis must be upon operative procedures. How does one go about solving this problem? What are the facts to be considered? What are the alternatives and what are the consequences? The applications of value judgments must be a joint enterprise of all who are involved.

INDIVIDUALS AS A SOURCE OF AIMS

To SOME PEOPLE, the notion of personal integration is suitable to summarize the aims and purposes of education. Certainly, the concept can be fruitful. For one thing, it calls attention to the basic conflict between an individual and the society of which he forms a part. All seem desirous of freedom to create and otherwise to express themselves as individuals, yet the requirements of mutual support by the members of a group place restrictions upon individual freedom.

Teachers, as they plan their part in the educational process, must be ready to work with youngsters in all stages between conformity and nonconformity. If they are humane, if they love their fellow-man, they will help children to be as free as possible. As they do, they will be confronted over and over with the age-old dilemma. Only knowledge can make a man truly free, and to acquire knowledge he must, for the time at least, surrender part of his freedom and accept the discipline of learning. This dilemma is best met by allowing the subject matter to impose its own discipline. To do so means that the child's wish to learn, his interest in the subject, must be fostered and maintained. The teacher who is constantly getting his own personality, pleasantly or unpleasantly, between the learner and his studies is performing a disservice to the child. He is a task-

master, not a teacher; benevolent perhaps, but still a taskmaster. Sooner or later, the pupil must learn to love learning, not the teacher. Of course, if he hates the teacher, he is likely to hate the subject, though this is not invariably true.

The foregoing sets the stage for a discussion of individuals—teachers and students—as sources of aims of education.

Teachers

Educational plans which fail to consider the individual characteristics of teachers are doomed to failure.

No teacher can develop pupil interest in a subject unless he himself is interested. At the present time, many elementary schoolteachers have had an unpleasant experience with arithmetic. They manage the routine facts of addition, subtraction, multiplication, and division without much difficulty, but percentage troubles them, and word problems about rotating gears drive them to a nail-biting frenzy. Obviously, these facts must be considered prior to the introduction of any plan to improve the teaching of arithmetic in the elementary schools. Along the same line lies most of the force behind the argument in favor of having each high school subject taught by a specialist in that subject. By inclination and by training, the majority of secondary schoolteachers are able to develop an interest in only one or two subject-matter areas. This acceptance of specialism on the part of the teacher is even more imperative at the college and university level. For example, courses in general science and combined courses in social studies and English sound extremely logical, but before attempts are made to introduce such general-education courses in secondary school and college, the teachers must be found who are willing and able to teach these courses.

Like all other workers in the community, teachers need to feel that the service they perform is of value. Teaching is notoriously difficult to evaluate. Some children realize fully their possibilities; others fail to do so. The reasons are difficult to trace, for environmental influences are complex and the seeds of good teaching may be expected to bear fruit years and sometimes decades later.

Built-in devices for the evaluation of teaching and learning must be constructed when the curriculum itself is planned, and teachers, singly and in groups, must share heavily in the construc-

tion of these devices. Opportunities for follow-up studies are most important and time for them must be provided. Where such studies are performed exclusively by administrators and guidance personnel, the effect of the findings on the curriculum is negligible.

Evaluation of teaching is prodigal in the consumption of time and energy. Teachers should be provided with opportunities to observe one another if they wish it. Classroom supervision by administrators, coordinators, and supervisors can be examined carefully to ensure that these age-old devices have a positive effect on teacher morale. Perhaps the administratively convenient teacher-rating devices need to be jettisoned and replaced with methods calculated to preserve the dignity of the teacher.

Few facts are known with scientific certainty about teachers and teaching. We do know that three-quarters of the members of the teaching profession are women. In elementary schools over nine-tenths are women. Half the secondary teachers and a quarter of the college and university instructors are women. The figure in higher education would be lower were there not a fairly large proportion of independent colleges and universities that enroll only women students.

The excessive number of women teachers is unfortunate for several reasons, none of which has anything to do with the relative competence of men and women as teachers.

First, our culture generally still reserves nearly all its leading positions for men. There has never been a woman President, there are only one or two women among a hundred lawyers, one woman among twenty doctors, few females holding important publishing positions, and so on. To some extent, women are afforded the leading role in the home and the family, but it probably takes a truly exceptional woman to influence her husband's business and professional decisions in the matriarchal fashion that is sometimes fictionally depicted. Teaching could thus be one of the leading professions for women and some of our most outstanding women are teachers, but by that very fact, teaching becomes an inferior profession for men. Although most men teachers are desirous of staying in the field of education, they usually strive to become either administrators or teachers at the college and university level, two kinds of educational work in which there are far more men than women.

There are probably several reasons why more women are not credited with outstanding success in the teaching profession. First, the majority of young women teachers look forward to becoming homemakers and fail to register the enthusiasm for teaching and the singleness of purpose that is necessary for an outstanding contribution. Second, teaching success is notoriously difficult to measure, and promotion to an administrative position is most unusual for women. Third, even those women who wish to spend their lives teaching will probably find themselves moving from place to place with their husbands, or to follow other relatives.

Much has been written concerning the conformity-nonconformity patterns of teacher behavior. Those school boards and administrators more interested in a smooth-running school than in the education of boys and girls usually expect teachers to conform to community attitudes with respect to controversial issues. Unless the teachers in a community are permitted and encouraged to adopt opinions concerning controversial issues that seem right to them, allegiance to the principles of democracy is open to serious question.

The abstract concept just presented is made vivid by an illustration from the current controversy concerning integration of schools in certain states. Scientific evidence is available to show clearly that separate schools for Negro children mean inferior schools for Negro children. Preferential treatment for the children of a particular race is not to be tolerated under the principles and political institutions of this country. Hence, we should expect a strong segment of teacher opinion in all states to be in favor of the desegregation of schools. At least, some expression of opinion in favor of desegregation should be sounded in schools where segregation is in effect, if teachers are to display the kind of leadership that is expected of them. Teachers in segregated areas where local opinion is strongly in favor of segregation have not spoken out, singly or in groups, and the conclusion must be reached that, torn between national and local norms of behavior, they have, for one reason or another, decided erroneously in favor of the local norms.

When teachers are considered as a source of aims for the schools, decisions cannot be reached either by paying attention exclusively to the current behavior of teachers, nor yet by considering society at one time and teachers at another. All the sources of the aims of education in a free society must be considered in rela-

tion to the alternatives that are open if the conclusions reached are to be as satisfactory as possible.

Students

A third source of aims of American education is the children in the schools. If this source is to be adequately utilized, we must find out all we possibly can about children and youth, especially the way they learn.

The best-known fact of psychology is the fact of individual differences. The major differences so far identified include: intelligence, home background, physical characteristics, physical and mental health, attitudes, level of aspiration, school achievement, vocational choice, educational choice, interests, bodily skills, and self-perceptions. All the traits and characteristics included in the foregoing have been quantified and measured. Although the pattern of variation may be somewhat in doubt as a result of the mathematical peculiarities of the statistics used, the fact that variation does occur with respect to these characteristics has been established beyond a shadow of a doubt. Other differences, as in religions and in other values held, are known to occur, but such differences, as well as the historically observed differences in moral character, are less easily quantified and therefore less easily treated in a scientific manner.

Attempts to define intelligence among school children have run into serious difficulty. Arguments concerning such a definition usually end with an agreement to define this illusive term by the various measuring instruments themselves. Intelligence thus becomes whatever it is that intelligence tests measure. Only to the extent that we know what it is that the tests measure can we know anything about intelligence. Because the items of an intelligence test are usually checked and analyzed with the help of teacher grades as an external criterion, it would seem that the intelligence test is in reality a measure of long-term achievement. As such it should be regarded only as a measure of *past* achievement, and predictions based on its use therefore ignore the possibility of more effective teaching in the future. An overemphasis on the results of intelligence tests, leaving aside the present unreliability of these instruments, may actually be harmful, in that attention is drawn toward what is, rather than toward what might be. Obviously the

child cannot go back and do it over again. However, an insistence that he be compelled to continue doing only what he has done in the past is not creative but purely obstructionist. It would seem that the separation of children according to past performance is hazardous, to say the least, for it too may operate in the direction of perpetuating such inferiorities in academic achievement as already exist. However, results reported in a monograph by Schmidt [8] on the elevation of the I.Q. among children of low intelligence show that change may be possible when the teaching methods are directed toward this end.

A number of researchers have been able to demonstrate an association between socioeconomic level and I.Q. One method of interpreting such results is to assume that those with the highest intelligence rise naturally to the top of the society in which they find themselves, that they have more intelligent children than other people, and that adjustment to the variations in intelligence that occur with succeeding generations will take place automatically in this best of all possible social arrangements. This interpretation places a greater emphasis on heredity than most psychologists are willing to permit, as well as showing a touching faith in the equality of educational opportunity in this country. (Most pertinent is the Klineberg study [9] showing the change in I.Q. when Negroes move north.) It also expresses the typical middle-class belief that educational success is the cause of socioeconomic success. This belief is not held by people from the lower classes. Perhaps their cynicism is warranted by their experience. Despite the known high correlation between educational success and socioeconomic success, it is quite possible to assume that the socioeconomic success is the cause of the educational success—more books, records, and conversation within the family circle, a place to get off by themselves, money for travel, and chiefly a favorable set of attitudes toward success in school. All this is quite apart from the possibility that favorable contacts made in and through the school carry over and assist in later adult life.

[8] Bernadine G. Schmidt, "Changes in Personal, Social, and Intellectual Behavior of Children Originally Classified as Feebleminded," *Psychological Monographs*, Vol. 60, No. 5, 1946, p. 144.

[9] Otto Klineberg, "Cultural Factors in Intelligence Test Performance," *Journal of Negro Education*, Vol. 3, July, 1934, pp. 478–83.

The schools probably adjust best to differences in the physical characteristics of children, including sex, height, weight, maturity, bodily type, color of skin and hair, state of bodily health, strength, agility, and so on, all of which are properly recorded, usually by the nurse, the doctor, or members of the physical education department. Although these data are recorded with the utmost care and diligence, they are still not being used by teachers as extensively as they might be, largely because teachers are not trained to use them.

The most important psychological need of human beings is to remain unified and integrated personalities. Although his special subject may well be uppermost in the mind of the high school teacher, the varying personalities of students cannot be ignored. Suppose, for example, that certain changes become apparent in some of the ninth-grade boys: their voices are lower, their shoulders are broader, and they are demonstrating an interest in girls. The teacher can use the natural excitement of this period to arouse an interest in fine literature, much of which deals with the theme of romantic love, or the teacher can ignore the needs of this group, leaving them to gravitate toward reading which may add to the excitement while doing nothing to increase the understanding of the reader, or his appreciation of beauty.

The idea of "attitudes" has long been used to categorize an orientation toward the environment that characterizes individual behavior. Memory, imagination, and the nature of language itself demand that general principles be abstracted regarding the structure of the physical and social environment. No matter how complex the phenomena that are dealt with, these general principles must be more or less simplified if the individual is to think about phenomena. Hence, experientially, a pattern of attitudes arises. Over the years, attitudes can become relatively fixed and laden with value. These are developed into a more or less coherent system which sometimes consciously and rationally, and sometimes unconsciously, helps to guide personal behavior. Because the possible combination of genetic influences and of experience is so enormously varied, the value system of each individual is unique. It prescribes behavior which the individual feels he ought to carry out. The extent to which he does so is a measure of his self-control.

In our democratic society it must also be considered in any judgment of his morality.

Discrepancies between actual behavior and behavior prescribed by the value system of the individual are the source of guilt feelings. Such discrepancies may arise in a number of ways: through weakness of the individual, through the careless adoption of a system of values that is not well thought out and that because of its inconsistencies leads the person to the brink of one dilemma after another, and, sometimes, through the adoption of a system of values that imposes impossibly high standards, standards so out of touch with psychological realities that the human being concerned could not possibly live up to them. Such standards place an unfair burden on the human spirit.

Attitudes are learned, and they are derived from many sources, all of them social. No man is an island. He must learn from his parents, his teachers, and the rest of his fellow-men. Paradoxically, the better he learns from others, the greater becomes the possibility of his being able to stand alone.

Values held not only provide the individual with means to censor action, they also compel action, for there are sins of omission as well as of commission.

Children come to school with a fairly complete set of values derived from home and community. Very few of them would murder or steal, and most would find it difficult to lie or cheat. Even here there are differences. Most American children extol courage and bravery in others, but themselves demonstrate conduct that ranges from abject cowardice to heroism. Attitudes toward sex vary from class to class and from individual to individual within the class.

A few children come to school filled with warm understanding of their fellows and with delicate control of their own actions. Personalities of such radiance are unfortunately as rare as they are desirable.

Attitudes that develop into values such as those described must be considered by the teacher in the public schools; but in most cases he will be able to make only minor alterations and additions to an existing structure. Basic personality changes call for more time than the average teacher can spend with a given child, to say noth-

ing of the consummate skill required, as well as far more emotional involvement than can be expected from the relationships permitted in a typical classroom.

Teachers should show more concern than they do in regard to attitudes toward learning. At the present time, most of them seem willing to select children with a recognizable set of academically respectable attitudes and to reject the others as school failures. Doing so, teachers ignore their most important role in the development of human potentiality. Transmission of learning is important, but more important and far more difficult is the transmission of a love of learning. The relations of attitudes to academic success will be considered more fully in a later chapter.

Far more remains to be said on the subject of individual differences among learners. For example, children come from homes differing widely in socioeconomic status, and the influence of social class upon learning has been pointed out. Other influences have been traced to race and to creed. According to the widely stated belief in the United States of equal educational opportunity for all, the schools should be so managed as to meet these differences and provide for them so far as this is possible.

But perhaps enough has been said to illustrate the extent of these differences and to stress the fact that the curriculum-maker and the teacher who makes use of the curriculum to educate children must take these differences into consideration. The discussion of the characteristics of the learner as a source of educational aims will end with a brief look at a few of the principles of learning.

One of the most widely accepted principles of learning, both practically and theoretically is that practice or drill must accompany learning. Recent investigations have shown that this principle can occasionally mislead through its lack of specificity. Blind repetition, that is, repetition without any attempt on the part of the learner to form fresh associations, does not result in learning. This fact has led numerous investigators, especially Brownell [10] and Buswell,[11] to insist on the need for understanding. The facts to be

[10] William A. Brownell, "The Place of Meaning in the Teaching of Arithmetic," *Elementary School Journal*, XLVII, Jan., 1947, pp. 257–58.

[11] Guy F. Buswell, "The Psychology of Learning in Relation to the Teaching of Arithmetic," *The Teaching of Arithmetic*, Fiftieth Yearbook, Part II. (Bloomington, Ill.: National Society for the Study of Education, 1951), pp. 143–54.

learned must have meaning for the learner, that is to say, they must be such that he is able to form associations, if he is to remember these facts. It is certainly true that, once the associations are formed, practice or drill which calls attention to these associations strengthens the learning and may eventually cause it to be permanent for all practical purposes. Further, Rock [12] has pointed out that mental associations are formed instantly. The reason that long lists of facts are not learned instantly is because there are too many facts for the learner to make the needed associations about all of them.

Ebbinghaus showed, half a century ago, that when too much is tried at one time, the learning may be inefficient because of interference. A series of investigations since his time have established the soundness of this principle. For one reason or another, this principle has influenced practice in the schools far less than the principle of repetition. It may be that neither "law of learning" has influenced school practice and that the reason teachers drill their pupils is that they have done so since schools first began. The law of interference (sometimes called the law of retroactive inhibition) tells us that rote learning is most efficient when it is divided into relatively small units. Even when the units are kept small, similar kinds of material will interfere if they are allowed to follow one another too closely.

A principle that seems at odds with that of inhibition is the principle of learning by wholes, the Gestalt principle. In the thirties, this principle had a marked effect on educational practice, especially in the progressive schools. According to this principle, man, and presumably the lesser anthropoids, experience a drive toward completing things. If one sees two sides of a triangle, there is an almost irresistible impulse to draw a third side. If a circle is complete except for a small arc, the observer experiences an urge to complete the circle. When the three principles of learning so far mentioned, repetition, interference, and learning by wholes, are applied to the learning of a poem, the following procedure seems most sound psychologically. The child needs to read through and understand the entire poem so that he can see it whole and therefore appreciate it

[12] Irvin Rock, "Repetition and Learning," *Scientific American*, Vol. 199, No. 2, Aug., 1958, pp. 68–72.

artistically. Memorization is probably best carried out in parts sufficiently small for him to be able to make the needed association. Once the associations have been made in this way, the child should continue to go over the poem a number of times after he is apparently letter-perfect.

The foregoing points up the need to distinguish between at least two kinds of learning. One is the kind of learning that is achieved when insight or understanding has been accomplished. For example, we can read a novel once and then tell someone else the story in our own words. Or we can listen to an explanation of Newton's second law of motion once and, if our understanding has been reasonably complete, we can explain the law to someone else—perhaps better than it has been explained to us if we know how to help our listener make the needed associations. In reading the novel, and in understanding the law, we have noted a certain pattern, observed certain relationships, and because the pattern and the relationships have been tied to our former experience, recall of the Gestalt is not difficult. If we wished to repeat passages of the novel, word for word, or if we wished to use Newton's law to solve an acceleration problem without having to think through which units to use, and which formula to substitute into, a different kind of learning would be called for which some would refer to as rote learning. Most school subjects demand both kinds of learning, and life experiences call for both kinds also. Some subjects require that the learner pay more attention to understanding than to rote memorization. In other subjects, the reverse is true. The subject of physics places a heavy emphasis upon understanding. On the other hand, the learning of a foreign language places a stronger emphasis upon precise memorization. This is not to say that a study of physics requires no memorization or that a study of languages requires no understanding. The physics student must memorize a number of details, and the language student must, if he is to become proficient, understand the structure of the language.

Other categories of learning can be added. The acquisition of a bodily skill—dodging, throwing a ball, aiming a rifle, swimming, or playing an instrument—calls for learning that is distinct from either the memorization of the names of the days of the week, or the understanding of the principle of ionization. Here, a mastery

of the body must accompany the insight and the remembering. Attitudes can be learned, and this is the most complex, the most difficult, and the most important learning of all, for not only must we understand, remember, and increase our self-control, but also we must rework the very nature of our being, the manner in which our personalities are organized, so that experiences hitherto unknown can now be satisfying, and former experiences can become satisfying in a new and different way. Attitudes can be learned or acquired consciously, or unconsciously. It is when we consciously set out to acquire an attitude that we demonstrate our most distinctively human qualities. Teachers probably influence the learning of attitudes on the part of their pupils far more than they realize. To get a hint of understanding in this direction, we must consider still another principle of learning.

An ancient and widely accepted principle of learning is the principle of reinforcement. Adults have been rewarding and punishing children since the beginning of time and they will probably continue to do so. The advantages of rewards over punishments are sometimes proclaimed loudly, depending on the current popularity of one or another school of child-rearing. Again, because of the difficulty of measuring the teacher-learning process with any high degree of objectivity, the results of empirical investigation are ambiguous. For a time, when progressive education was most popular, the rewarding of children was loudly extolled, and the punishment of children correspondingly deprecated. If the purpose of education is to mold children to become like present-day adults, that is, to equip them with approximately the same general attitudes, the administration of rewards and punishments by adults to children makes sense. If the purpose of education is to increase the rationality of human beings, the administration of rewards and punishments by adults makes little sense, and this goes for grades, promotions, scholarships, standing in the corner, whipping, candy bars, money, block letters, and all the thousand and one other devices that human beings have invented to register approval or disapproval. If a teacher seriously wishes to bring a child into a direct relationship with a body of subject matter, the rewards must be limited to the satisfactions derived from the mastery of the subject matter, and the

punishments limited to the withholding of these satisfactions as a result on the pupil's part of a lack of concentration, a rejection of discipline, or uncritical thinking. If a teacher wishes to go even further, and bring the child into a direct relationship with life itself, the rewards and punishments must derive from the situation itself, always assuming that the teacher or some other adult is ready to step in if needed for the protection of the child from the consequences of his actions. In the determination of when to step in, and when to let the chips continue falling, lies the difference between the extremes of coddling and neglect. Some believe that the teacher is a trespasser in the realm of direct experience and that he had better, providing the child can bring the experience needed to provide meaning, confine the activities of his pupils to those which are vicarious. That is to say, the purpose of the schools may be only to talk about life, and to read about it, confining direct experience to that needed to illuminate the reading and discussion with meaning for the child. An individual teacher who attempts to set his own private limits on the extent of direct experience the pupils in his care are to enjoy is exceeding his jurisdiction, for the problem had best be solved by a number of the adults associated with a particular school district.

SCHOOLS AS A SOURCE OF AIMS

THE ROLE OF THE SCHOOL in implementing the aims of education can readily be determined from numerous available histories on education. A review of such histories will reveal that schools are ancient institutions with so much inertia that the hand of tradition is not easily dislodged. Even where the leadership in a school is dynamic and willing to change, there are many difficult problems of continuity, sequence, and provision for individual differences that must be solved. These problems must be solved not only if the schools are to provide any kind of social leadership, but also if they are to continue their function of providing citizens with the resources needed to cope with social changes produced by the technological inventions accompanying new discoveries in the physical sciences.

A review of the development of many of the better schools will reveal their part in identifying and implementing the aims of the society in which they operate.

SUMMARY

ON THE ASSUMPTION that curriculum-makers must first decide what the schools are for before they can plan an educational program, we have shown that the aims and purposes of the school can be decided only after careful study of at least four sources:

1. The society in which the school is provided,
2. The teachers engaged to staff the schools,
3. The students who go to the schools, and
4. The schools themselves.

Only when the demands of all four of these sources of aims of education are resolutely considered in a particular community will there by any possibility of establishing a consistent and logical set of aims for education in that community.

EXERCISES

1. Fix the exact cost of sending pupils and students to various institutions for their education.

2. Write down, without the help of any written material on the subject, a list of purposes you think should be accomplished by elementary, secondary school, or college, depending on where your interests lie.

3. So far as society generally is concerned, what is the basic purpose of the schools?

4. Find out what proportion of school costs is paid for by state funds in your particular locality.

5. What is the extent of state control of education in the place where you live?

6. Choose some controversial topic and set up plans to determine community opinion on it.

7. Examine carefully a recent criticism of education. Is it consistent? Does it make use of such objectively determined data as are available?

8. Average scores on I.Q. tests are not the same for children of working-class parents as they are for children of parents in the professional and managerial classes. What are the possible reasons?

9. Read the Klineberg study of the changes in I.Q. effected when Negro children move north. Discuss the findings.

10. Investigate to see whether or not there is a citizen's committee for education working in your community. If there is, find out how the members of the committee were selected.

11. Describe a teacher you have known who can best be described as a "benevolent despot." List the benefits this teacher may have provided you. Can any harm have derived from your contact with this teacher?

12. How are the teachers in any given school evaluated for tenure, pay raises, retention, and so on? Visit a school and ask someone about this.

13. Try to find out how much time a certain teacher spends on nonteaching tasks. You might ask a friend or relative to keep a diary, or you might follow a teacher around for a day, or for part of a day.

14. What are the requirements for a teaching certificate in your state? How wide a variation in competence is possible within these limits?

15. Think of one of your own best teachers. Try to recall and describe elements of his or her personality. What, to you as a pupil, was the most important of these characteristics?

16. What statistic is most widely used to express the range of a measured variable? How is this statistic calculated?

17. How might a teacher make use of physical characteristics of children as recorded by a nurse or doctor?

18. How can the teacher take the law of retroactive inhibition into consideration?

19. Try to recall an attitude, say a taste for symphonic music, that developed fairly late in your life, and attempt to relive the formation of this attitude. Do you think that you are as

keen on this material as one of your friends who seems to have acquired the taste much earlier in life?

20. Write an essay on the school itself as a source of educational aims.

TOPICS FOR DISCUSSION

1. A student should be free to choose his vocation.
2. A philosophy of education.
3. All citizens ought to have a say in what the schools should attempt to do.
4. Federal support of education.
5. High school districts with fewer than one hundred graduating students per year should be merged with other districts.
6. Resistance to enforced integration of schools by certain of the southern states.
7. Teaching about UNESCO in the schools.
8. Statements about education that have been made recently by prominent citizens.
9. Does class structure affect educational opportunity in America?
10. The advantages and disadvantages of a committee of lay citizens concerned with problems of education.
11. Should the teacher let the pupils know the nature of his political choices?
12. Education for all.
13. Teachers should understand children and love the subject they teach.
14. The importance of teacher morale.
15. Adequate use of the potentialities of women in our culture.
16. Evaluation of teacher competence.
17. Characteristics of a teacher.
18. Women are more conforming than men.
19. To what extent should teachers take a stand on political matters?
20. The relationship of measured I.Q. to socioeconomic status.

21. The extent to which a person lives up to his own standards must be the sole measure of personal morality in a democratic society.

22. Value systems held by a given individual are fixed fairly early in life and once fixed they are nearly impossible to change.

23. The single comprehensive high school is the only method we can ever hope to use in order to provide an equal educational opportunity for all.

24. Field trips by third-graders to such community centers as the fire station and the post office are worth while and should continue to be conducted under teacher supervision.

25. Details of a philosophy of education can be worked out only in a local situation.

ADDITIONAL READING

Alexander, William, and Saylor, J. Galen, MODERN SECONDARY EDUCATION: BASIC PRINCIPLES AND PRACTICES (New York: Rinehart & Company, Inc., 1959). *A popular textbook that is an excellent general reference to the work of the American secondary schools.*

Brackenbury, Robert L., GETTING DOWN TO CASES: A PROBLEMS APPROACH TO EDUCATIONAL PHILOSOPHIZING (New York: G. P. Putnam's Sons, 1959). *Crucial issues in education are presented along with alternative solutions. The philosophical point of view of each alternative is then presented.*

Bush, Robert Nelson, THE TEACHER-PUPIL RELATIONSHIP (New York: Prentice-Hall, Inc., 1954). *Bush accepts the basic premise that there is a wide variation in the goals that are acceptable to different teachers. Pupils and teachers will get along best when they share goals. The evaluation of teaching should be in the light of the teacher's goals.*

Cantor, Nathaniel, DYNAMICS OF LEARNING (New York: Foster and Stewart, 1946). *One of the most vivid of the psychology texts, because much of the text consists of transcripts of class discussions. The book is a vigorous assault on the view of education as the accumulation of credits.*

Cole, Luella, PSYCHOLOGY OF ADOLESCENCE (New York: Rinehart & Company, Inc., 1948). *One of the older textbooks on the subject, but highly authoritative.*

Dewey, John, DEMOCRACY AND EDUCATION (New York: The Macmillan Company, 1916). *The most popular of the educational discussions of John Dewey. In it are summarized most of Dewey's basic ideas about education.*

Hall, Calvin S., and Lindzey, Gardner, THEORIES OF PERSONALITY (New York: John Wiley & Sons, Inc., 1957). *Most of the leading theories of personality are summarized, including those of Freud and of Lewin. The writing is clear and accurate.*

Havighurst, R., and Taba, Hilda, ADOLESCENT CHARACTER AND PERSONALITY (New York: John Wiley & Sons, Inc., 1949). *The senior author is best known for his statements regarding the developmental tasks of youth. These are the tasks that beset the pathway of the adolescent as he matures.*

Klineberg, Otto, "Scientific Basis for Intergroup Education," HARVARD EDUCATIONAL REVIEW, 15 (March 1945), pp. 117–21. *This study shows the rise in the I.Q. of Negro children as they move from southern to northern schools.*

Lieberman, Myron, EDUCATION AS A PROFESSION (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1956). *Not only are there plenty of data concerning the teachers, but also many data which help to explain teacher behavior and the status of teaching.*

Lindzey, Gardner (ed.), HANDBOOK OF SOCIAL PSYCHOLOGY, Vol. II, Special Fields and Applications (Cambridge, Mass.: Addison-Wesley Publishing Company, 1954). *In Chapter 16, "Social Motivation," Gardner Murphy reviews various points of view on motivation and presents a theory of his own. He concludes that all behavior seems motivated and that motives are attached through learning to special objects and integrated into complex patterns of social development. He believes that social motives are related to the need to enhance and defend oneself.*

National Society for the Study of Education, MODERN PHILOSOPHIES AND EDUCATION, the Fifty-fourth Yearbook of the Society (Chicago: University of Chicago Press, 1955). *Philosophers and educationists have combined to produce a volume that is authoritative, yet fairly easy to understand.*

CHAPTER 3

Aims: Schools and Survival

EDUCATION AND SAFETY

RECENT INTERNATIONAL DEVELOPMENTS have emphasized the importance of education. The conviction seems to be growing that survival depends on education. However, in the minds of some people, this is primarily education in mathematics and the physical sciences for the academically talented. Hence, the current flurry of interest may or may not assist progress toward the long-range goals of education. There are some friends of education who think that any help is good no matter why or how it is given. Others fear that well-meaning but short-sighted assistance will only prove harmful in the long run.

DANGERS IN OVERSPECIALIZATION

IT MAY PROVE INTERESTING to compare the viewpoints of those concerned chiefly with national safety and those who have in mind additional educational aims. Those citizens who favor a heavy emphasis in the schools upon the forced development of our

cleverest children in mathematics and the physical sciences advocate the education of these children by specialists in separate schools. Education of the other children is to go on as before, but the selecting and the pushing of bright children is to begin early in the elementary grades. Intelligence tests are to screen the children who learn quickly how to read and figure. These youngsters, isolated almost completely from their fellows, are to be urged to increase constantly the rate at which they acquire mastery in the labyrinths of mathematical analysis and the powerful generalities of physical law. With speed and specialization as the watchwords, the single goal would presumably be a superweapon able to isolate and destroy all those guilty of enmity to the United States of America.

Fortunately, this horrible picture is in little danger of being completely realized. No parent has yet come forward to advocate such a deliberate forcing of the personality of his own child. Yet the rewards for success in engineering and in the physical sciences will probably continue to exceed those obtainable in other walks of life, with the possible exceptions of law and medicine, and hence increased emphasis on the education of bright children in the physical sciences and mathematics can be expected.

MEANING OF PROCESS

IN CONTRAST TO THIS NARROW APPROACH which can lead only to eventual disaster through the complete fragmentation of knowledge, with each of us spending life mastering a tiny specialty, unable to fit into any general picture and unable to talk things over with others, consideration of the sources of aims has led a number of educators to recommend an emphasis on "process" in the schools. They have suggested "choice-making" or "decision-making" as an over-riding theme.[1]

Process is a word used by educators to draw attention to the age-old problem of the utilization of knowledge. Common sense tells us that learning can be acquired in such a way that the prod-

[1] T. Bentley Edwards and J. Cecil Parker, "Education for Making Decisions," *California Journal of Secondary Education*, Vol. 31, No. 7, Nov., 1956, pp. 402–408.

ucts of learning play no part in our lives. Conversely, learning that seems real and important and that we know how to use can enrich our lives. Admittedly, the ways in which knowledge can be put to practice can never be isolated from knowledge itself. For example, one could never give serious thought to the problem of juvenile delinquency unless he knew about juveniles, delinquents, the courts, the corrective institutions, the results of empirical investigations, police procedures, and a host of other details. He might have been drilled extensively in the use of major and minor premises, in the recognition of semantic variations, and in grammatical exactness, but unless he knew some of the facts of life he would be defenseless. On the other hand, the facts themselves can be learned apart from the methods to be employed in their use. Conceptualization of a distinction between process and content is useful as it provides categories for the ideas of "behavior," "activity," and "experience," about which educators have so much to say. The category of content includes what have been sometimes referred to as "facts," and especially when taken in isolation from their use, as "dry facts" and "dull facts."

This distinction is not the same as the distinction between concrete and abstract. Process can be concrete, as it is when a child writes, speaks, or runs over to greet a friend. On the other hand, process can be abstract, as it is when a child deliberates. Such deliberation may precede, accompany, or follow overt behavior, or it may be carried on quite apart from any visible activity. Facts can be abstract or concrete. Knowledge which is both abstract and concrete is useful as it helps us to order our environment, which is how we cope with life.

Neither is the distinction the same as the distinction between subjective and objective. By definition, teacher and child cannot be positive they are sharing each other's subjective experiences. Yet successful teachers feel reasonably sure that when they set the stage properly, a great number of children derive meaning in more or less the same way even though the range of response is great. From one point of view, all experience is subjective. It is only by calibrating sensations with the help of instruments that we are able to create experiences that are reproducible and which we call objective. Although all of us may agree concerning the wave length of

blue light, part of the joy that comes from a contemplation of the blue sky must remain subjective.

In part, the distinction between process and content is manifested when we say that facts must be made meaningful to the child, that he must understand what he learns. Process implies understanding of a most special sort. It means that the child must be aware of a complex pattern of relationships. An insistence that schools pay attention to process means a desire to teach the child the necessary behavioral skills as well as a willingness to see to it that he is motivated to undertake complex rational behavior.

Hence process involves factual knowledge, understanding, attitudes, abilities, and skills. We see its possible usefulness not only to categorize and discuss educational activities, but also to point the way to the heart of education and hence to the possibility for curricular improvement.

TEACHING OF PROCESS

PROCESSES THAT ARE IMPORTANT EDUCATIONALLY have been listed as those having to do with (a) communicating, (b) thinking, (c) associating with others, and (d) creating.

Examination of a classroom situation will demonstrate the usefulness of these four concepts.

Consider a class in general biology where the lesson is on the balance of nature. The need for the teacher to communicate with the pupils and they with him and with each other is immediately apparent. To begin with, special words like mammals, phyla, respiration, and ecology will probably be used. When the teacher is trying to arouse class interest in the topic he will use sentences, gestures, and expressions that demonstrate his own interest. Perhaps a number of the pupils will object to the whole idea, largely for subjective reasons. They will probably find vigorous and accurate words, phrases, and sentences to express their resistance. When an argument is refuted, the proponent is likely to remonstrate, "Oh! I didn't quite mean that," and he will proceed to rephrase his comment. Misunderstanding may have arisen through poor speaking, but poor listening is just as likely to have been the cause. Students

will read books in class, in the library, and at home. They will discuss the topic with their parents. To achieve a more exact expression of their thoughts, some of the students may wish to prepare written statements. Thus we see that in this lesson, as in all others, the arts of communication—speaking, reading, writing, and listening—are of great significance.

In the same lesson the students are bound to realize that human beings have rejected many of the methods used by nature to maintain a balance. Immediately they will begin to sense the countless problems introduced by each new civilized ruling, such as those having to do with the ownership of property. The teacher will undoubtedly insist that his aroused class do some serious thinking about these problems. He will probably suggest a number of alternatives the pupils have neglected. If he is strong enough to be willing to risk the possibility of being misunderstood, he might point out that a laissez faire system was rejected by man when he took his first step toward civilization. For civilization means a conscious ordering of at least part of life on one basic set of beliefs or another. All of this is thinking. Students will learn how to locate reliable sources of information, the teacher will check student logic, new associations will be formed, and perhaps recognized for what they are, and so the class, if the teacher is a good one, will improve its skill in thinking.

Thinking, to be effective, requires concentration and it is difficult to concentrate in a hubbub. As they learn to be courteous to each other, students will improve their social skills. Books and equipment will have to be shared; a degree of movement is inevitable. In conversation, an avoidance of personal references is often desirable; feelings of others have to be considered.

Practice in creativity is possible in this biology class. Perhaps one or two of the students will wish to prepare a diorama depicting the various ways in which the balance of nature is maintained in a primitive situation. Another student or group of students may collect a set of photographs. Essays will be written, tales will be told, pictures will be drawn and painted. Not a great deal is known about the development of creative skill, yet it seems reasonable to assume that the more people there are who try to be creative, the

more will eventually succeed. Certainly, there is great joy to be derived from creative activity. This alone is justification for an expenditure of a part of the class time.

The single example used, a class in general biology on the topic of the "balance of nature," demonstrates the possibility of teaching the processes of communicating, thinking, associating with others, and creating. To a greater or lesser degree, attention can be paid in every lesson to the teaching and learning of these basic processes. To be sure, practice in one of these categories will lap over into practice in another. Many of the lessons in one subject will stress one or another of the kinds of process.

NECESSITY FOR TEACHING PROBLEM-SOLVING SKILLS

A BRIEF EXAMINATION OF SOCIETY will make us aware, if we are not aware already, of the many social problems that have followed the extremely rapid scientific developments of the last hundred years. Technological modifications have produced intense dislocations in the employment of wage earners. Social mobility has been accelerated. Women, freed by gadgetry from many household tasks, have gone out with their mates to earn.

Transcending these and other domestic problems with respect not only to our manner of living but also, indeed, to our living at all, are those raised by dislocations in our foreign relations. Oil in the Middle East, metal in the Far East, communism in Russia and China, the independent status of countries that were formerly colonies of Britain, France, and other European countries, have focused our attention on the plain fact that millions of human beings are short of food. Jet-plane transport and video communication have made all of us aware of the urgency of problems raised by the massive movements in countries where industrial revolutions have just begun.

According to the American way, these problems are to be solved with the help and advice of all our citizens. Certainly each of us is not going to submit an opinion directly, on each and every issue. Each of us has the responsibility, nevertheless, of forming an opinion. Politicians, wishing to remain in power, will find ways of sens-

ing trends of public opinion, and will accordingly frame policy that strives to modify these trends but also takes them into consideration. When a large segment of the population has no opinion, decisions will be made largely on the basis of political expediency and a gradual or even rapid deterioration in the quality of these decisions can be expected. Hence we see that the schools in a democracy have a duty to teach citizens not only *how* to solve problems using manageable groups, but also to *want* to solve them. They also have a duty to teach citizens to record their opinions on public issues.

A word is in order concerning the role of the specialist in all of this. His duty is to suggest alternatives and to explain, as well as he is able, the consequences of the various alternatives. The possibility of such communication means that all must know enough to understand when the specialist gives as simple an explanation as he can without misleading his hearers.

Herein lies the basis for the most difficult educational problem of our time. Advances in many subject-matter areas have been so rapid, in recent decades, that a very high degree of specialization is demanded if this rate of growth is to continue. If the degree of specialization is forced to increase until the specialists lose touch, not only with ordinary citizens, but also with each other, then knowledge of the world becomes so fragmented that all hope of order is lost, and life remains as much of an enigma as ever. Two aspects of education must be emphasized constantly, if this serious regression is to be avoided; first, all must learn enough to understand what the specialists are up to, and in addition, ways must be found of increasing the rate at which all are able to learn.

The point of view presented in the preceding paragraph is one that is currently popular with commentators and analysts. A third point of view tosses the problem more squarely at the specialists themselves. It is up to them to keep in touch with other people, and also to think so deeply and carefully about what they know that they are able themselves to explain alternatives and consequences in a way that intelligent people in other walks of life can understand.

A theoretical physicist has little difficulty in completely mystifying his hearers. He can do this by employing words like parity,

and writing down differential equations to represent relationships. Possibly concepts that demand new words for their expression, and relationships that have been derived by the use of calculus, can never be accurately represented in terms that people without a specialized training can understand. However, if these concepts and relationships are to be useful in the pure science of physics, there must be a point where once more contact is made with the environment. It is at this point that people generally will be affected, and are entitled to an explanation. At this point, they can understand.

The relationship between matter and energy is a good example. Schrödinger's wave equations and the derivation of the Lorentz transformations are isolated, perhaps forever, from the understanding of most people. These must be comprehended if the full beauty of the theory of relativity is to be appreciated. But every schoolboy knows the formula $E = mc^2$, and knows that it means that when even small quantities of matter are changed to energy, the quantity of energy that is set free is enormous. By means of pictures, by the use of analogy, and by verbal descriptions, all of us are able to comprehend the magnitude of an atomic explosion. At least, we can do this just as well as the physicist can unless he happens to have witnessed such an explosion firsthand.

Whenever a group of people make lifelong studies of certain aspects of life, as they do in psychology and sociology, for example, they are bound to go so far along the road to understanding that special terms, both verbal and mathematical, and involved logic are demanded to keep the theoretical investigations under way. As they experiment, like the physicists, these specialists too must eventually return to the concrete, and here the general public is again entitled to an explanation.

Does this mean that we are to take the intermediary steps completely on faith? Not at all, for we can easily check. In all these fields, we can keep watch at the point that matters, namely, the point of contact with physical reality.

The preceding discussion applies only to the extent that life is rationally controlled, that is, to the extent that people consciously try to relate their own behavior with that of others and with the material environment in such a way as to bring about foreseeable

consequences. Regardless of how much or how little of life is rational in this way, one of the underlying assumptions of this book is that it is the duty of the schools always to strive for an increase in the extent of rationality in human behavior.

Once the difficult understanding has been achieved, the struggle is by no means ended. Groups of interested citizens must meet to discuss the facts, to consult experts, to decide what to do, to act, and finally to evaluate their actions. This sequence of purpose, study, decision, action, and evaluation is the same as the procedure suggested for dynamic and effective curriculum development. If students practice this sequence in the classroom, and if teachers practice this procedure as they develop the curriculum, the chances are very good that adult citizens can be led to practice this behavior as they seek solutions for local, state, national, and international problems. Local groups will be unable to carry through by themselves when action is demanded on the part of any political unit that extends beyond the local community. But they must arrive at opinions, make decisions, and record them. Following action by the larger political unit (which may or may not be in accord with the decision that was purely local), the local group can continue to evaluate such action, to reinforce or modify the opinions already expressed, and once more to record their findings.

The political machinery needed for far-flung democratic activity of this kind is already available. We have, among others, the League of Women Voters, Young Republicans, Young Democrats, local political party organizations, adult study and discussion groups, labor organizations, and citizens' committees. To the extent that citizens fail to align themselves with such formal groups and confine their political discussions to café and living-room, and to the extent that, even if they have joined such a formal group, they continue in ignorance of what the issues are as well as the manner in which they are being decided, decisions will continue to be made in the "smoke-filled rooms." There is little that is wrong with the smoke-filled room as an agency of democracy; but there ought to be enough of them to house all our citizenry of voting age. The role of the schools is to develop individuals with a feeling of responsibility to join such voluntary groups and with the skills needed for effective group action after they have joined.

An examination of the general procedure of purpose, study, decision, action, and evaluation indicates the four categories of processes already illustrated:

1. *Communication,* in order that the thoughts and findings of others may be shared.
2. *Thinking,* which must be purposive and critical if it is to serve as a safe guide to action. Part of thinking seems to be a conscious sorting of facts and opinions in order that they may be brought to bear on the solution of the problem.
3. *Working with Others.* Few, if any, problems are solved in complete isolation.
4. *Creating.* On the other hand, creativity, which means the invention of ways and means, may not be possible in an immediate, face to face situation. It is quite likely that the group will have to separate so that each, in privacy, can carry on the thinking and worrying that seems to be a prerequisite to inspiration. Afterwards, development of suggested ways and means can often make effective use of a division of labor.

BUILDING THE NECESSARY ATTITUDES

IF CHILDREN ARE TO DEVELOP SKILL in the use of the social processes which have been briefly described, they must acquire the needed attitudes.

The fundamental social unit, in America as in many other nations of the world, is the family. Immediately following the Bolshevik revolution in Russia in 1917, the role of the family was deliberately undermined through the provision of easy divorce and legalized abortion. Children were to be nationalized. Such attempts to crush the human spirit were found to be inconsistent even with the goals of communism. For the collectivist state relies as much as the democratic state upon the existence of shared attitudes.

However, an easily discernible difference between the two political ideologies prevalent in the modern world is the extent to which each provides for variations in attitudes. In America, we believe in a wide tolerance for human individuality and we accept a variety of alternative behaviors.

Thus American society assumes a high degree of freedom within

each family circle. There are, however, definite limits to this freedom, and the school as the second social unit to deal with a child has a right to expect to find in him a foundation of attitudes on which to build. The child must come to school with some awareness of the rights and privileges of others. This is what we mean by "individual conscience." This is the basis of moral order among men. In many families, this feeling of responsibility toward the welfare of others will be developed through the tenets of a particular religion. In a few families, a feeling that is equally strong will be developed through reason. Some less fortunate children will only learn to respect the rights of others the hard way—by getting beaten when they intrude. Such children may grow into adults possessed of nothing but hatred or contempt for their fellow-man, and an overwhelming impulse toward self-aggrandizement. Extreme cases of these are the pathologically criminal—those with utter disregard of the rights and feelings of others.

In most classrooms a wide range of character is to be anticipated even though most of the children will be similarly dressed, and will talk excitedly about the same kinds of toys, records, and heroes. The similarities will be largely superficial; the differences deep and sometimes irreconcilable.

On this basis the teacher must help the children to learn to communicate, to think, to work with others, and to create. Paradoxically, when children are well taught, both the differences and similarities increase. They acquire a stock of common learnings, but through specialization of abilities and interests, the differences increase.

COMMUNICATION

COMMUNICATION AND EDUCATION are so nearly synonymous that we have decided to use the following chapter to relate the two of them. Still a third chapter, in a later part of the book, will deal with "Communication" as an area of subject matter in the schools. A brief overview of the chapter relating communication and education will be presented at this point.

Although the problems that the student faces today, as well as those he will meet as an adult, are to some extent unique, never-

theless he must rely upon the experience of others. To ignore the past experience of mankind would be possibly more foolish than to refuse communication with living persons. Hence, the schools must transmit to the child his cultural heritage. The danger inherent in this transmission is twofold. First, it may be perfunctory so that only the very brightest children, and they with the utmost difficulty, can relate the knowledge acquired to their own lives. Second, the comforting but misleading belief may be conveyed that solutions to all our problems lie waiting to be found in books. In a sense this is true. But the vicarious experience to be derived from books needs thorough restructuring if such experience is to prove useful in the solution of current problems. Habits of restructuring vicarious experience can be learned, and a suitable selection of books to be read and studied can be made when the maturing student attacks problems of living today.

The importance of children's attitudes both to learning and to life has been pointed out a number of times already. Attitudes must be consciously communicated in a group situation where both emotional and intellectual interaction is possible. The schools must permit children to discuss their problems with each other.

Skills must be communicated, preferably from people who already possess them. The man who learns to swim or to play golf solely from a book will be a poor performer. The same is true of a student who learns the skills of chemistry, mathematics, or debate, solely from a book. As Benjamin Franklin said, "He who is self-taught, hath but a fool for a teacher."

Finally, certain habits are generally accepted as conducive to the survival of society and the integration of the individual. In part, the purpose of the curriculum is to inculcate such habits. If every decision had to be made once again each time action was demanded, the intellectual burden would be intolerable. However, prior to the formation of a habit, the decision to act in a certain way should be thought through carefully, and the nature of the decision reviewed just as carefully whenever the slightest doubt as to the value of the habit arises.

THINKING

THE TEACHING OF THINKING is discussed in another chapter which has to do with the teaching of science. Most of the ideas concerned with an analysis of thinking can also be classified under the heading "evidence." On what basis are we justified in forming an opinion or a belief?

Those anxious to achieve the ultimate in order in their lives will often surrender to the appeal of a philosophical or religious system. "Evidence" for such people must usually be judged according to a complex set of *a priori* principles. Such a person may be completely rational but he will be swayed by "legal" evidence rather than "scientific" evidence whenever the deductive approach of law meets head-on with the inductive approach of science.

No social life seems to be possible without laws. Hence a complete acceptance of science as the arbiter in all our disputes is probably impossible. After all, the decision to rely on evidence made available through the inductive approach of science cannot be justified except by the use of the method itself; therefore the decision to rely on inductive evidence must be accepted or rejected on an arbitrary basis.

Further, scientific evidence can be supplied only in the form of relationships that permit prediction and hence a degree of control over the environment. Goals must be accepted prior to the evidence so that directions for this control can be established. Far more decisions can be made on the basis of scientific evidence than most people realize, for the needed background of beliefs for judging the worth of alternatives presented is so widely held as to be almost universal. It is when science demonstrates the inconsistency of certain beliefs that are precious to the individual, that the basis for agreement is undermined.

WORKING WITH OTHERS

ONE WAY OF DISTINGUISHING between democratic and undemocratic procedures is to consider whether or not overt conflict is possible concerning policy. In a laissez faire situation, each in-

dividual goes his own way. Hence, his inner conflict will be reduced to a minimum but his outer conflict will be increased to a maximum. In addition, such conflict will be destructive rather than constructive. Carried to an extreme, such individualism can result only in the eventual destruction of group solidarity. Sooner or later, individuals must combine to achieve a degree of social order. Such order can be achieved politically by imposing a rigid system on a people, or by permitting constant modification of the system in response to decisions reached by as many as possible of those who are affected.

In the rigid system, since no criticism is permitted, the official view must always be that the system is perfect. Hence the seeds of discontent and frustration will always be present and individual members of such a system will be subject to inner conflict of a particularly bruising kind. They must discipline themselves to unquestioning support of the state, yet they see unmistakable evidence that all is not well. Often the frustration of the public is deliberately increased by the issuance of conflicting demands. The application of this discussion to a school system is all too obvious.

A flexible political system is one in which there is constructive give and take between the governed and the governors. Children educated for a democratic society must learn to disagree without violence. On the one hand, the individual must develop the courage of his convictions; on the other hand, the group members must learn to examine without rancor an opposing point of view.

There are sound and unsound ways to resolve conflict. Faced with a strong difference of opinion among the members of his group, the leader can follow several procedures, all of which can be recommended. First, he should allow plenty of discussion, with an insistence that all base their remarks upon facts whenever possible, and that arguments be presented logically. If the discussion is a good one, feelings will undoubtedly be involved, but the leader should try to prevent any speaker from going so far that the attention of his listeners is directed away from criticism of what he is saying by fascination with his manner of saying it. At an appropriate time, the leader should sum up the discussion by listing the alternatives proposed together with their consequences as these have been so far brought out. As soon as possible he should try to

get all to consider only two alternatives. A useful device for boiling down the list of alternatives is to take a straw vote. Quite often two possible sources of action will be far and away more popular than others which can then be dropped. When a deadlock is reached, a cooling-off period is sometimes an advantage. But often in a democratic social group, conflict can be permitted not only in plans to meet a situation, but in the provisional acceptance of two or more decisions with the accompanying variations in activity that the decisions invoke. For example, in 1943, the government of this country decided to go ahead with the preparation of both uranium 235 and plutonium, either of which could have been used to make an atomic bomb.

Under no circumstances should the leader try to coerce the group into making a decision his way. All of the previous discussion has been wasted if he does so. Now every administrator knows that he should make many decisions on his own. These are either the kind where the issues are clear cut, or where very few other people are concerned. He should not jump into a group discussion to cut the Gordian knot in an authoritative manner, and he should not decide, on his own, issues that are important in the lives of a number of people—metaphors likening the administrator to the captain of a ship notwithstanding.

CREATING

THERE ARE A NUMBER OF WAYS in which schools can help students to express creativity. Few of these ways are exploited to the full, and many of them are outside the regular curriculum of the school, and in particular outside the range of the so-called solid subjects in the college-preparatory program. The reason for this is that some curriculum-makers, especially those who have exerted a strong influence in the past, seem to be of the opinion that creativity is a concept lacking in validity, or else that a full-blown potential is supplied to certain fortunate creatures at birth. The college-preparatory program has, therefore, been hedged about with so many well-meant restrictions that the teachers have to hurry to "cover the ground," and even the so-called laboratory exercises have become completely "cut and dried." To the extent that this proce-

dure is rational, the assumption seems to have been taken that there is no need to nurture a creative talent—all that is needed is to pump the student full of knowledge of what has been done, and that only when this stocking process is complete can any reworking of the data be permitted. In addition, formalized procedures have obviated any possibility of creative action in a number of shop, art, and music courses.

To fill the gap, experimental courses like "creative writing" and "arts and crafts" have been introduced. A few of these courses have been taught by teachers with thorough training in the area, and with creative talents of their own. Others have been turned over to starry-eyed innovators without any insistence that they be adequately trained, or that the new course be carefully planned. Much that is trivial has resulted. Whether such courses are any improvement over the standard formal courses is open to question. In any event, a novelty in the curriculum must be exceedingly good if it is to survive. The status quo is so much more easily defended. Improvement of courses that are known and accepted by the public is probably superior curriculum-making strategy in the long run.

From what is known concerning the development of creativity, the assumption that modifications of standard high school courses could increase the rate at which creative potential is released seems reasonably safe. Gardner Murphy [2] for one seems completely convinced that realization of a much greater part of human potential for creativeness is not only desirable but is also a necessary condition of continued survival. Margaret Mead [3] shares this conviction and makes the impossible demand that we teach our pupils to "solve unknown problems in unknown ways." Despite the current emphasis on the physical sciences, solutions of problems having to do with the relationships of man with his fellows are probably of greater importance. In this brief glance at the creative process and its significance in development of the curriculum, consideration will be given to what is known of the creative process generally, then attention will be paid to the possibility of modifying man's

[2] Gardner Murphy, *Human Potentialities,* Basic Books, Inc., New York, 1958, p. 340.

[3] Margaret Mead, *The School in American Culture,* Harvard University Press, Cambridge, Mass., 1951.

behavior by means of social invention, and this will be followed by an indication of the possible role of education as an agent for social change.

A few things are known about the creative process once it has been set in motion. First, there has to be thorough knowledge of the particular subject. To some extent, knowledge of the subject must be direct. Especially at first, the potentially creative person must receive direct impressions of phenomena by means of one or more of his senses if the things that he reads about are to have meaning for him. But soon, like the tunes that are made by patterns of musical notes, generalizations must appear. Even the simplest abstraction, like the use of the common noun "cat" to represent a group of animals, is a generalization. Where man's relation to the phenomena has reached a stage of intellectual complexity, nearly all association with the subject is vicarious. Reading and hearing about theories and activities of others not only saves time, it serves to link the researcher or artist with a common effort. After imaginative journeys of greater or less duration and complexity, contact with actual phenomena is not only salutary, it is a necessary part of the process.

After a study of a subject that has carried him to the very frontiers of knowledge, a creative person may receive a flash of genius or insight as he realizes that a previously unsuspected relationship exists between two or more sets of generalized phenomena. The obvious example, in the twentieth century, is Einstein's relationship between matter and energy. But the insight may link the rhythms of jazz with serious musical composition and give us "Rhapsody in Blue." Such flashes do not illuminate the thinking of the uninitiated. They come only when the potential has accumulated through a period of effort. After they come, much additional effort is needed to carry them through to perfection. Not all potential geniuses have the staying power to hammer out the details of a new invention or idea.

Flashes of insight seem to come more frequently to some people than to others and we speak of these as creative persons. Conceivably they have *learned* to be creative. The fact that creativity seems to flourish in certain eras or periods lends credence to this view. Energy for the needed breakthrough is necessary. The love of

the innovator for his subject must be fed by at least partial success with his efforts. Part of the success is inevitably social. To some extent the artist may be sustained by looking upon his work and knowing that it is good, but the applause, or at least the approving nods of even a handful of his peers are needed to carry him through the gray days. Certainly he needs to be provided with the equivalent of food and shelter. In the twentieth century, corporate industry is able to provide some of these needs, but it is also financially committed to the social status quo. Although it is in the well-lined nests of industrial research departments that many inventors and innovators find the social support they must have, the insulation provided allows the corporation presidents plenty of opportunity to censor inventions.

A system of education should provide opportunity for the individual to blossom. The picture of children seated in rows, marching in and out to the ringing of bells, paying attention to materials that are of interest to adults, and ignoring basic human relationships almost completely, is all too familiar. Yet the way we respond to an emergency shows that we contain within ourselves resources of creative action. Man may yet learn to free himself from the shackles of habit by a study of the creative process.

Through our senses we contact the world of phenomena. Indeed, it is the need to order phenomena so as to be able to cope with them that provides much of life's continual challenge. Little children are exceedingly inquisitive concerning the strange new world in which they find themselves and may resist the temptation of food or sleep to continue an alluring investigation. Unfortunately, the teacher, by insisting on what he conceives of as discipline, does much to curtail the child's curiosity.

If a society is to foster creativity, its thoughtful men must contemplate worthwhile goals. Where other community agencies fail to provide the child or youth with navigational aids, his teachers could do so.

The best way for the teacher to direct this difficult and touchy development is through enlightened use of groups. Attitudes are developed or changed far more readily in a group composed of several persons than they are when the teacher deals with the single

child. A teacher working through the spectrum of beliefs held by a group is protected from parochialism.

DECISION-MAKING

WE BELIEVE THAT TEACHERS should be introduced to decision-making as an educational concept. When teachers think of education as learning to make decisions, a concept appears which embraces many of the generally agreed-upon dicta of good teaching and which is readily translatable into classroom action.

Education for a free society presents a number of dilemmas, one of the most difficult of which is the need to fashion unity, while nourishing diversity. When schools emphasize decision-making rather than the decisions themselves, the dilemma dissolves. What keeps people apart are not differences of opinion, but the absence of any common basis for discussion.

The current controversy over American education itself provides an excellent illustration.

A number of the attacks being made on the public schools of America are couched in terms calculated to arouse the emotions. It is as though these critics wished to banish scholarly argument, and instead, to win the acclaim of the bystanders by first building men of straw and then proceeding to knock them down. This is an amusing and diverting spectacle, and by leading the public into believing that their antics have met the arguments of those who see the need for change in our educational procedures of the past hundred years, these critics have won for themselves a respite from the need to think through the current problems of education with diligence and care. This is the reason that so few thoughtful educators have taken the trouble to reply to such critics.

By no means all the criticisms of education are being made in these offhand ways. Where the critics make use of acceptable ground rules with respect to process, constructive conflict of opinion is possible, and such conflict is of the type being advocated for the solution of our foreign and domestic problems.

NEED TO LEARN VALUES

AN ESSENTIAL ASPECT OF EDUCATION has been hinted at in the foregoing but has not been treated specifically. This is the need for problem-solvers to be emotionally concerned with the problem. Students can be trained in the skills of communicating and thinking, but unless they feel a responsibility to work hard at the solution, or, better still, unless they are interested in the solution of a problem, they will perform in a perfunctory way.

The school has relied too long on the development of interests in the home and in the church. It is high time that teachers regarded the development of interest in the subject they are teaching as important as the acquisition of skill and knowledge in the subject. Interest will develop if children are permitted to spend a lot of time on an activity which is similar to an interest they already have. It takes considerable time to discover the interests and inclinations of some children. The physics teacher will find that many boys who seem to show little interest in a theoretical approach to Newton's laws are intensely interested in automobiles. Problems of acceleration, momentum, cornering, and center of gravity are already receiving their almost undivided attention. But the solution of these problems is mixed with the smell of exhaust smoke, the feel of a steering wheel, and the sheer bodily thrill of travel at high speed. Somehow or other, the teacher must continue to see that the student relates problems in the physics class with solid reality. At the beginning, the teacher will assign very few problems; he will allow the student to test out the solution in his own way. Always, the teacher will seek to impress the student with the power of physics as a research tool. The boy who is a "ham" radio operator ought to be a "whiz" in physics. Very few of them are. Is this the fault of the boy, or of the way the rewards in the class are assigned?

Intrinsic interests of the kind just described should not be interfered with by questions of grades, playing on the football team, or pleasing the teacher. They really ought not to be completely identified with vocational and educational aspirations. On the other hand, permitting the student to demonstrate his newly acquired skill to his fellows is a good idea. Not only will the demonstrator's

own favorable attitudes be reinforced under the approving eyes of his fellows, but also they may be tempted to put this kind of effort into their studies themselves.

The importance, for building favorable attitudes, of the fact that most children are concerned with vocational choices cannot be denied. However, when the teacher refers to his course as a requirement for a particular vocational choice, he is merely urging the child to get along with it so as to get it out of the way. A far more intelligent teaching procedure is to choose parts of the subject matter that relate easily to the vocational choice of the student and to let him see for himself how valuable the preparation will be. Incidentally, although a selection procedure of this kind will undoubtedly reduce the amount of material covered by the class, it will in all probability greatly increase the amount of learning by the class.

Eventually, the child will build sufficiently favorable attitudes to the subject through associating it first with his immediate interests, and second with his vocational choice, so that he can begin to accept the discipline of learning. This is the most crucial point in the teaching-learning process. Discipline means a willingness to work for a deferred value. Once he gets his pupil over this hump, the teacher can push ahead almost as fast as he wants. Until he does, driving the pupil is a waste of time and effort.

SUMMARY

THE THEME OF THIS CHAPTER is that educational procedures are best organized, in a democratic society, under the concept of choice-making. This is an emphasis on the use of information rather than on the storing of it. We have referred to an analysis of what people do as "process," and to what they know as "content." Processes that can be taught include (1) communicating, (2) thinking, (3) working with others, and (4) creating.

Process is emphasized when the curriculum is built around the solution of problems by the pupils. An analysis of problem-solving activities leads us to the four processes already mentioned. If children are to engage in problem-solving activities, they must be led to acquire the necessary attitudes. Hence, along with the four cate-

gories of process, schools have the responsibility of developing certain attitudes.

A partial analysis of communicating, thinking, working with others, and creating, follows. These are summed up by the concept of decision-making. The chapter ends with a discussion of the development of those attitudes and values for which schools must accept responsibility.

EXERCISES

1. Try to locate positive evidence to show that some of our leading citizens are stressing the need for education in mathematics and science largely for the purpose of bolstering our national defense.

2. What are some elements of good teaching that are stressed when the teacher helps children to make choices?

3. Describe a scientific instrument with which you are familiar and show how it is used not only to extend the range and sensitivity of man's senses but also to render impressions received by one person susceptible to verification by another.

4. Describe how a topic with which you are familiar could be taught in such a way as to emphasize the learning of communicating, thinking, associating with others, and creating.

5. What creative processes that could be taught in a high school biology class might be expected to carry over into adult life?

6. Choose an invention of the past ten years and show how this invention has already produced social changes.

7. What is the role of the educational consultant when asked by a school board for advice on a building program?

8. Choose a particularly difficult topic in your own subject-matter area and write an explanation that makes it comparatively easy to understand.

9. Refer to investigations of attitudes by either the method of factor analysis or scalogram analysis to show that although details of the analysis may be difficult to understand, the dimensions of the questionnaires themselves are relatively easy to grasp.

10. Study the actions of a committee of which you have been a member. Can you trace the following various steps: establishment of purpose, study, decision, action, and evaluation? Better still, can you relate success or nonsuccess to the inclusion or elimination of one of these?

11. Does democratic action imply only individual action, or only group action, or both? Illustrate by reference to classroom activities.

12. Take a basic attitude such as that toward making money and show how a wide range can be tolerated under the American capitalistic system. Are there no limits at all? If there are, how are they determined? Do these limits need revision from time to time?

13. Describe characters that you have known or read about that fit the following categories:

a. The amoral individual with no consideration for the rights and feelings of others.

b. The person who seems to have a perpetual grudge for his fellow-man.

c. The person who, for one reason or another, finds the world and its people intolerably difficult.

d. The person with a serene and happy disposition, normally considerate of the rights of others, but with his own ego needs reasonably well satisfied.

What does the teacher do with each, for there are quite likely to be one or more representatives of each in an average class of pupils?

14. What is the best way to learn to drive an automobile?

15. Show, by reporting the discussion of a group of adolescent girls concerning dating practices, how attitudes might be formed.

16. Describe an anarchistic or laissez-faire classroom, one that is authoritatively controlled, and one that is democratically controlled. Which of the three is most prevalent?

17. Why is individual frustration inevitable in an authoritatively controlled classroom? It is often present in a democratically controlled classroom, but is it inevitable there?

18. Describe, in detail, permissible conflict between pupil and teacher.

19. Describe a classroom situation where opinion as to what should be done seems to be equally divided among the pupils. Is it possible to follow both courses of action?

20. Describe what was once a common error in teacher perception of pupils. How has this perceptual bias been eliminated?

21. Many people think of individuals who are members of minority groups as stereotypes. Show how one of these stereotypes could be shattered by scientific knowledge.

22. Try to locate an example in the history of science where others have had to work out the details of an invention or idea.

23. Produce examples of strange social behavior that you find annoying. Is this strange behavior important, or are you reacting in a rather immature way?

24. Must a family or a classroom be anarchistic in order for creativity to develop?

25. Can you think of one of your own consuming interests that has sprung to life without being associated with any other interest? Do not overlook the interest you might have had in another person.

26. Relate parts of your favorite subject to a particular vocation. (Not to the teaching of the subject!)

TOPICS FOR DISCUSSION

1. The end result of complete specialization of knowledge is the loss of all knowledge.

2. Juvenile delinquency is increasing in America.

3. Facts are necessarily dull.

4. In schools, the emphasis should be on the abstract rather than upon the concrete.

5. Schools have a responsibility to teach human beings how to get along reasonably well with each other.

6. The motto of one of England's oldest "public schools" is the expression "Manners maketh man."

7. *Plus ça change, plus c'est la même chose.*

8. Wars are necessary to produce technological progress.

9. Various methods are used by senators to sense public opinion in the state they represent.

10. Democracy, in the sense that all those affected by a decision must share in the making of it, is a dream that will never be realized.

11. The school must provide only vicarious experience, and that largely in the form of abstract relationships. The restructuring of this experience is beyond the jurisdiction of the school.

12. More trouble in the world is caused by having too many basic beliefs than by having too few of them.

13. If too many of life's frustrations were removed, life would become dull and uninteresting. Is there any danger this might happen?

14. To what extent is a group member obligated to present an unpopular point of view?

15. It is better to stand still than to travel in the wrong direction.

16. Concerning matters that are not susceptible to experimental verification, no final decision is possible.

17. Speech patterns are important in intercultural relations.

18. It is best for the schools not to tamper with the basic beliefs held by individuals.

19. The first set of decisions that must be made by a group are those concerning their own processes and behavior.

20. Process governs controversy just as rules govern the playing of a game. Without decisions as to process, controversy will get nowhere. Hence, decisions as to process are impossible to reach.

ADDITIONAL READING

Benjamin, Harold, SABER-TOOTH CURRICULUM (New York: McGraw-Hill Book Company, Inc., 1939). *An amusing and now famous satire on the teaching of obsolete material.*

Bruner, Jerome S., Goodnow, Jacqueline J., and Austin, George A., A STUDY OF THINKING (New York: John Wiley &

Sons, Inc., 1956). *The Harvard Cognition Project developed a terminology for talking about categories. The authors of this book set forth that terminology. In doing so they have provided a useful analysis of concept attainment, by which they mean the seeking and testing of attributes by which categories may be distinguished. The distinction is analyzed into a series of decisions.*

Daedalus: JOURNAL OF THE AMERICAN ACADEMY OF ARTS AND SCIENCES, Vol. 89, 1960. (Published jointly by the Academy and the Wesleyan University Press.) *A volume devoted entirely to the issue of arms control. Of special interest is an article by Herman Kahn. Kahn, a well-known physicist, lists the frightening hazards of the arms race. Other articles in this volume discuss the feasibility of arms control, the possibility of conventional war, and other related topics. The list of authors includes Teller, Kissinger, Fromm, and Brown.*

Edwards, T. Bentley, "Measurement of Some Aspects of Critical Thinking," JOURNAL OF EXPERIMENTAL EDUCATION, 18 (March, 1950), 263–78. *A description of the use of an original kind of test to measure critical or judgmental ability.*

Fawcett, Harold P., THE NATURE OF PROOF, 13th Yearbook, National Council of Teachers of Mathematics (New York: Bureau of Publications, Teachers College, Columbia University, 1938). *Few doctoral dissertations are published in their entirety as yearbooks of the subject-matter societies. And this is one of the well-known and famous yearbooks. It contains a point of view for the teaching of geometry; a careful description of classroom procedures; and a complete exposition of the methods of evaluation that were used.*

Galanter, Eugene, AUTOMATIC TEACHING: THE STATE OF THE ART (New York: John Wiley & Sons, Inc., 1959). *Galanter introduces a series of papers with a description of the ideal teacher. The papers themselves relate the use of teaching machines to learning theory. The tone of most of the papers indicates that automatic teaching is already here and that its use will spread.*

Hollingshead, A. B., ELMTOWN'S YOUTH (New York: John Wiley & Sons, Inc., 1949). *A famous study made of an Illinois town just prior to the Second World War. The relationships of social*

class membership to attitudes toward education and to treatment of pupils by teachers are carefully worked out.

Minnich, Harvey C., WILLIAM HOLMES MC GUFFY AND HIS READERS (New York: American Book Company, 1936). *A sympathetic study of a man who influenced greatly the character of many Americans, some of them still living. One of McGuffy's sayings is: "Instinct is wiser than uncultivated reason." Another is, "The teacher does not aim to 'be' but to 'become' useless to his pupils." And still another, "The teacher takes the watch apart; the learner puts it together."*

Russell, David H., CHILDREN'S THINKING (Boston: Ginn & Company, 1956). *A complete summary of the research on the subject, but so well written that it captures and holds the reader's interest.*

CHAPTER 4

Aims:

Schools and Communication

EDUCATION AS COMMUNICATION

IN THE OPINION OF MANY PEOPLE, the words "communication" and "education" come close to being synonymous. If we ask what must be communicated between teacher and learner, we will probably say knowledge, understanding, attitudes, skills, and habits. All possible products of learning can be listed under one or more of these categories.

Although the school is the chief educational agency of society, it is not the only one. Even if it were, it could not possibly teach everything to all children. Hence, each school must select the courses it offers according to its particular purposes. These purposes may be expected to vary more or less from school to school and even from classroom to classroom within the school. Only when the school's purposes vary from scholar to scholar can it expect to achieve all its possibilities.

SOURCES OF AIMS

PREVIOUS CHAPTERS HAVE DISCUSSED the sources of aims of education. These are the society served by the school, the individual students in the school, the schools themselves, and the teachers. Because of local variations, no single set of aims can be derived from these sources that will be appropriate for every school. These aims, however, do fall within certain limits. General aims must be brought to a sharper focus by local committees for curriculum development.

BASIC ASSUMPTIONS

EVEN THE BROAD LIMITS within which sources of aims lie call for certain assumptions. In our opinion, these include:

1. In America, elementary schools and junior and senior high schools are open to all the children of all the people.
2. For the first six grades, children will spend most of the day with a single teacher in what is often referred to as a self-contained classroom.
3. In the next six grades, the amount of time spent with each teacher will steadily decrease until, in the twelfth grade, no student will spend more than two periods daily with any one teacher.
4. From the seventh grade on, teachers will specialize in more and more clearly defined fields.
5. The elementary curriculum will continue to be divided into such subjects as reading, arithmetic, social studies, general science, and health and physical education.
6. The secondary curriculum will continue to include such subjects as American literature, algebra, U.S. history, physics, art, music, woodshop, auto-shop, metal-shop, typing, shorthand, and health and physical education.

STATEMENTS OF AIMS

SEVERAL STATEMENTS OF EDUCATIONAL AIMS are available which are compatible with these assumptions. Among the best

known are the "cardinal principles" (see below) and those set forth by the Educational Policies Commission. A number of individual writers have attempted to state the aims of education. Among them are Plato and A. N. Whitehead. Various statements will be quoted and analyzed. The analysis will be followed by broad suggestions for the selection of the knowledge, understanding, attitudes, skills, and habits that the schools should teach.

This analysis and list of suggestions will complete the general discussion of the aims and purposes of education in America. In a sense, the main part of the book, organized according to subject areas, is a detailed and specific discussion of these aims. At the end, evaluation will be considered in the light of aims.

CARDINAL PRINCIPLES

IN 1912, the Commission on the Reorganization of Secondary Education was appointed under the chairmanship of Clarence D. Kingsley to try to bring order out of the chaotic system of American education which had by then developed. The almost impossible task assigned this Commission was to formulate suggestions for the reorganization of all levels of American education and to allocate responsibilities among schools for elementary, secondary, and post-high-school education.

In 1918, five years after it was appointed, the Commission issued its famous report [1] in which were listed several principles of education and seven aims or purposes. So influential was this Commission that the "Cardinal Principles" still serve as basic guides to American secondary education. Included in the report were the following recommendations:

1. Education until the age of eighteen should be possible for all.
2. The second six years of schooling, for those twelve to eighteen years of age, should be regarded as secondary education.
3. American high schools, except for possible division into jun-

[1] Commission on the Reorganization of Secondary Education, *Cardinal Principles of Secondary Education*, Bulletin 1918, No. 35, Department of the Interior, Bureau of Education, p. 27.

ior and senior sections, should be comprehensive and inclusive rather than specialized.

At the present time, a few states require attendance until the age of eighteen, but nearly all states provide free public education up to the age of eighteen. Special high schools like the Bronx High School of Science in the state of New York have become rare.

These principles are under severe attack at the present time. It is said that they work to the neglect of children who are academically gifted. Whether or not the brilliant child can be stimulated to fulfill his educational potential in a comprehensive high school which opens its door to over ninety per cent of our youth is an issue that is far from settled. Among the more vigorous and informed critics of the comprehensive high school is Isaac Kandel.[2] It is certain, however, that at the present time, despite a variety of courses, ability groupings, electives, and counseling, numbers of gifted students stagnate in our present-day high schools.

Opponents of the comprehensive high school argue that class distinctions are emphasized as much in the single high school as they would be if there were separate high schools for college preparation, for vocational training, for business education, and for other less specialized terminal education. They point to studies by Davis[3] and Hollingshead[4] to show that the so-called objective type of examinations as well as teacher grades favor children from middle-class homes with presumably sharply delineated value systems.

No arguments and no statistics have appeared to deny the obvious fact that when all the youth of a community see each other in the halls, listen to each other in certain classes, and cheer for the football team which is manned by all groups, the mutual understanding which must precede effective communication is more likely

[2] Isaac Kandel, "Educational Reorganization in Relation to the Social Order," *Education in a Changing World*, C. H. Dobinson (ed.), Oxford University Press, London, 1951, p. 145.

[3] Alison Davis, *Social Class Influences on Learning*, Harvard University Press, Cambridge, 1955, p. 100.

[4] A. B. Hollingshead, *Elmtown's Youth*, John Wiley & Sons, Inc., New York, 1949.

to develop than when the various groups are housed in separate schools.

A second strong argument against separate high schools appears when we consider that among the ages of twelve and fourteen the child must choose between various directions in which his education is to proceed, and that his choice is extremely important in determining his future. Regardless of the basis of the choice, it generally establishes once and for all not only the child's vocational pattern but his social status as well. Inevitably, the college-preparatory schools will exert the most appeal; inevitably, the other schools will be regarded as second best.

The seven aims of secondary education set forth by the Commission on the Reorganization of Secondary Education were as follows: "health, worthy home membership, command of fundamental processes, vocation, civic education, ethical character, and the worthy use of leisure." As can be seen, the Commission used extremely diffuse and general language.

For example, "health" might be taken to include not only proper bodily exercise, but also the satisfaction of physiological appetites. It could include mental health and all the complex requirements of a sense of well-being. It could mean getting along with people, and even membership in a political and social organization such as to give protection from the hazards of pestilence, war, and criminal activity.

The term "worthy home membership" might possibly be interpreted to mean that the school must assume full responsibility for the development of attitudes.

A corresponding lack of clarity could be demonstrated for the other aims and purposes listed by the Commission. These statements fail to define the particular role of the school in the nurture of children.

EDUCATIONAL POLICIES COMMISSION

IN THE LATE THIRTIES, when this country and a number of others were being economically strangled by the worst business depression in history, a commission was appointed by the National Education Association to draw up a revised list of objectives

of education at the secondary level. This commission published a group of well-phrased reports listing the objectives under four categories:

1. Civic responsibility,
2. Human relationships,
3. Economic efficiency, and
4. Self-realization.

Once again, this is fine talk, but too broad and vague to be accepted as a workaday statement by practical school people.

PLATO

IN PLATO'S *The Republic,* the purpose of education is the nourishment of the human soul to the end that a harmonious cooperation of various elements may result. Because the individual and the state each depend on the other, this harmony must be present in the persons themselves and among various persons as they perform those functions for which they are suited.

Plato defines for us "appetite" and "spirit." Many of the appetites must be satisfied if the physical well-being which is the basis of harmony is to be established. But other appetites are "wild," and must be subdued or denied.

The "spirit" is threefold. First, there is courage to overcome difficulties; second, the gentleness and toleration that goes with a "love of wisdom"; and finally, wisdom itself. In the end, life is ordered and harmonious because each man behaves rationally.

Gymnastics serve a dual purpose; they are healthful and they provide the tests needed to develop persistence and courage. Carried to an extreme, gymnastics may produce such evils as brutality, apathy, and a rejection of ideas.

The love of wisdom is to be engendered by a study of music. To the Greeks, music probably meant literature, as well as instrumental music. Through literature, the youth becomes familiar with times and places other than his own, yet he finds these other times and these strange places populated with men and women that are similar to himself. He thus develops an understanding of himself as a human being and at the same time develops a feeling of kinship

and eventually of love for his fellow-man. Obviously, not all literature and music can qualify for this responsible task. Again, carried to excess, the love of wisdom can keep man forever hovering uselessly on the brink of action.

Eventually comes wisdom itself. Rationality takes command and harmony results. Knowledge is thus imperative for the good life. Each man must know himself. Each must see his own life in relation to society. When he does, there will be no room for pettiness, avarice, or conceit. He will fear nothing—not even death.

WHITEHEAD

TWO THOUSAND YEARS is a long jump between aims but, with no apology, we turn to a consideration of aims listed by one of the most influential scholars of modern times. Alfred North Whitehead came to this country and joined the faculty of Harvard University in 1924, when he was sixty-three years of age. At the time, his fame rested chiefly on a publication which he co-authored with Bertrand Russell, *Principia Mathematica,* a definitive treatise on mathematical logic.

Whitehead has published a collection of ten delightfully written essays under the title *The Aims of Education.* This is the title of the first essay as well, but the others, including "The Rhythmic Claims of Freedom and Discipline" and "The Mathematical Curriculum," also deal with educational problems that are closely related to aims. Even the difficult chapter on "Space, Time, and Relativity" runs not too far afield, providing as it does an opportunity for the author to outline his basic philosophical position.

A favorite theme of Professor Whitehead's is that the chief purpose of education is to develop wisdom in the learner rather than to impart knowledge to him. He readily admits that one of the prerequisites for wisdom is a fund of knowledge. When wisdom, or the use of knowledge, is stressed, the learner acquires knowledge commensurate with his needs and with his understanding.

In his preface, Whitehead briefly states the main idea of the book, "The students are alive and the purpose of education is to stimulate and guide their self-development." He is strongly opposed to stuffing children's minds with what he refers to as "inert ideas,"

that is, ideas that sit in the child's mind without being thrown into fresh combinations. "Culture is activity of thought, and receptiveness to beauty and humane feeling. Scraps of information have nothing to do with it."

This general point of view leads Whitehead to suggest that we should not teach too many subjects, but that we should teach them thoroughly. By teaching thoroughly, he means teaching to the point of complete understanding. Understanding is not possible if the content of the subjects consists of events which are totally unconnected with the child's experience. The children must indeed learn from the past, but only that learning is useful which can help them with their present difficulties, or enliven and enrich their present lives.

Because this book was written in England, in 1916, the author is particularly hard on examinations set by boards of examiners for pupils from a number of different schools and on the kind of teaching that seems to prevail when this type of evaluation is stressed. Examples of such externally applied examinations were the uniform tests given throughout England to screen for entrance to the university.

Whitehead deals harshly with the theory of mental discipline, which holds that the mind must be sharpened before it can be used. In its place he stresses the fact that interest on the part of the pupil, and lively mental activity, must accompany every lesson.

He deplores equally an isolated, departmentalized approach. As he says, "There is only one subject-matter of education, Life in all its manifestations." This does not mean that we should discontinue teaching separate subjects. It does mean that the subjects should be presented in such a way that each pupil takes what he requires and makes it his own. To make an idea his own, he must weave it into the fabric of his intellect. The child is to develop a general view of the world from a study of separate and special subjects. Surely beginners can expect less difficulty if the pattern of the cloth is simple to begin with. This is not specialism as we ordinarily think of it whereby a man "knows more and more about less and less." No, it presents the child with an opportunity (to change the metaphor) of taking a fairly long look at life from a single point of view. A number of modern educators would quarrel

with this suggestion, but the specialization of interest among children cannot be denied. One has only to contrast boys' interests with girls' interests to convince himself of this.

Whitehead goes on to talk about "style" in a way that shows how much importance he attaches to its mastery. Undoubtedly, there are many sources of beauty: language, art, music, science, mathematics, or, what we seem only lately to be realizing, a product of industry. A thing of beauty is seldom, if ever, created by the dilettante. Every child deserves to know the joy of creating a thing of beauty. As he struggles to construct a paragraph, paint a picture, play a musical instrument, or even pass a football, he will match his interest against the difficulty of the subject. And this is discipline. For Whitehead, such mastery is the highest aim of education.

COMMUNICATION CATEGORIES

KNOWLEDGE

CONSIDERATION OF THE SOURCES OF AIMS, and of the general statements of aims, provides broad hints for curriculum-makers in particular schools and for individual teachers in those schools.

In the first place, a clear suggestion comes through for constant revision of the content of a particular course. Admittedly, a course in history or English must appeal to a wide range of interests and so must cover a wide range of subject matter. This does not warrant the inclusion of material that, year after year, fails to awaken the interest of any of the students. Revision committees usually seem to find it easy to add to a course but difficult to subtract from a course. Perhaps this is a universal failing.

On one occasion, a minor naval bureaucrat stationed on an outlying island complained to his superiors in the homeland that his storehouse was filled with mimeographed material that nobody referred to and asked if he was at liberty to dispose of this material to make room for the stuff coming in each day. Word came back, after a month or so, that permission to burn the material was being

granted, but before doing so three copies of everything must be prepared! Some of our university libraries are loaded with books that nobody ever reads, and what professor ever takes the time to clear out his office? Obviously, there are certain libraries, such as the Library of Congress, where completeness of the record is all-important, but in nearly all other libraries a selection is possible. Certainly, a school must make a selection of subject matter. If the material selected is to be taught thoroughly, a degree of ruthlessness is demanded in the elimination of any that is not likely to be really useful to any member of the class. There seems little object in weighing the child down with a complete listing of all the mistakes of his predecessors.

Few teachers are likely to disagree, in an abstract discussion such as this, with the need to select subject matter. The battle will come when the actual process of selection is started. One fact seems certain. Each time something is added to a course, something else should be taken out.

A second hint derives from the need to pay attention to the so-called propaedeutic function of education—the fact that success in a course sometimes depends on knowledge acquired in previous courses. This dependence, so far as precise knowledge is concerned, is much less than most people think. Mathematics is one of the most orderly and logical of subjects. Studies have shown that comparatively little of the algebra included in the usual beginning high school course is needed in subsequent mathematics courses.[5] If this is true in mathematics, one wonders how much precise knowledge is prerequisite to the understanding of a given history course. Occasionally the meticulous fitting together of a pattern of courses means the curriculum-workers are paying far too much attention to what will be presented in the course and far too little attention to what will be taken by the children from the course.

Further comments on the acquisition of quantity and quality of knowledge by learners will be included in the chapters that deal specifically with subject-matter areas.

[5] A. R. Congdon, *Training in High School Mathematics Essential for Success in Certain College Subjects,* Contributions to Education, No. 403, Teachers College, 1930, p. 102.

UNDERSTANDING

ALL THE GENERAL AIMS AND PURPOSES OF EDUCATION SO far discussed stress the importance of understanding in the teaching-learning process. When the learner understands the ideas presented, he makes the ideas his own to the extent that he is able to fit them into a pattern in his own mind. When teachers evaluate the understanding of pupils they usually ask the pupil to demonstrate his ability to weave the new ideas into fresh combinations.

Understanding that two and two makes four is different from remembering that two and two makes four. When the teacher asks a pupil the question, "What is two and two?" and the pupil answers, "Four," the teacher cannot be sure that the pupil understands. The pupil may merely have memorized this fact. Correct answers to the following questions indicate varying levels of understanding:

1. If I have two apples and my friend has two apples, how many apples have we between us?
2. If mother has four apples and her son Johnny eats two of them, how many has she left?
3. If Stephen is two, and Susan is twice as old as Stephen, how old is Susan?
4. A pie is cut into four pieces. How many children can have two pieces each?

A more obvious example for people who haven't worked with little children for some time may be taken from algebra. Here is an equation which most people will be able to solve without difficulty:

$$6x + 6 = 3(x + 6)$$
$$6x + 6 = 3x + 18$$
$$3x = 12$$
$$x = 4$$

Here, on the other hand, is a problem:

A man is six times as old as his son. In six years he will be only three times as old. How old is the son now?

Not only is the answer four as it was in the algebraic example, but also the equation given above is one way of solving this problem. More people have difficulty with the word problem than with the equation. Those who do would probably say they have difficulty understanding how to apply algebra to a problem.

Perhaps the best example of understanding is provided when we contrast the activity of an electric computer with that of the research worker who makes use of it. But when we are told some of the feats that can be performed by certain highly complex electronic brains, the clarity of the difference diminishes. Perhaps, after all, the difference described between learning with and without understanding is a difference in degree rather than in kind. Bertrand Russell tells us there is nothing inherently wrong with the concept of a universe without a beginning and without an end. It is just the poverty of our imagination that prevents us from finding this a satisfactory concept. Should a member of the human race ever find its possible to work this out for us, the rest of us will then say that we understand it. At one time, the idea of specific gravity eluded the finest minds. Now Archimedes' principle is an intellectual tool for every schoolboy.

ATTITUDES

RECENTLY, TEACHERS HAVE BEGUN TO PLACE a stronger emphasis on the teaching of attitudes in school. The reason for this is that research workers in psychology, sociology, and psychiatry have begun to strain the mud from some deep and troubled waters.

Experienced teachers have always known that attitudes of the child are important. They found some children filled with a passion to explore the world around them. Any learning suggested by the teacher provoked in them a ready response. Often, these attitudes were displayed for only certain kinds of learning, and so interests were spoken of to distinguish pupils with likings for certain subjects.

Variations in children's attitudes appear in other ways. Some children are highly sensitive to adult approval or disapproval. One little girl blushes for shame if she fails, even for an instant, to meet the requirement of the teacher. Another stares impudently even when threatened with physical punishment. Among high school

girls, prestige is attached to high grades. Some of the boys seem to be completely without regard for these symbols of academic success.

Going further, we find children with the utmost respect and even affection for those placed in authority over them. Other children seem to want to show as much disrespect for authority as they can. They seem to hate those placed in authority just because of that authority. A third group of children seem to feel neither love nor hate, but pure disregard.

Because they can use knowledge to motivate children, teachers and counselors have long been interested in the vocational aspirations of children.

Research workers have, in general, tried to assess quantitatively these interests, attitudes, and other personality orientations of children in two ways. They have asked questions which apparently meant one thing and actually meant another, using so-called projective techniques, such as the ink-blot test (Rorschach), a variety of picture tests, and a number of personality inventories. They have also asked children directly for their opinions. Certain of these, like the Strong interest inventory, have sought validation by means of external criteria. The list of questions is asked of representative adults in a particular occupation and the pattern of interests shown by these adults is assumed to be characteristic of those who will do well in the particular vocation. When, by means of factor analyses, similar patterns of interests are demonstrated among the sets of responses from broad samples of children, trust in the scales, as they are called, steadily accumulates.

Edwards and Wilson [6] have reported on the construction of an inventory to measure attitudes toward the study of school subjects. To establish among attitudes peak areas which could be contrasted with each other in the various items of the inventory, they postulated two cross-cutting dimensions of personality. The first goes from the social to the nonsocial and considers the extent to which a given person favors interests and activities which include association with other people rather than being confined to association with animals and things. The second measures the extent to which deliberation occurs prior to choice-making. Four peaks are thus

[6] T. Bentley Edwards and Alan B. Wilson, "Attitudes Toward the Study of School Subjects," *Educational Theory*, Vol. VIII, No. 4, Oct., 1958, pp. 275–84.

made available, as these two dimensions cross one another at right angles:

1. Prudent—a deliberative orientation toward people.
2. Theoretic—a deliberative orientation toward things.
3. Immediate—a nondeliberative orientation toward people.
4. Aesthetic—a nondeliberative orientation toward things.

Contrasting each of these peaks with another provides six scales, prudent-theoretic, prudent-immediate, prudent-aesthetic, theoretic-immediate, theoretic-aesthetic, and finally aesthetic-immediate. It should be emphasized that the scales provide these terms with precise definition which is different from the usual meaning of ordinary discourse.

A student who is highly "prudent" can be expected to do well in social studies and the humanities. One who is "theoretic" can be expected to do well in science and mathematics. Those who are strongly "immediate" or "aesthetic" will not be expected to make an outstanding achievement as scholars.

Inventories using these scales showed that a majority of those who were highly "prudent" as opposed to "theoretic" made their best grades in social studies and English. A majority of those highly "theoretic" made their best grades in science and mathematics. Most of those who were "prudent" planned a "prudent" vocation, law, religion, social welfare, etc. Most of the "theoretic" wanted to be engineers and scientists.

The fact that more girls were "prudent" and more boys were "theoretic" will scarcely surprise anyone. Nor will the information that more girls receive higher grades in high school than boys. However, the association of high grades with scale scores shows that both boys and girls who are "prudent" receive more than their numerical share of high grades. Schools are favoring students who prefer the social studies over those who prefer science. This is true even with respect to such sciences as chemistry and physics. Apparently, evaluation by the teacher is such as to favor the student who by diligence and much reading achieves more at a verbal and mechanical level in these subjects than one who has a genuine scientific interest.

As was fully expected, students scoring high on the deliberative end of the scales received more high grades than those scoring high

on the nondeliberative ends, although the distinction was less clear for girls than for boys.

Deliberation appears to be correlated with both the occupation and the education of the father. A high degree of deliberative interest was found among children of well-educated fathers and (with considerable overlapping) among children of fathers holding important positions.

Attitude inventories such as those just described seem to be more generally useful to schoolteachers than those which measure traits like introversion and extroversion. Academic success seems to accompany a wide range of variation in traits such as these. Identification of persons in whom these wide limits are exceeded is most important, but, in general, the teacher will report these as medical problems in order that expert psychiatric and psychological treatment can be administered.

There are at least two reasons why teachers should wish to assess the attitudes of students. In selecting students for specialized courses and for further academic and vocational preparation, the interests and attitudes of the student are most significant. Second, where students demonstrate attitudes that are exclusively nondeliberative, or where the pattern of attitudes shows dangerous inconsistencies, the teacher may wish to help these students to change their attitudes. Although major changes in attitude patterns are still extremely difficult to establish, there is no doubt that minor changes occur throughout life. It is equally true that throughout recorded history, individuals and small groups of people have exerted a modifying influence upon the attitudes of entire nations.

SKILLS

NEEDLESS TO SAY, the categories employed in this chapter to specify the general aims of education—knowledge, understanding, attitudes, skills, and habits—are by no means mutually exclusive. Perhaps bodily skills can be conceptualized distinctly from understanding, or knowledge, but mental skills are most difficult to isolate. Use of the term "skills" does, however, point to a cluster of traits and characteristics the schools are interested in developing.

Let it be said immediately that skills are best learned from

those who have them. If possible, the teacher of a skill should be able to demonstrate a professional mastery to his pupils. Professional mastery of a body of skills is by no means the sole prerequisite for teaching. It is quite possibly not the most important quality of the good teacher. In the selection and assignment of faculty, administrators will often need to balance one quality of a teacher against another, but this does not relieve those institutions which are responsible for teacher preparation of the obligation that they develop professional mastery among as many teacher trainees as they possibly can.

Teachers of physical education in high schools are able to demonstrate more skill than formerly. Boys and girls who wish to acquire skill in swimming, tennis, badminton, and other sports are able, at least in a school with a faculty of seventy-five to one hundred, to arrange for expert instruction. This improvement is taking place because future teachers are able themselves to take professional training while they are in college. The situation is less satisfactory in elementary schools. Special supervisors for the district seem unable to compensate for the lack of one or two experts on each faculty. Again, there may be excellent reasons against the employment of specialists in physical education in an elementary school. The nature of the compromise to be effected has, in each school, to be determined locally.

Acquisition of skill is by no means limited to physical education. One of the most widely taught skills is handwriting. Legibility is aimed for, but some variation is currently being encouraged. This must be good news for those who use the left hand.

Science students deserve to find their teachers in possession of such rudimentary skills as glass bending and soldering. Researchers usually turn elaborate glass blowing over to experts. A physicist unable to solder a wire in place would be considered pretty helpless. In general, the teacher of chemistry and physics should be able to handle the apparatus in his high school laboratory with a degree of skill and competence that leaves his mind free to consider the less routine aspects of his job. If he can't hook up a flask without dropping it, or connect an ammeter without burning it out, he will continue to engage the attention of his students but not quite in the manner he intends.

Teachers of industrial arts and business education should be able

to demonstrate professional skill in these areas. In high school and college classes a professional quality can now be expected. One wonders slightly at the effect on boys in the elementary school when they see a teacher performing ineptly with a saw or wielding a hammer with both hands grasping it firmly by the neck. Actually, many teacher-training institutions are teaching the skills of hammer, saw, and plane to all prospective elementary-school teachers.

We speak of the skills of communication: reading, writing, speaking, and listening. Most teachers are good at reading, but their writing, from the point of sentence and paragraph structure, to say nothing of the use of appropriate figures of speech, leaves much to be desired. Teachers often do not speak so distinctly as persons the child hears on television.

A discussion of communication skills can easily become abstract and involved. We speak of skill in critical thinking, and creative skill. But these, if skills they be, are far different from the skills needed for the Australian six-beat crawl, and will be more fully treated elsewhere.

There is a zest that comes from the acquisition of a skill that no child should be denied. If the child is simple, he must be content with simple skills. But he deserves to learn them from a professional, not from an amateur.

HABITS

IF ANY OF US were forced to spend one whole day thinking through the pros and cons and consciously reaching a decision prior to each act, we should find the day extremely wearing. Let us suppose we wake to consciousness listening to the clamor of the alarm clock. The habitual, involuntary action is to reach out and shut it off. Today, we must consider all aspects of the problem. First, which is the stopping lever: this, this, or this? Second, am I fully awake, or is there a danger I shall drop off to sleep again? A third, fourth and fifth question can easily be imagined. All this time, the alarm has been continuing its din, waking the rest of the household, wearing out the clock, disturbing the neighbors. And the day is scarcely started. Which side of the bed to get out of? Having got out of bed, what, if anything, to wear? Which slipper

shall I put on first? Which end of the slipper is forward? Perhaps the first few scenes of the nightmare day are enough without tracing through the thousands of choices that must be made as we bathe, dress, eat, and get ready for work.

By long practice, most of these decisions are made habitually. Life would be impossible otherwise. These habits can trap us, as well as aid us, if they are not conducive either to our own welfare or to the welfare of others. As we grow older, we presumably become wiser. We should therefore, especially during the first few decades of life, make periodical reassessments of our habits. With older people, habits are apt to become firmly established. When social change is rapid, failure to adjust our habits of life can be not only stultifying, but also suicidal.

The most important habits of students so far as schoolteachers are concerned are their study habits. One of the most persistent investigators of study habits is H. D. Carter.[7] He has developed a study-habits inventory which consists of a number of questions such as, "Do you budget your time, leaving an allocated amount for the study of each subject?" Patterns of answers are correlated with school grades. There is not the close association we might expect between careful study habits and excellent grades. There are at least two possibilities to consider here: either study habits have little effect on learning, or the demands of the school are so slight that inefficient learners can still succeed if they put in enough time.

Victor Noll [8] investigated what he chose to call habits of scientific thinking. His line of research has had no intensive follow-up in recent years. Instead, such investigation as has been carried out on thinking has either been to study the psychology of thinking as a conscious process, or to investigate the extent to which students practice critical thinking. It would seem that "habit," implying an unconscious ordering of behavior, and "thinking," implying a conscious ordering of behavior do not make satisfactory parts of the same proposition.

Many teachers concern themselves over the inculcation of

[7] Harold D. Carter, "Development of a Diagnostic Scoring Scheme for a Study Methods Test," *California Journal of Educational Research,* Vol. VI, No. 1, Jan., 1955, pp. 26–32.

[8] Victor H. Noll, "The Habit of Scientific Thinking," *Teachers College Record,* Vol. 35, Oct., 1933, pp. 1–9.

habits of "neatness," "honesty," and similar generalized traits. The research available seems to indicate that the qualities referred to are highly specific and can become general only if there are many learnings of particular applications. For example, a student may be extremely neat in his written work in physics because he has been taught specifically how to be neat in this subject. At the same time, his written work in chemistry may be atrocious in appearance. Again, the fact that a man keeps his car in spotless condition is no guarantee he will hang up his clothes at night. In all probability, habits such as these are more apt to be generalized when the learner has a genuine will to be neat. That is to say, insistence upon neatness may be temporarily helpful, but eventually, when the restraints are removed, the learner will be sloppier than ever.

Honesty seems highly specific. A man may be willing to report to a sales clerk that he has a dollar too much in change and yet refuse to mention an item of income in his annual tax report. Some men who would never think of stealing material goods from a neighbor think nothing of alienating the affections of the neighbor's wife.

Probably the best chapter on habit formation that has been written so far is one by William James in his *Talks to Teachers.*

SUMMARY

THIS CHAPTER ON AIMS OF EDUCATION has not only listed and discussed certain well-known statements of aims; it has also suggested that education reaches its aims through communication. In answer to the question, "What must be communicated?" the subject matter of the school was analyzed as knowledge, understanding, skills, attitudes, and habits. Although these general categories will be dealt with more specifically when teaching and learning are treated from the point of view of traditional subject-matter areas such as language, science, and the various social studies, they can be summarized at this point by the definition of decision-making.

Children and youth share in the selection of what knowledge they will acquire when they help to choose the problems for which they will seek a solution. Although many curriculum decisions may be made at the national, state, county, district, and school level, an area of freedom must be preserved for students.

When children seek solutions to problems that are of interest to them, they will be motivated to understand the knowledge they seek in order to make the decisions that precede enlightened behavior.

With respect to skill development, the major decision made by the pupil is the determination of the degree of skill with which he is satisfied. Emphasis on this particular decision decreases wear and tear on both teacher and pupil in that goals are set which are realistic, and the student is motivated to attain those goals. Furthermore, the learner will tend to raise his sights, rather than lower them, as he approaches his goal.

Decision must precede all behavior and hence all habit formation. Decision-making calls attention to the regular reassessment of habits.

Attitudes may be acquired consciously or unconsciously. Only consciously acquired habits can be rational. Because the schools ought to stress the development of rational behavior, attitude formation, like habit formation, should be preceded by conscious decisions on the part of the student.

EXERCISES

1. List as many ways as you can of providing for individual differences in a comprehensive high school.
2. What methods are available for the selection of twelve-year-olds for various school curriculums?
3. Summarize Plato's philosophy of education. Was this education for all, or for the elite?
4. What does A. N. Whitehead mean by "inert ideas"?
5. What are some of the disadvantages of state-wide examinations? What are some of the advantages?
6. Compare a book that makes one think with a book in which all the facts are set out in a predigested fashion.
7. Suggest dimensions for the classification of interests.
8. Can you think of any examples of English literature that every American should be expected to read?
9. Try to find statements by science professors concerning what they expect of high school students.

10. Write a short essay on what you mean by an understanding of history.

11. Think of an example from architecture of a principle that man took thousands of years to master, but which is easily made clear to a child in grades seven or eight.

12. Try to find out from the library or elsewhere exactly what is meant by a coefficient of reproducibility of 80 per cent.

13. Can you think of a historical figure who has influenced the attitudes of large numbers of people?

14. Take the subject you are most interested in and show how a teacher might develop favorable attitudes among pupils toward the study of this subject.

15. How are attitudes involved in the acquisition of skills?

16. What skills should a history teacher be able to demonstrate?

17. How might a teacher try to ensure the development of proper study habits by pupils?

18. If you caught a child cheating on an examination paper, what would you do?

19. Should a physics teacher pay attention to such matters as spelling, punctuation, and sentence structure as he reads the laboratory reports of his students?

20. Attempts to correct errors in the language of pupils by marking these errors in red pencil (or blue for that matter) when the pupils write compositions, have been reported as unsuccessful. Yet teachers have been marking compositions for years and pupils have been learning to write. What might the researchers be overlooking in their experiments?

TOPICS FOR DISCUSSION

1. Comprehensive high schools are best in a democracy.

2. Attendance to the age of eighteen should be possible for all American youth.

3. "Equal educational opportunity" means the right of every child to acquire a set of favorable attitudes toward learning.

4. Only individuals who are free can be completely healthy.

5. Worthy home membership is a legitimate purpose for secondary schools.

6. What are the "fundamental processes"?

7. Must the high schools develop salable skills?

8. What is the meaning of discipline?

9. It is worth while teaching children material before they understand it. Understanding can then be expected to come later.

10. Teachers should acquire skill in drawing and lettering on the chalkboard.

11. To what extent should teachers try to improve the character of pupils? What is the best way to go about doing this?

ADDITIONAL READING

Association for Supervision and Curriculum Development, A LOOK AT CONTINUITY IN THE SCHOOL PROGRAM. ASCD is a department of the National Education Association, 1201 Sixteenth St. N.W., Washington 6, D.C. The 1958 Yearbook of the society. *This book is an analysis of the experiences of some three thousand children as they moved from one level of schooling to another. Articulation was observed between some schools but not between others.*

Bereday, George Z. F., and Lauwerys, Joseph A., THE SECONDARY SCHOOL CURRICULUM (New York: World Book Company, 1958). *This, the 1958 Yearbook of Education, was sponsored jointly by the University of London, Institute of Education, and Teachers College, Columbia University. It is a collection of nearly fifty articles, nearly all by famous authors and with topics ranging from "Tradition in Sixteenth Century English Education," to "A Yugoslav View of National Loyalty."*

Brown, Roger, WORDS AND THINGS (Glencoe, Ill.: The Free Press, 1958). *A book by a psychologist especially interested in linguistics. Although this book is aimed at the serious student of the psychology of language, the special terms are so clearly explained that the reader to whom this area is new will find much of interest.*

Lewin, Kurt, Lippitt, Ronald, and White, R. K., "Patterns of Aggressive Behavior in Experimentally Created Social Climates," JOURNAL OF SOCIAL PSYCHOLOGY, 10 (May, 1939), 271–99. *Probably the best-known study of child behavior which compares authoritarian, laissez-faire, and democratic control in the classroom.*

Lindzey, Gardner, ASSESSMENT OF HUMAN MOTIVES (New York: Rinehart & Company, Inc., 1958). *A collection of articles by the leaders in the field of the study of human motivation. The list of authors includes George A. Kelly, Leon Festinger, Henry A. Murray, Raymond B. Cattell, and Gordon W. Allport.*

Noar, Gertrude, THE JUNIOR HIGH SCHOOL (New York: Prentice-Hall, Inc., 1953). *Widely accepted as the definitive statement on the American junior high school.*

Orata, Pedro, "Educational Pseudo-science," MATHEMATICS TEACHER, 28 (May, 1935), 265–89. *A summary of the findings of psychological research concerning the transfer of training. In particular, this study treats the conflict between Thorndike and Judd.*

Riesman, David, CONSTRAINT AND VARIETY IN AMERICAN EDUCATION (Lincoln: University of Nebraska Press, 1956). *A collection of three essays, the most pertinent for secondary schools being the third, entitled, "Secondary Education and 'Countercyclical Policy.'"*

Ruesch, J., and Kees, W., NONVERBAL COMMUNICATION (Berkeley and Los Angeles: University of California Press, 1956). *An attempt to investigate a number of the nonverbal ways in which people communicate with each other, illustrated mostly by still photography.*

Simon, Louis, SHAW ON EDUCATION (New York: Columbia University Press, 1958). *Shaw was a playwright willing to discuss problems that many educated people reject as insoluble. Shaw's plays should be read again as a check against Professor Simon's interpretation.*

Spencer, Herbert, EDUCATION (New York: A. L. Burt). *This book was first published a century ago, but it reads like a discussion of today's problems.*

CHAPTER 5

Curriculum Development

SOURCES OF THE CURRICULUM

THE SOURCES OF THE CURRICULUM are numerous, complex, and diverse. Historically, the school has been used to serve the controlling individuals and groups in society. Through the establishment of a body of professional educators, and in other ways, schools have become institutionalized. Thinkers and philosophers have exerted a personal influence; technology, especially the invention of printing, has had its effect. Many textbooks have been written to please the contemporary preferences of teachers, yet teachers have chosen textbooks to fit courses whose basic outlines have long since been established. By and large, seen in historical perspective, school programs are most conservative.

IMPROVEMENT THROUGH TEACHER COOPERATION

INSTEAD OF RETREATING to a position that seems easier to defend, the best way of meeting the current wave of criticism

of the schools is to improve what goes on in them. This improvement is best brought about by a form of cooperative action that includes thinking and planning on the part of classroom teachers. There are several reasons for this:

1. Any plan for modifying educational procedures must be implemented by teachers in their own classrooms, and it is known that group decisions help individuals achieve behavior changes.
2. A program of education for those who are to retain some freedom of choice must be tailored to the local situation.
3. In the absence of complete and precise scientific information, full discussion by a number of people seems less hazardous than decision by one or even by a few. The dictator may get going faster but sometimes he rides alone in the wrong direction.
4. If disagreement over certain of the aims of education is to be tolerated, the extent of the toleration must be determined carefully. To do otherwise is to invite anarchy. A wide range of views must be represented when the extent of the toleration is to be determined, so that the consequences of various alternatives to individuals can be brought out.
5. The school in a community can be expected to experience a longer history than any of its officers. Individuals in the school system come and go. To provide the needed continuity over a period of time, group decisions are needed.

A phrase used to refer to the cooperative method of improving what goes on in schools is "curriculum development." Formally and informally, in large school systems as well as small ones, a vast quantity of activity of this kind is under way. Prodded by leaders with varying degrees of competence in the difficult group processes that are involved, committees of teachers, laymen, school-board members, students, professors, and educators generally are meeting hour after hour and day after day, hoping to agree upon modifications in the curriculum that will improve our schools. This is "curriculum development."

Based on a few scientific experiments, a number of observations, and a solid core of common sense, volumes have been written on the leadership and group processes involved in the development of the curriculum. A brief review of these processes should prove

helpful. The kind of activity that is envisaged places a stress on the freedom of choice retained for the individual and the responsibility of each individual that this freedom demands.

PARKER'S GUIDELINES

PARKER [1] HAS DESCRIBED ELEVEN GUIDELINES for curriculum improvement by means of committee action. According to the first of these:

1. *People work as individuals and as members of groups on problems that are significant to them.*

Every curriculum situation is one of making a choice among alternatives. Shall there be more time for arithmetic, or less? Shall the work of grades seven and eight be departmentalized? Shall this or that topic be omitted from or included in a course? Only when the question is significant to those who must consider it, can effective committee action be anticipated.

Problems are said to be significant to an individual when he can become involved emotionally as well as intellectually, when the problem can be seen as a basis for action, and when solution of the problem seems to be demanded. Needless to say, a problem may have significance for an individual even if he does not suggest it. Otherwise, group discussion would be fruitless and impossible. All, including the leader, share in the responsibility for suggesting problems.

2. *The same people who work on problems plan how they will work together.*

Authoritarian statements regarding procedures to be used in the solution of problems are out of place. This guideline is extremely difficult to follow, but it is most important. The leader who says, "Now, let's all sit facing each other in a circle," or, "First we must select a chairman," or, especially, "We will follow Robert's Rules of Order," soon finds himself in trouble. He may make some synthetic progress at the first meeting, but the members present will carefully avoid saying what they mean unless they spend whatever time is needed to develop their own procedures.

[1] J. Cecil Parker, "Guidelines for In-Service Education," *In-Service Education,* Fifty-sixth Yearbook of the National Society for the Study of Education, Part I, The Society, Bloomington, Ill., 1957, pp. 103–28.

3. *Many opportunities are developed for people to relate themselves to each other.*

We know that attitudes are modifiable, that they can be changed in group situations, and that such changes involve personal relationships between the individual concerned and the other members of the group. If the feelings are negative, the attitudes may change but not in the direction of the group. Such nonconformity, especially if it persists after full discussion of such facts as are known, must not only be accepted by the group, it should be treasured. Conflict such as that just described need not and should not produce personal animosities. However, the unruffled acceptance of difference is the mark of an adult, and like much of adult behavior, it must be learned.

4. *An atmosphere is created that is conducive to building mutual respect, support, permissiveness, and creativeness.*

People who know a situation thoroughly usually feel secure. There are even some fortunate people who feel secure in a situation that is essentially strange to them. Perhaps these are the ones best qualified to assume the role of leadership. Those who are insecure are best helped by giving them the time and opportunity to become thoroughly familiar with the new situation. Individuals in official positions who are unable to forget their status should be excluded from the group. Otherwise, the group will find it profitable to disband, for the decisions will be those of such individuals rather than those of the group. Basic to the democratic procedure is acceptance of the worth of each individual.

5. *Multiple and rich resources are made available and are* used.

Three kinds of assistance are needed: with content, with group techniques, and with methods of problem-solving. Suggestions of a constructive nature can be found in unexpected places —other faculty members, custodians, teachers in another school or at another educational level, parents and adults in the community, and students. One of the most fertile methods of spreading the word about good teaching techniques is to jump subject-matter lines. More than once, a difficulty encountered by the teachers of science has been resolved by the teachers of the social studies, for example.

6. *The simplest possible means are developed to move through decisions to actions.*

Nothing kills off the enthusiasm of a committee as quickly as complete lack of action following the reporting of their decisions. There are one or two built-in features by use of which this element of frustration may be avoided. At the outset, the limits of their freedom are carefully explained to the committee. Second, the person in a position to implement any decisions is kept up to date with the activities of the group. Communication with the administrator is best carried on verbally rather than in writing.

7. *Constant encouragement is present to test and to try ideas and plans in real situations.*

The individual school, rather than a school system embracing several schools, is probably the most effective unit for curriculum development. The possibility of immediate classroom testing must be close at all times. For much the same reason, ready-made curriculum materials—prepared by others than the teachers who will use them—have but limited use. Unless the teachers have shared in the preparation of a course of study they are not likely to read much sense into it. The likelihood that a course of study can be easily adapted for the use of a number of schools is remote because of differences in the needs and characteristics of the children.

8. *Appraisal is made an integral part of in-service education.*

Evaluation should be built-in from the start of any activity. Further, arrangements for the collection of factual and descriptive data must be clearly established. A formal experimental design is advocated if any great weight is to be attached by the committee to their findings.

Resistance to appraisal is to be expected and must be overcome. The principal means for reducing resistance are:

a. Including all who are affected in the planning of appraisals,
b. Doing a good job in communication,
c. Making every effort to separate descriptive data from value judgments, and
d. Making the application of value judgments a joint enterprise of all who are included in the evaluation.

9. *Continuous attention is given to the interrelationship of different groups.*

Groups concerned with education at the elementary, secondary, and college and university levels need to show mutual consideration. None of these groups should seek to dominate another, though in the past attempts at prescription by college and university groups may have been evident.

Secondary school faculties have the right, perhaps the duty, to explain to elementary teachers what skills, knowledge, attitudes, and abilities will be needed by students for success in high school, and college and university faculties have a similar responsibility. But those responsible for the so-called propaedeutic function of elementary and secondary education should be granted as much freedom as possible to work out ways of maintaining this function. Further, high school teachers can learn much from teachers of elementary school, if they are willing to listen, and college and university personnel can use profitably the unique skills of both groups. All professional groups need to maintain liaison with community groups such as those representing the parent-teacher organization, committees from the service clubs, recreation officials, health committees, and duly appointed groups of lay citizens.

The lines of communication with school-board members need to be clearly marked. Because of the multiplicity of local school districts, teacher groups are advantageously placed to provide leadership for the cooperation among the numerous school boards that is urgently needed. Positive cooperation between school boards and professional associations of teachers is just beginning. It should scarcely be necessary to point out the many opportunities that are available to cooperate profitably with county, state, and federal departments and offices of education.

Division of the educational program at the secondary and college level into departments according to subject matter presents a special need for efforts at cooperation. The isolation of one department from another, inevitable under laissez faire leadership, has a disintegrating effect upon the pupil. Positive methods of interdepartmental cooperation will be described from time to time throughout this book. Positive cooperation of a similar nature must be established between counselors and

teachers, and both groups need to acquire insight into special problems of the nurse, the attendance clerks, the custodians, and the secretarial assistants. Above all, there must be constant interchange between faculty groups and student groups at all educational levels.

10. *The facts of individual differences among members of each group are accepted and utilized.*

Not all people are back-slapping extroverts. Some are happiest spending most of the time by themselves with infrequent contacts with others. Other people do their best work in small committees with two or three members. The needed contacts are not necessarily formal. In fact, chance contacts in the hall, or over a cup of coffee, can be extremely effective in the shaping of attitudes. The point is that such attitudes should be taken only after fairly full discussion of whatever facts are available.

A major step toward the acceptance and utilization of these facts has been taken when the members of the various groups show genuine respect for each other. Such respect is acquired easily when one group seeks to find out about another from firsthand experience instead of by relying on the stereotypes provided by rumor and prejudice.

11. *Activities are related to pertinent aspects of the current educational, cultural, political, and economic scene.*

That groups planning an educational program should rely on out-of-date information concerning current educational, cultural, political, and economic events seems scarcely credible. Yet, in the words of Bertrand Russell, the schools usually seem to be busy "hammering the tacks where the carpet was yesterday." Because of the number of years taken by human beings to grow to maturity, the schools must not only keep abreast of the current scene, they must be able to anticipate it. For example, unless a war of annihilation decimates the human race, Americans can look forward to increased periods of leisure. Are children being prepared in school and college to use such an abundance of leisure for greater self-realization? Is education being presented to them in such a way that it becomes an end in itself? Of the thousands who trudge doggedly through our museums and art galleries, or who conscientiously attend concerts, operas, and plays, how many have the background needed to enjoy these triumphs of civilization to the full? Most impor-

tantly, to what extent are our children learning to live happily and peacefully in a world where they can regard all men as brothers?

These guidelines are based upon research and much practical experience. One premise of the procedure advocated is that curriculum improvement is implemented in part by fundamental improvements in the teachers themselves.

THE ROLE OF THE LEADER

ALTHOUGH THE DECISIONS preceding the necessary action are to be group decisions, the role of the leader is most significant. He does not begin the series of meetings with his mind made up and then proceed with varying degrees of subtlety to coerce or persuade the members of his committee to reach these foregone conclusions. But he must, if he is competent, be ready to supply a number of alternatives, and be able to state with some authority the consequences of following one or the other of the alternatives suggested. Further than this, he must be sufficiently flexible to be able to lead discussion of additional alternatives and be ready, as a member of the group, to join in making completely different choices, providing the area of freedom needed is accessible to the group and the choice is within their jurisdiction.

Most importantly, the leader must be able to initiate action. Not only must his own motivation for curriculum improvement be high, but also he must be able to stimulate others so that all members of the group learn to share his feeling of responsibility. He will often find that it is more difficult to maintain an enthusiastic group than it is to get one started. In spite of an enthusiastic leader and a sure-fire beginning, the vigor of a group is bound to wane unless some sort of action results from its decisions.

A good group leader knows when to keep quiet and to let others have their say. A high degree of tolerance must be maintained for those who insist on wandering off the subject, especially in the early stages of the discussion. At the same time, the leader must be sensitive to the need to push, at just the right moment for decision. This sense of timing is vital, and seems to come only with much practice.

GROUP RESPONSIBILITY

MUCH OF THE FOREGOING seems to place most of the responsibility for success on the shoulders of the leader. In a sense, this is true. Some one person must be answerable for the group. But the work of the leader is much easier, and the rate at which decisions are made is much higher, if the members of the group are willing to share the responsibility for keeping discussion going, for staying on the subject, and for supplying part of the needed impetus. The less leadership that is needed, the greater the freedom of the individual members. The more that suggestions are made by members of the group, the less they will be needed from the leader. As each member exerts his best efforts, the decisions become truly group decisions.

Obviously, the committee of teachers and their leader cannot ignore precedent. They could not, for example, recommend a sudden switch to the Italian curriculum, or the English, or even the Russian. Even if they could do so, the chances of the implementation of their recommendation would be slight indeed. Such revolution would be prevented by the way in which the school has developed historically, by the conservative attitudes of the general public, and by the inertia of the school system itself, to say nothing of a host of rules, regulations, and laws.

Hence, the process of evolution that has been described. However, needed modification of public opinion in the community can often be accelerated when school people sit down with groups of citizens and explain precisely what it is they are trying to do.

Sometimes, no explanation is needed. On at least one occasion, the following interesting technique was used to answer the criticisms of a group of parents and other adults. They were invited to an open meeting and asked to say what it was they wanted the schools to do. Precise, rather than vague, statements were demanded. For instance, "We should use phonics to teach reading in the first grade." After half an hour or so, an imposing list of wants was ready on the chalkboard at the front of the room. (Where the group is large, requests can be written and handed up to the platform.) The list was then gone over twice. First, those items were eliminated

about which, even after fairly complete discussion, there was still palpable opposition. Second, the items actually in use in the school, unknown to the proposer, were so designated by the school people present, and a check was put beside them. In nearly all cases, very few of the items left by the first going-over remained unchecked at the second going-over. Always, the list of checked items was imposingly long and the people present were convinced that the schools were doing a worthwhile and important work. The schools are thus constantly under public scrutiny; when this is not the case, many important activities of the school pass unnoticed and, like the loyal but unobtrusive housekeeper, are taken for granted.

COMMUNITY AND SCHOOL RELATIONSHIP

ON THE ONE HAND, a school whose curriculum is directly related to the people, industry, life, and pulse of the community makes a major contribution to the life of that community. On the other hand, a community whose people are alert, active, interested, and closely associated with the school makes a vital contribution to the school.

The establishment of this mutual relationship is a natural development in American communities. Traditionally in America the schools belong to the people of the community. This natural relationship is not difficult to maintain when the people in the community have an active part in the development of the school and its curriculum. In small communities nearly every person may be a contributor to the school. In larger communities the relationship is maintained by an active and sizable cross-section of the people in the community. Neither is the relationship difficult to maintain as long as the school, the teachers, the curriculum, and school activities are well known to the citizens and that "what," "how," "why," and "when" of school activities are easily observed.

If a close relationship does not exist between the school and the community, the gap indicates an unnatural relationship and should be of serious concern to the school staff. It means that there has been something that has caused this unnatural development. To re-establish the natural relationship of close cooperation may not be easy. In any event there should be a careful study of the reasons for

the lack of community closeness to the school. The restoration will also call for active cooperation and planning on the part of the entire school staff. The curriculum of the school must then be developed to the point where it will identify the school, the staff, and youth as desirable and contributing factors in the community. With the three elements of understanding, teamwork, and a desirable school operation, the task of establishing the school as a mutual partner in the life and growth of the community can be undertaken with considerable assurance of success.

INDUSTRIAL CHANGE AND THE CURRICULUM

IN PREVIOUS CHAPTERS OF THIS BOOK, the sources of basic aims for the curriculum of schools in a democratic society were presented. These were general and basic aims which apply to each child, to each community, and to the nation as a whole. These basic principles of education have developed out of many discoveries and extensive knowledge gained over many centuries. They have received special support and backing from the intensive study of many social and physical scientists during the last half-century. In fact, it is safe to say that our scientists have discovered, recorded, accumulated, and learned more in the last half-century about how people learn, grow, think, and live than in all previously recorded history.

Anthropologists point out the impetus for this intensive study. There have been three great periods of development in man's history: (1) the Neolithic Age which marked man's development as a farmer; (2) the Bronze Age which marked man's development as a maker and user of tools; and (3) the present Industrial Age wherein man has developed machinery to work for him and to improve his standard of living. Each of these periods has been under a particular impetus, and progress has been reflected in man's ability to educate his youth to carry on the growth of the culture. The present age has been marked with scientific studies in all areas of living. However, many problems have arisen which make it essential to discover ways and means to meet them if the culture is to continue to progress. One of the big problems and major areas for study in this age has been man himself.

The Industrial Age has not only involved the development of machines to help man, but also during the last half-century it has become essential that man learn to adapt himself to the machines, to the life created by an industrial society, to the standard of living produced by an abundance of materials, and to the problems involved in human relations when people must live interdependently in large groups or cities.

Since the Industrial Age is a relatively recent development of society and has risen most rapidly in America, there is very little historical or comparative material which can be used as a design for the school curriculum. This means that practical use must be made of the research on present man—his present conditions, how he adjusts, and how he learns. The proper development of the school curriculum must therefore depend upon educated decisions from the evidence at hand. In the absence of certain knowledge, the insight of numbers of people must feed into the decision-making process.

Material inventions have made the "American standard of living" unequaled by any other nation and an international byword.

But the American development of the philosophy of the common man has been a greater contribution than the invention of the assembly line. Our country has been the first to conceive of a society where the lot of the common man could be made easier, where the same opportunities are available to all.

This American cultural development has been gained chiefly through the mastery of a skill for "arriving at group decisions in the best interests of the group and dealing with matters of common concern." Through the exercise of this skill it has been shown repeatedly that the judgment of the "masses" is sounder than the judgment of "the classes," especially on broad questions of policy. This same democratic skill can be used in building the curriculum of the school.

It is essential that the curriculum of the school, whether it is the scope of the program or the method of the teacher, must develop within youth the necessary social skills, understandings, and interpretations demanded by our increasingly complex way of life. It is also essential that the school should base its curriculum and methods upon the research that has been done in recent years in the

areas of learning, child growth and development, group interaction, and other studies of social development. These have all been embodied in the sources of aims listed previously. Aims are essential to direction, and understanding is essential to implementing these aims into curricular practice.

SCIENCE AND THE CURRICULUM

MANY PERSONS ARE STILL UNAWARE of the spirit and method of modern science as an essential part of our way of life. Yet American youth will be called upon to live in a wonderworld of science. Youth must not only understand but provide leadership in the Atomic Age. In a few short years our children will be called upon to make decisions crucial beyond the scope of present-day imagination. These decisions certainly will involve scientific considerations. The manner in which they are arrived at, acted upon, and weighed in relation to circumstances and events undoubtedly will determine the course of society.

It is essential therefore not only that a few qualified students receive an education centered in science, but also that the general curriculum include scientific orientation. Related to this orientation are certain quantitative, qualitative, mechanical, problem-solving, and decision-making skills. Science has long prided itself on the "scientific method"—the often announced essential element in "critical thinking." It is the task of the school to develop this method into a tool for making critical decisions, based on evidence, understanding, and experience.

The school that does not provide a good science program and the community that does not insist upon such a program are seriously neglecting the education of modern youth. This program must be well planned; must be productive of basic, essential, qualitative, and quantitative understandings; and must provide background experiences for making important social decisions. As can be readily seen, these essential ingredients call for much more than the memorizing of traditional experiments.

SOCIAL COMMUNICATION

THE CURRICULUM must be developed in another area. Today's life requires understanding between various peoples, communities, and nations. Experience is shared by the use of symbols. Language, spoken and written, communicates thought and association. Books, magazines, newspapers, letters, casual meetings, and formal conferences are all devices for the sharing of experience by means of language. Youth need opportunities for thoughtful listening and for mastering and using languages.

What is needed is the development of the essential tools for intelligent social communication. Rote conjugation of verbs, memorization of thousands of isolated "spelling" words, and the automatic elimination of "ain't" or "he seen" from normal speaking are important, but the primary goals are the accumulation of experience in thinking and communication of thought to be used in the development of skill in making group and individual decisions.

The development of such skill should not depend solely upon teacher-pupil communication (assignments and recitation). It is essential that the pupil practice what he has learned formally in more lifelike situations. As youth learn to communicate intelligently with others in an expanding world they will use an ever-increasing variety of materials and constantly need to learn new forms of communication.

THEORY AND PRACTICE

THE TEST OF THEORY is whether or not it can be put into practice. And the test of practice is whether or not it is based upon sound theory. Theory for curriculum development should be based upon evidence, practice, research, and group decisions. Whether or not theory is sound for the development of communicative skills or other areas of the curriculum can be determined in schools and communities only by taking definite steps to bridge the gap between theory and practice.

There is already considerable agreement that the teaching of social studies, science, and language arts is important in the Ameri-

can school. There is also general agreement on the other broad fields of the curriculum—mathematics, fine arts, business education, health and physical education, industrial arts—and even agreement with the need for inclusion of allied activities such as student council, clubs, and athletics. Further, there is widespread agreement on the subareas within these fields, such as geometry and sewing. There are many sound theories and acceptable practices to implement these theories. However, when it comes down to a specific school and a specific community there may not be agreement as to what constitutes sound theory and acceptable practices. There may be no clear concept on the part of the total school staff or individual members of the staff regarding the total curriculum and its total contribution to the youth of the community. Also, individual teachers may not feel they have a part in the total curriculum and the total planning. There may be just blind acceptance and an assumption that the entire curriculum has already been finally planned. This assumption may be false. Even when it is not, there may be no discernible relationship between what the individual teacher is teaching and the entire program or the over-all theory.

THE TEACHER'S CONTRIBUTION

THERE ARE CERTAIN THINGS that the individual teacher can do on his own in contributing to sound curriculum development.

1. He can become an expert observer. He can sort out the elements that make up his community. He can participate in one or more important community activities. He should not tell people how to solve their problems, but observe how they attempt to do so. He should talk with people in all parts of the community, see how they live, know their ambitions, their needs, their feelings, and their function in the community. He can visit an industrial or manufacturing plant in the community. To see the assembly line, "automation" at work, the worker as an individual and as a member of a group, helps understanding of the potential and the meaning of free enterprise.

   He can visit or at least spend some time studying one other country to contrast the American standard of living with

that of others. As he does so he can appreciate the need for the young people of America to develop a sense of responsibility for world leadership. As he studies, compares, and participates, both the potential and the goals of the culture begin to clarify. Then he is on more solid ground in accepting or rejecting theory.

2. He can explore the books of the leaders in various social sciences. Nontechnical writings are usually available which clearly state the theory and research findings of the several fields. The task here is to get a general acquaintance with theory and its relation to the curriculum.
3. He can observe and study his students, for they, after all, are the ones most directly affected by the curriculum. He can discuss their problems with them; he can visit their homes, and see how and where they live. He can study the discoveries in the field of child and adolescent psychology, and learn more of youth's growth and development, ways of learning, social ties, group relations, motivations, and interests.

He can develop, on his own, a list of essential items to be included in the curriculum.

Where entire faculties or groups of the school staff and even members of the community desire to work on the curriculum of the school, the process for the group in gaining background is not materially different from that of the individual teacher. Pooling of effort will save time. Group decisions will probably be more significant than individual decisions. Most of the procedures suggested here have already been tried out in many different schools and locations. However, local acceptance needs to be pursued with as much care as possible if the local community is to see clearly the direction of curriculum development and to be convinced of its soundness.

PRACTICE AT LOCAL LEVEL

ONCE A SET OF PROPOSALS is accepted by the district or community, there still remains the task of implementing these proposals in a given school. Before this can be done, there are a few basic principles to be considered.

1. Youth must acquire the skills of citizenship.
2. Each youth needs help in resolving conflicts, establishing attitudes, and building interests.
3. Various problems of continuity, sequence, and differentiation are to be looked out for as the curriculum is developed.
4. There is a tendency to let the accumulation of problems slow down and bring to a halt curriculum changes. Yet in our age of speed and change no school or community can afford to neglect curriculum planning and development.
5. The desired end-product is the development of citizens who have the power to think their way through to constructive decisions.

EXERCISES

1. Try to find pairs of sayings about child-rearing which express opposing points of view.

2. Point to curriculum changes in your local high school that have been made in response to some of the recent criticisms of schools.

3. Can you produce evidence in your locality to show that the state university has influenced the high school curriculum? If you can, how extensive is the influence and does it apply only to those who will eventually attend the state university?

4. What curriculum does Plato recommend for the guardians?

5. What are the seven liberal arts?

6. Differentiate between inductive and deductive thinking.

7. Compare the present curriculum of one of England's public schools (Eton or Harrow, for example) with its curriculum fifty years ago.

8. Study one of the early Protestant schoolmasters in America and give a brief description of his life.

9. What was the major contribution to science of William Gilbert?

10. Examine and describe a textbook that is over one hundred years old.

11. Find out when your state university was founded and try to locate a copy of its charter.

12. What are the provisions regarding education in your state constitution?

13. How does the University of the State of New York compare with some other state university?

14. Summarize the educational contributions of Froebel, Montessori, and Comenius.

15. Show how the methods of Pestalozzi lost much of their significance when American teachers were in effect compelled to use them.

16. Write an essay on the founding and development of the National Education Association.

17. What can you find out about Horace Mann and Henry Barnard? Is there a famous educator in your state whose name you have heard frequently but of whose life and educational influence you know nothing?

18. Examine your state university and demonstrate clearly the relationship of the college of letters and science or of liberal arts to the various professional schools. Is there a graduate school? Show the official relationship of administrators in charge of these schools and colleges and the university president. How are funds disbursed? Who makes up the various budgets? How are faculty members recruited and promoted? How does a typical faculty member spend his time?

19. What are some specific effects of the scientific approach to education?

20. Why should classroom teachers be involved in curriculum modifications?

21. Examine the operation of your local school district. If possible, visit the downtown office of the superintendent of schools. Interview at least one person there and try to find out how the schools are run. When does the school board meet? How about attending a meeting of the school board?

TOPICS FOR DISCUSSION

1. Children should be made to work hard in school.
2. The usefulness, as educational criticism, of the book by Arthur Bestor, titled *Educational Wastelands.*
3. The curriculum of the government schools of ancient Egypt.
4. Control of education by the church.
5. Ways in which teachers can avoid complete routinization of their procedures and at the same time build on their experience from year to year.
6. The pansophic curriculum of Comenius.
7. The concept put forward by John Locke that the mind of the newborn child is a clean slate.
8. When an institution is newly founded, ideas are sought among the leading thinkers of past and present. When an institution has developed a life of its own, the influence of fresh thought from contemporary thinkers is negligible.
9. Rousseau's suggestions for bringing up children.
10. Methods of grouping children for instruction that were in use prior to 1800.
11. Rural as compared with urban adolescence.
12. John Dewey's "complete act of thought"—to sense problem, define it, hunt for clues, state a hypothetical solution, test the hypothesis, and reach a conclusion.
13. Parker's guidelines for curriculum improvement.

ADDITIONAL READING

Association for Supervision and Curriculum Development, GROUP PROCESSES IN SUPERVISION (Washington, D.C.: The Association Yearbook for 1948). *The second chapter provides a carefully documented statement of the theoretical position with respect to democratic group processes.*

Association for Supervision and Curriculum Development, RESEARCH FOR CURRICULUM IMPROVEMENT (Washington, D.C.: The

Association Yearbook for 1957). *The list of authors represented in this collection includes Hilda Taba, Chester W. Harris, Virgil E. Herrick, and Stephen M. Corey.*

Benne, Kenneth D., and Muntyan, Bozidar, HUMAN RELATIONS IN CURRICULUM CHANGE. Circular Series A, No. 51, Illinois Secondary School Curriculum Program Bulletin No. 7 (Springfield, Ill.: Office of the State Superintendent of Public Instruction, 1949). *This book has had an excellent reception. It is one of the publications of the Illinois Curriculum Program. It is a collection of articles dealing with the problems that arise first in getting started on curriculum development and then with those that arise after the development is under way.*

Corey, Stephen M., ACTION RESEARCH TO IMPROVE SCHOOL PRACTICES. (New York: Bureau of Publications, Teachers College, Columbia University, 1953). *The best statement available on how to conduct action research.*

deHuszar, George B., PRACTICAL APPLICATIONS OF DEMOCRACY (New York: Harper & Brothers, 1945). *Divides democracy into "talk democracy," "consent democracy," and "do democracy." This book is full of useful and practical hints on how to move people through talk to action.*

Edwards, T. Bentley, THE REGIONAL PROJECT IN SECONDARY EDUCATION (Berkeley: The University of California Press, 1956). *The official description of a program of cooperative curriculum development carried out in eighteen high schools in Northern California.*

Evans, Hubert M., and others, COOPERATIVE RESEARCH AND CURRICULUM IMPROVEMENT (New York: Bureau of Publications, Teachers College, Columbia University, 1950). *A progress report on an experimental project developed in the Battle Creek, Michigan, schools.*

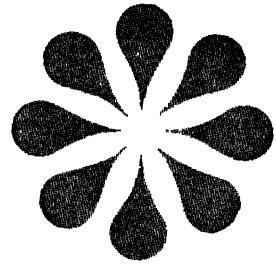
National Society for the Study of Education, ADAPTING THE SECONDARY SCHOOLS TO THE NEEDS OF YOUTH. The Fifty-second Yearbook of the Society. (Chicago: University of Chicago Press, 1953). *This yearbook marks the end of an era. It is the last complete volume to appear that considered the curriculum solely from a child-centered point of view.*

Parker, J. Cecil, "Guidelines for In-Service Education," IN-SERVICE EDUCATION. The Fifty-sixth Yearbook of the National

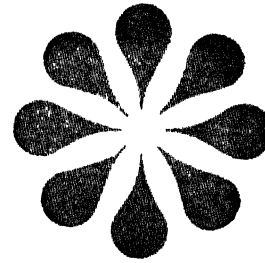
Society for the Study of Education, Part I (Chicago: University of Chicago Press, 1957). *The entire volume provides a modern summary of views concerning in-service education.*

Selznick, Philip, LEADERSHIP IN ADMINISTRATION: A SOCIOLOGICAL INTERPRETATION (Evanston, Ill.: Row Peterson, 1957). This provocative essay is especially significant for educational leaders, subject as they are to external stress. The theme of the essay is that desirable leadership makes the kind of decisions that are consonant with the integrity of the organization in much the same way that the moral person makes decisions that are consonant with his own integrity.

PART II



OVERVIEW



THE PRECEDING CHAPTERS provided a point of view based on a concept of equal educational opportunity for all children. This view acknowledges the existence of differences among children and implies that the differences will grow more rather than less under the proposed system.

After a consideration of the sources of the aims of American education, a few well-known statements of aims were analyzed. As a result of this consideration and analysis, an increase in the extent of deliberation prior to the making of a choice was seen as the unifying purpose of the schools in our American democracy.

The next part is divided into chapters which correspond to traditional subjects or groups of subjects. A number of alternative suggestions have been made for the organization of the curriculum, but though such a plan as the core program, for example, has been popular with educational theorists for over a quarter of a cen-

tury, it has never been accepted by any large section of educational practitioners. To the great majority of school people, the curriculum is a collection of courses.

Over the years, many courses have been added, a few have been removed, a number have been modified, and one or two have remained more or less the same. Traditionalists in education point with pride to the persistence with which certain subjects have remained on the curriculum. It must be pointed out, however, that the teachability of a course, and this is what the test of time measures, is not necessarily a measure of educational value.

Each chapter discusses a broad area of the curriculum, such as science, and the discussion refers to the teaching of these subjects in the elementary school as well as the secondary school.

CHAPTER 6

Curriculum for Communication and the Language Arts

LANGUAGE: A DECISION-MAKING TOOL

THE ADVENT OF SPEECH spurred man's long history of development as a social being. The advent of writing has meant that there are no discernible limits to this development. Anthropology, as well as history, illustrates this generalization; the literate groups or societies are vastly more complex than the illiterate.

As literacy increases, therefore, so does social diversity. Language teaching in western civilization, and particularly in American society, must reflect this diversity and at the same time be consistent with the goals of our society and our generation. For, in the words of the National Council of Teachers of English,[1] "The goals of teaching the language arts are as old as the ideals of west-

[1] National Council of Teachers of English, the Commission on the English Curriculum, *The English Language Arts in the Secondary School,* Appleton-Century-Crofts, New York, 1952.

ern civilization. Yet each generation faces the task of interpreting the goals anew in the light of conditions of its own age." Language is essentially a social process, a social skill, a social tool, and a social advantage.

Language as the basis of communication is the key to all learning. From one point of view, communication and education are synonymous, for it is the ability to share complex and highly abstract thoughts that sets man apart from other living organisms. Each word, whether written, read, spoken, heard, or thought, is a generalization based upon experience. By means of words, man seeks to extract the essential meaning from his physical and social environment. Hence, there is the danger of what has been called "elementarism," a reflection of the impossibility of making any collections of words, even in English, both precise enough and complex enough to provide identical meaning for speaker and listener, for writer and reader. Teachers of language share a grave responsibility. On the one hand, they must develop the student's vocabulary, and on the other hand, they must guard against a superficial verbalism.

Careful and informed use of language makes possible the rapid contemplation of a wide range of alternatives. Language, because it symbolizes thought, unfetters the imagination; with its acquisition and use come a host of unforeseen purposes. These purposes, and the means then arrived at of achieving them, make up the culture in its broadest sense.

Research in human development has pointed out with repeated emphasis that growth is a steady and gradual process rather than one which jumps ahead at clearly marked intervals. The pattern of understandings, attitudes, and abilities needed in adult life begin their growth at birth—developing at each increased level of maturity into better insights, better attitudes, and better abilities. An individual cannot be forced into a higher level. However, the direction and shape of his experience can help greatly. Thus, the task of education is to provide, with an appropriate degree of organization and interpretation, experiences for students as they progress through levels of maturity. It is for this reason that the language arts curriculum must provide practice in the social processes

of communication: thinking, reading, writing, listening, using values, working in groups, and reaching decisions.

In this critical period, a youth's experience as he matures must develop in him a strong sense of social responsibility.

Teachers of the language arts are fully aware of their role in this development. Through their national organization, the National Council of Teachers of English, which includes among its membership teachers at all educational levels, they have sought to define the goals of the teaching of English. A Commission of thirty-one members including teachers, professors of English, experts in child psychology, principals, a librarian, and a college president was appointed in 1945 to prepare a series of volumes on the English curriculum.

GOALS FOR THE LANGUAGE ARTS

THE NATIONAL COUNCIL OF TEACHERS OF ENGLISH [2] lists these ten goals for the language arts curriculum:

1. Wholesome personal development.
2. Dynamic and worthwhile allegiance through heightened moral perception and sense of value.
3. Growing intellectual curiosity and capacity for critical thinking.
4. Effective use of language in the daily affairs of life.
5. Habitual and intelligent use of the mass media of communication.
6. Growing personal interests and increasingly mature standards of enjoyment.
7. Effective habits of work.
8. Competent use of language and reading for vocational purposes.
9. Social sensitivity and effective participation in group life.
10. Faith in and allegiance to the basic values of democratic society.

The ten goals listed above are easily criticized. The paragraphs by the NCTE which amplify the statement considers most of the

[2] *Ibid.*

criticisms that follow. For example, the word "wholesome" used in the first goal was probably accepted by the Council with reluctance after they had rejected "healthy," "adequate," "good," and "complete."

Statement two seems to say nearly the same as ten. However, statement two refers to home, friends, church, and community, and statement ten to America generally. Although the charge of redundancy can be withdrawn when the statements are read in context, the two statements should probably be placed next to each other in the list.

Statement eight seems definitely a part of statement four. Certainly these two statements should not appear together in a list of ten separate goals.

Use of the words "effective," "competent," and "intelligent," seem inappropriate in a list of goals because of their vagueness. Yet statements which will be acceptable to all teachers of English must of necessity be couched in broad terms. A listing of general goals is inherently a contradictory process and therefore a practice which curriculum committees should forego. On the other hand, statements of philosophy, without the numbered separations, should prove helpful to teachers, for words, sentences, and paragraphs provide the needed flexibility when they are not clamped in place by numbers.

These goals for language arts, the examples used, and the amplification provided show that the Council has made a significant attempt to outline educational guideposts.

If the broad goals of language education are to be achieved, all teachers must become teachers of communicative skills. This has long been practiced by teachers of the elementary grades. It is just as essential for teachers in colleges and secondary schools. Communicative skills include reading, writing, speaking, and thinking.

The basic question for each teacher is, "What can I do to help each pupil improve his communicative abilities as fully as possible?" This includes developing interest, providing materials, using effective methods, and expanding the developmental sequence of learning so that the pupil's educational experience takes him as far as possible.

This also means keeping the youth's language interests active

regardless of the level of skill. Since language development is closely associated with intellectual curiosity and critical thinking, goals in all subject areas, each teacher has the task of helping with this development. Any teacher who has seen first-graders the first day of school knows how eagerly they look forward to reading. Most teachers have observed at one time or another the outward signs of emotional struggles that take place within a child when he does not readily learn to read. These anticipations, emotional components, and natural drives are equally involved in the development of all the language skills.

Broad goals, such as those presented by the National Council of Teachers of English, point the general direction for the language arts curriculum. It is quite evident from these goals that there are many things, in addition to reading, writing, speaking, and listening, that pupils must learn within the scope of a language arts program. In particular, they must develop the abilities needed for performing social tasks. At an early age, achievement in independence, in the power to do well, in the ability to think along with others, and in contributing to important decisions is a potential source of great satisfaction and pride.

Reading is not just an isolated skill. When a child reads, he reads as a whole personality, creating his perceptions from within himself under the stimulation of the symbols he has learned to interpret. Hence, in learning to read and in improving reading ability there are many growth processes. Other language development is equally complex.

The general goals of language arts teaching, the complexity of the processes to be taught, and the concepts provided by research on child growth and development must be considered together as we develop plans to serve as immediate goals for the language arts program in each school. These plans must develop locally, but even those for a particular school must leave plenty of room for variations among teachers and pupils. The following statement is an example of the headings under which the local plans might be organized.

1. To recognize the need for learning to communicate.
2. To acquire an interest in reading.
3. To carry on a conversation.

4. To organize thoughts in order to express feelings and ideas clearly to others.
5. To learn meaningful, precise, and adequate vocabularies for the speaking, listening, reading, and writing required in school experiences.
6. To use sentences, paragraphs, punctuation, and precise word meanings in written and oral expression.
7. To adapt language to the varied circumstances, situations, and tasks which pupils must face.
8. To learn to gather information and to examine data critically.
9. To acquire a taste for good literature.
10. To speak clearly and forcefully before others.
11. To develop a sense of security in language usage which is achieved when one knows how to spell, read, write, listen, and speak.

These language skills will increase gradually. Each child is individual in his potential for growth and his background of language experiences. When a child enters school, he brings his own language with him. He has developed this language by association with his parents and neighbors. When the child leaves school, the language he takes with him will still be his own. He will develop this language through his personal experiences with home, school, and community. The language level which the child finally achieves will depend both upon these experiences and the guidance he receives in school.

In European countries, and in those countries most heavily influenced by European methods of education, there is a strong emphasis on the reaching of a fairly uniform set of standards of writing and speaking by a comparatively small segment of the adult population. To a large extent, membership in this segment is determined at birth. American educational procedures, mirroring American social procedures, repudiate the concept of a hereditary aristocracy, yet many Americans find the concept of high standards for those who can reach them most appealing. In all probability, this concept will continue to be emphasized in American schools. In their zeal for the imposition of standards, the reformers should not overlook the fact (which leading educators in European education clearly understand) that while uniformity of standards may be

appropriate for such mechanical elements of communication as spelling, and perhaps grammar, "style" must belong to the individual and cannot be judged without taking the personality of the speaker or writer into consideration. If the creativity demanded for the solution of today's problems is to be released, at least a few authors and speakers must not be contained by any possible set of uniform standards.

PROCEDURES AND METHODS

THE TYPE OF GUIDANCE and the activities which the teacher may plan in order to provide these personal language experiences are numerous. The following offer rich opportunities for guidance in the practice of the language arts:

1. Working on school projects: listening to ideas, expressing ideas, taking part in the formation of group plans, making things, preparing projects, recording progress, collecting information, dramatizing information, and writing observations.
2. Preparing reports: planning, outlining, discussing, displaying, hearing, reading, and writing.
3. Experimenting and observing: planning, writing, making observations, explaining, discussing.
4. Gathering information: reading, taking notes, thinking about it, discussing, showing, dramatizing, sharing.
5. Solving problems: searching, discovering, discussing, recording, planning solutions, analyzing, explaining, making decisions regarding solutions to be tested.
6. Enjoying stories, adventures and events: watching, hearing, telling, writing, reading, dramatizing, discussing, evaluating, creating.
7. Studying people and cultures: reading, sharing information, developing ideas about them, discussing observations, writing stories, seeing pictures or movies about them, using media of mass communication to become informed about them, and discussing their problems and social functions.
8. Enjoying poetry and literature: reading, listening, discussing, dramatizing, creating, writing, explaining.
9. Using television, radio, telephone, recordings, movies: lis-

tening, planning programs, taking part in programs, discussing, developing written reports.

10. Communicating with people outside the classroom: writing letters, seeking information about and from them, discussing problems of mutual interest with them, arranging interviews with them to obtain stories of personal experiences.
11. Self government: developing class and school standards, making rules, planning, organizing, participating, discussing, making decisions, writing rules and minutes.

These are some of the many and varied language activities which can be carried on in any classroom. A classroom constantly dominated by the teacher, who is talking much of the time, giving directions, making assignments, giving tests, demanding quiet, listening to recitations, deprives the pupils of many vital language experiences. In a classroom where there is a variety of participation activities, the teacher sets the direction, introduces basic concepts, and promotes correct language usage.

Before a discussion of details of the language arts program, a few words may be in order concerning an aspect of modern education that has been heavily criticized in the last few years. In the emotionally-toned words of the critics, this is the "cult of mediocrity." Many school people experience mixed feelings when they hear this accusation. On the one hand, they resent the implication that schools are deliberately holding clever children back, yet on the other hand, they know full well that not even in the elementary schools have the problems raised by individual differences been completely solved.

Leaders in language arts education influence teachers in a number of important ways. They meet in solemn conclave and produce such important generalizations as those summarized in the preceding pages. Having established these goals, some of them conduct research into the teaching of the language arts in order to determine the most effective teaching methods. A number of the leaders write textbooks for use in the teaching of the language arts. Sometimes, but not always, the men and women who conduct the research assume senior authorship for the production of the textbooks. Senior authors of most textbook series use leading practitioners as assistants, choosing separate experts for the various grade

levels. The textbooks, and the manuals written for the teacher, contain numerous suggestions for decreasing the heavy burdens on the teacher, who must work every day and all day with a room full of children. Inevitably, these suggestions have to do with the management of groups rather than with the management of individuals. In the elementary grades, the use of several texts has become popular, thus encouraging varied performance on the part of the children.

A stronger influence toward uniform performance than the use of textbooks, and one that many teachers do not recognize, is the stress on the teaching of language as a social process. The logic that urges the teaching of language, a social process, by means of social methods, is most appealing. But use of such methods as "sharing," chart preparation, and group projects must be exceedingly adroit, and must be balanced with opportunities for individual work, if the most advanced children in the class are to be benefited. An emphasis on speaking and listening in the classroom means that unless the teacher deliberately holds back the level of conversation, the slow child will find these activities as far beyond his powers as the highly developed child finds them below his.

Much research on the growth and development of children emphasizes typical behavior. Statistically, a norm becomes an average, rather than a goal which many will strive for but few achieve. Because the validity of scientific research is judged partly by the extent to which the generalizations made are applicable, scientific findings concerning human beings can never be couched in terms that apply to a particular individual. Research can make a statement about bright children as a group, but never about this particular child. The teacher needs help in interpreting the findings of research if he is to use these findings wisely in the classroom. For example, research concerning growth and development has shown that the child must be ready before he can learn to read. But kindergarten is not the only place where children acquire readiness. A few children enter the public school not only ready to read, but already reading. Are these children going to be stimulated to take advantage of their early start, or is their growth to be hobbled while other children are provided with an opportunity to catch up?

The foregoing discussion has emphasized the role of the teacher

in planning activities for children. An entirely different influence toward typical behavior comes from the children themselves. Coleman[8] has recently reported on the value systems of adolescents and concludes from his data that boys and girls, even in relatively high-achieving schools, are faced with the necessity of choosing between extending themselves intellectually, and being popular with their fellows. To cope with the grading system of teachers, student peer groups establish standards for maximum output that keep the majority from experiencing excessive strain.

THE LIBRARY

THE SCHOOL LIBRARY is a vital link in the language arts program. It is the workshop, resource center, and personal laboratory for each pupil and teacher in the school. It is here that the language resources and "food for thought" are stored, ready for use.

The library is useless if it is not used. Furthermore, it must be properly stocked. Although most high schools and all colleges have had libraries for decades, only in recent years has the library become an integral part of the language arts program.

There are several types of library programs, all working toward the same goal—a live, functioning part of the school curriculum. Some school libraries are separate entities within the school, ordering their own books and setting up their own distribution program within the school. In other districts the school library is only part of a broader library system with administration from a central district office. In some districts the school library is responsible for supplying audio-visual materials as well as books.

There are a few basic principles that should guide the library system within every school:

1. The librarian should be a regular member of the school staff and a specialist in the sources, content, and application of instructional materials, especially books.

[8] James S. Coleman, *Social Climates in High Schools,* Cooperative Research Monograph No. 4, U.S. Department of Health, Education, and Welfare, Office of Education, Washington, D.C., 1961.

2. The librarian should be a member of the curriculum-planning team.
3. The librarian should be a resource person who can help each teacher collect, distribute, and use effectively the instructional aids in each curriculum area.
4. The librarian should be a friendly and cooperative individual who can guide each pupil in his search for information and recreational stimulation.
5. The library should be a comfortable, cheerful, relaxing, and interesting place in which to be, with an environment that stimulates the intellectual and the recreational interests of both staff and pupils.
6. The library should be stocked with up-to-date reading, visual, and auditory materials suitable to the age groups being served.
7. The library should contain a wide variety of materials, ranging from easy recreational reading materials to highly specialized scientific and cultural information.
8. The materials of the library should be easily available to every teacher, every room, and every pupil.

These few basic principles could be broadened, of course, and also could be made more specific. The point is, however, that the school staff should assist in setting up specific guiding principles in each school for the selection, distribution, and use of library materials which will contribute directly to the curriculum of the school. The function of the library should be clearly realized and plans made and executed for full use of the library as a learning laboratory. A properly planned and well-stocked library is one of the strongest arms of a total school language arts program.

PRIMARY GRADES (K–3) CURRICULUM

IN THE PRIMARY GRADES separate and prolonged instruction in each language area is of little value. The children should have opportunities to listen to stories, to write letters to their parents, to play roles in dramatizations, to make announcements, to spell out signs for "open house." Each such experience

has a purpose and involves many kinds of language practice. There should be a natural integration of language skills. Very often a teacher may develop a skill in the pupils merely by leading them repeatedly through similar experiences. The more letters they have to write, the more familiar they will become with letter-writing form.

The child is normally ready to speak before he is ready to read, and he is ready to read before he is ready to write. Readiness is an important factor in all language skills. The child's listening and speaking abilities have been developed more or less before he enters school. In the primary grades, these abilities will expand. At the same time, the school will play a major part in the development of readiness and the early stages of reading and writing.

The scope and sequence of the language arts program in the primary grades should include:

DEVELOPING THE FOUNDATIONS OF ABILITY

KINDERGARTEN AND PRIMARY CHILDREN vary in their ability to listen. Some are too easily distracted by sights, sounds, and events to concentrate on what others are saying. Others hear, but neither absorb nor remember what they hear. A child entering kindergarten may not even want or care to listen to others. By the first grade he generally listens to some of the contributions of others, if only enough to know when the speaker has finished so he may express his own ideas.

The second-grader has a longer interest span; the third-grader can generally enter into a give-and-take relationship through attentive listening and through expressing his own ideas. At various developmental levels the primary child is increasingly capable of developing mature language abilities. However, listening and give-and-take abilities may not improve unless the school provides activities and direction.

Through classroom experiences and instruction, the school can reasonably expect to teach these language skills in the primary grades:

1. ***Reading:*** In kindergarten and grade one the pupils should

learn, through language experiences in school, meaningful concepts in preparation for reading. They should expand and enrich their speaking, listening, and understanding vocabularies basic to successful reading. Readiness to read is, for most children, the major accomplishment. Some may learn to read charts and pre-primers. Grades two and three should constitute a period of rapid learning of fundamental skills, habits, and attitudes. The pupils during these grades should be able to master to a considerable extent the basic motor mechanics of reading. They should gain the ability to comprehend and interpret simple materials of oral and silent reading. Pupils learn to associate symbols with meaning. Also, during these grades basic attitudes toward reading are established. Some children should acquire independence in attacking new words analytically.

2. ***Speaking:*** During the primary grades the improvement of speaking abilities, growth of self-assurance, and comprehension of meaning should take place, and expansion of vocabulary and increasingly accurate pronunciation should be acquired.

In learning to converse, the child begins the improvement of basic language habits. Through natural language opportunities and experiences, shyness and fear before others give way to confidence and poise and should lead to easy and comfortable oral expression. These are basic to establishing the desire and the willingness to improve in quality of expression and to accept help in correcting language errors.

Emphasis is upon content—what is said—in the primary grades. Incomplete and immature sentences, through practice in the expression of ideas, will become complete and more mature. The abler pupils can learn to use a variety of sentence constructions. They can also make a beginning in choosing words that express exact meaning. The basic elements of audibility, distinctness, correct pronunciation, and voice control can be accomplished. In the informal oral language work of the primary grades is provided the foundation of all later language development.

3. ***Listening:*** Listening is a natural corollary of speaking. For every speaker there should be a listening audience. Through emphasis upon the ideas, thoughts, and sequence of topics, reflective, attentive, and thoughtful listening grows.

4. ***Writing:*** For many years of the child's school life, freedom

of expression in written language will be limited by mechanical and muscular difficulties. However, habits and abilities developed in oral work will appear as the mechanical difficulties of writing are overcome. Primary emphasis should be placed on oral work in the kindergarten and first grade. Preparation for writing is started early through observation of the teacher as he writes names, assignments of duties, records, and notes on the board. As soon as pupils acquire a small, basic reading vocabulary, they begin to observe written words, read sentences, engage in making experience charts dictated by the teacher, and notice sentences, capitals, and periods.

Writing begins with such purposeful individual activities as signatures and labels. Then follows copying a simple communication. Gradually sufficient mastery of handwriting and spelling skills is achieved for the written language to become a medium of expression. If emphasis is placed upon using written language as a natural medium of communication and self-expression, and if the mechanics of handwriting and spelling are shown as natural elements of good expression, the pupil's skill will develop rapidly after he has completed the primary grades. Emphasis in the primary grades upon correct form and spelling, with the subordination of written language as expression, may delay the development of written communication many years.

INTERMEDIATE GRADES (4–8) CURRICULUM

THE LANGUAGE ARTS PROGRAM in the primary grades is largely a functional program, with emphasis and organization centered in the various language activities in which children normally engage. This functional program is supplemented in the areas of speech correction, handwriting development, beginning spelling, and reading instruction by scheduled systematic and sequential development of competency.

In the intermediate grades the language program is usually developed in a separate period of instruction, although the work grows out of and leads into activities in other areas of the curricu-

lum. Pupils in the intermediate grades are usually sufficiently mature to profit from the more formalized instruction. Nevertheless, the formalized program must be supplemented with the functional usage of language in all activities of the school if the language skills are to expand into daily and normal usage. This kind of development closely approximates life situations.

The intermediate teacher may, and usually does, favor the scheduling of reading and writing activities for regular instructional periods. However, reading, writing, and other language activities are an important part of such other areas of the curriculum as social studies and science. It is only good sense that the teacher of intermediate grades should help pupils apply what they have learned in the separate language periods in other areas of the curriculum.

The pupil's nervous system becomes sufficiently mature and complex to permit the learning of reading and writing during the early years of the intermediate grades. Psychological studies show that the mechanics of reading are learned by most people by the age of twelve or thirteen. However, the ability to get meaning from what is read develops indefinitely if the individual continues to learn.

It is during the intermediate grades that reading becomes a tool for the achievement of developmental tasks because it gives knowledge, aesthetic enjoyment, and a supply of vicarious experience that is nearly inexhaustible. It is also in these grades that pupils learn to read for personal satisfaction as well as for knowledge.

During the intermediate grades writing becomes a useful tool of expression. It is also during this period that reflective thinking, basic to making decisions, enters its period of most rapid growth. Reflective thinking involves thinking ahead and foreseeing both the moral and material consequences of projected actions, choosing the plan of action that promises the most desirable consequence as measured by appropriate values.

The intermediate teacher is doing his best when he gives pupils the opportunity to achieve the developmental tasks of language in a wide variety of ways. By individualizing the curriculum so that each child is able to work at his own speed, by numerous varied and well-planned group activities, by enriching the program so that

the most capable pupils can find plenty of interesting challenge, the teacher can meet the demands for growth and expansion of a wide variety of language abilities.

EXPANSION OF ABILITIES

IT IS EXTREMELY IMPORTANT in the intermediate grades that the teacher makes sure there is adequate opportunity for the give and take of ideas, for acceptance or rejection of criticism, for new plans to be built from old ones, for plans to be carried to completion which satisfy a variety of purposes. Only as the school provides opportunity for pupils to express their ideas, listen thoughtfully, read for a purpose, write for a purpose, think critically, and react to ideas, do they expand their ability to communicate.

DEVELOPING INDEPENDENCE

WITH THE EXPANSION OF ABILITIES to read, write, speak, and listen comes an increase of individual independence. For example, each pupil should learn to use a variety of approaches to new words, to use many analysis techniques, and to call upon his experiences in order to learn new words and expand his interests. The pupil should also learn to use his observations, experiences, language knowledge, and reflective thinking to adapt himself to varied groups and situations. The pupil should learn to adapt his writing to various needs, requirements, and purposes as a socially adaptable tool. Listening abilities should be applied to many different types of materials in order to develop independence in selecting, adapting, and making judgment.

The responsibility of teachers in the intermediate grades and the function of the school curriculum are quite clear. Pupils with widely differing backgrounds of experience and abilities, should develop over a period of years the optimum well-rounded language performance of which each child is capable. During the intermediate grades the pupil can be expected to reasonably accomplish the following language skills:

1. ***Reading:*** The more capable pupils will rapidly expand their reading recognition vocabularies, which will become larger than

their speaking vocabularies. Most pupils will develop to the stage where reading can be used for many purposes including recreational. Pupils will develop sufficient background, vocabulary, and interest to read alone and silently. If they are given assistance, direction, and practice, they will be able to give up "lip," or "throat," reading and will learn to read rapidly—more rapidly than they can talk or "verbalize." Through practice with analysis techniques, they can learn new words from the dictionary, from context, from meaning and use, from sound (phonics), or from any one or a combination of several approaches. They can then become independent of the teacher and the help of others in expanding their reading ability.

Because of social, emotional, or physical reasons, some pupils may develop slowly during this period. These pupils need patient understanding from the teacher and pupils. They also need special and continued assistance. If the teacher is familiar with ways of diagnosing difficulties, and if he understands the learning process involved, his instruction will be based on the individual and immediate needs of these pupils. These pupils are not "failures," for they can read to some extent. In some cases these pupils may need and should receive the assistance of specialists to determine the reason for the slow progress. A wide variety of materials and the patience to help the pupil at his own pace should be provided to see him through the same developmental stages other pupils have mastered.

2. ***Writing:*** Probably development in written communication depends more upon the curriculum conceived and planned by the teacher than in any other area of language development. If the pupil learns early to write to satisfy his own purpose, if he is judged on content rather than on precise form, if he has participated in many stimulating writing experiences, clarifying his thoughts and ideas, his growth in writing will be rapid during the intermediate grades.

On the other hand, if the pupil begins his writing experience through tedious "penmanship" exercises, long spelling lists, and exercises demanding that he reach strict standards of formal grammar, his progress in written language will be slow. Such an approach also may develop a strong dislike for writing, antisocial self-consciousness in written expression, or possibly complete frustration.

Vocabulary, spelling, handwriting, and punctuation are important. Spelling is an integral part of written expression. Each pupil should learn to spell correctly words used in his own individual writing. However, the pupil will more readily accept the idea that correctly written material which expresses his ideas clearly is the end sought. The pupil will readily accept the idea and personally realize that all words in important written work, in whatever field it is prepared, should be correctly spelled. The same aims and development apply to handwriting. Each student should develop an ever-increasing vocabulary. It is difficult for the pupil in the intermediate grades to see the value of words for which he has no immediate use. On the other hand, he is delighted to learn new and expressive words if they are related to his ever-expanding interests.

In written communication, pupils will learn to group their ideas, organize them in sequence, and present them clearly. Given considerable and frequent purposes for writing, pupils will develop through several stages to considerable maturity during the intermediate grades.

3. ***Speaking:*** Many pupils do not use the informal standard language expected of elementary pupils. They use instead the language their peers use, and some of it is on a shockingly low level. Their basic language was acquired at an early age. The teaching task is one of helping many pupils to become aware of and use a different kind of language. The changing of early patterns of speech often proceeds slowly and the success of the curriculum depends upon opportunities to hear, become aware of, and use the more acceptable forms of speech. Many schools today delay the teaching of formal grammar to the seventh or eight grade, although some teach parts of speech and sentence structure earlier. This delay in teaching formal language enables the school to develop speech patterns which will support the analysis of formal language when taught. Pupils with well-developed speech patterns must be challenged to improve still further. The development of a usable, comfortable, and grammatically acceptable speech is possible and can be achieved by pupils in the intermediate grades.

4. ***Listening:*** Although it is not ordinarily recognized, thoughtful listening is actually the core of language learning in the inter-

mediate grades. It is during the intermediate grades that pupils become aware of and begin to become a part of the wide, wide world. They *listen* to radio, television, newspapers, magazines, and people for the first time. They read and share the author's thoughts. They listen to a speaker, accepting or rejecting him. They express themselves in writing. They speak up for themselves, haltingly at first, but with more and more confidence as they listen and apply their thinking.

During this period what a child listens to, if carefully planned, shapes him and "opens" him for ideas and reflective long-term thinking. At the same time the teacher becomes an important person in his life and the pupil accepts direction more easily than at any other period. It is during the intermediate grades that television stimulates ideas, radio generates debate, the newspaper arouses desire for facts, the novel stimulates thinking, and people become important role-players. Encouraged, the pupil becomes a good listener, and listening becomes the basis of good thinking.

5. ***Critical Thinking:*** The pupil on his own will do some thinking about his personal problems, about what he hears, or about what he reads. However, much of this may be pointless, without purpose, and without critical application unless it is encouraged or given direction. Name calling, uncritical acceptance of others' statements, unthinking repetition, or finding answers to routine questions is poor training for critical thinking. Instead of retelling what he has read, the pupil should be encouraged to give his own reactions to what he reads—especially when he knows before he begins his reading that he will be expected to give his reactions. The pupil will be more likely to think critically when he is looking for significant answers in his studying, rather than unrelated facts. His thinking will be much more searching when he is looking for the answer to "Why did Columbus discover America?" than when looking for the answer to "When did Columbus discover America?" The role of the teacher is to help set up the significant problems, establish the learning environment, supply materials for learning, and guide the learning experiences toward solutions to the problems.

Critical thinking is probably the most significant procedure in developing the language arts in the intermediate grades. Pupils

need things to think about, such as experiences and information, as well as facility in expressing ideas.

In developing critical thinking the pupil must learn to guard against unwarranted generalities, to distinguish between assumptions and facts, to distinguish between fiction and reality, to recognize feelings, opinions, judgments, and facts. The pupil must learn to use what experiences and facts he has to make tentative judgments, to discover new facts, to expand his experiences, and to adjust his tentative judgments in the light of new evidence.

During the intermediate grades the pupil should become increasingly sensitive to vague or ambiguous words and statements. He should begin to question authority for statements as he acquires evidence to doubt the authority. He should begin to distinguish facts from unwarranted interpretation. He should develop tolerance for new ideas and new evidence. He should begin to consider negative as well as positive evidence. He should learn to see relationships between facts and to draw appropriate generalizations. He should also show increasing ability to collect and organize facts and to show how his conclusions follow logically from these facts and this evidence. The pupil may be slow in developing these critical thinking skills. The teacher should, however, guide and support this growth through planned and meaningful classroom experiences.

SECONDARY GRADES (9–12) CURRICULUM

THE LANGUAGE ARTS PROGRAM in the intermediate grades is largely an expansion program with emphasis and organization centered in activities which develop fundamental language skills. The language arts program in the secondary (high school) grades is largely a program of developing language maturity and use.

Here is one point of view on language development at the secondary level.[4]

1. ***Reading:*** The reading program utilizes the wide interests of youth who are rapidly outgrowing the characteristics of child-

[4] San Diego City Schools, *Curriculum Guide: The Secondary Program,* San Diego, Calif., pp. 35–92.

hood and are beginning to assume the social and emotional patterns of young adults.

From animal stories and simple tales of adventure, the pupil progresses to more mature concepts found in biographies, short stories, travel stories, poetry, essays, dramas, and suitable novels.

The pupil reads to discover how others have faced the problems which he is beginning to recognize in his own daily life.

Varied reading experiences and an expanding vocabulary in all program areas of the school enable the student to grasp more mature concepts. Improvement in reading skills is necessary in order to enable the student to satisfy his reading interests and needs. Each teacher should attempt to develop increasingly mature reading ability and interest.

Differences in native capacity and environmental influences lead to wide variations in language facility. The teacher should start at the student's level at the time he enters the class and guide his growth on the basis of his needs and individual differences.

Written expression develops naturally out of the student's oral language and reading activities. A student's ideas emerge out of his background of personal experience. An adequate, usable, and variable writing vocabulary develops from expressing ideas frequently, for varied purposes, and as a medium of creative expression.

Letter writing becomes the medium for mutual exchange of personal opinions, discoveries, beliefs, information, and interests. Taking notes and preparing outlines and reports serve needed purposes in the classroom and lead to writing maturity.

Pupils work harder to overcome spelling, usage, and grammatical errors when they know that the assignments and activities fit their personal needs. Memorizing lists of words and grammar rules without a purpose frequently inhibits development. Proofreading, correcting errors, and striving for effective expression are motivating forces for writing maturity.

Traditionally, the teaching of English in secondary schools has been separated into the teaching of literature and the teaching of composition.[5] Children continue to write "compositions," and teachers continue to "mark" them. Despite the fact that a number of

[5] California State Department of Education Bulletin, Vol. XXVI, No. 7, Sept. 1957, p. 25.

research studies have raised serious questions as to the effectiveness of this procedure, no other method has yet been suggested for the teaching of writing that is better, or that is equally effective.[6] Undoubtedly, the practice will continue.

There is wide variation in the number of pupils assigned to each high school teacher of English. Conant [7] recommends that not more than 100 pupils be assigned to one teacher during a given semester. A recent study in California showed that the largest number of full-time English teachers taught from 150 to 174 students per day.[8]

Most authorities are in favor of asking pupils to write a theme each week of approximately 250 words, which is roughly a page of typewriting, double spaced.

Careful reading of from 150 to 174 pages of student writing each week is a heavy task. Even if the teacher is willing and able to set aside two hours a day for this task, he would have to read between fifteen and eighteen compositions each hour in order to get through. At fifteen per hour, the teacher would have to shift gears every four minutes.

There are a number of devices for decreasing this heavy load on the secondary-school teachers of English. First, the number of pupils for which the teacher is responsible should be reduced as close to 100 as is possible. Second, it should be brought home to the teacher that compositions can be marked too carefully. The criticism that is most helpful to children is not necessarily the kind that pays meticulous attention to detail, unless the student is far enough along in his development to warrant this almost microscopic attention. Quite often, a heavy hand with the blue pencil either makes the child so angry that he quits, especially if he has tried really hard, or else he gives up in despair. Instead of splattering the work of the mediocre students with blue or red, the color should be saved for insightful comment on the papers of good students. Truly effective criticism calls for greater effort on the part

[6] Virgil Lokke and George Wykoff, "Double Writing in Freshman Composition Experiment," *School and Society*, XLVIII, Dec. 18, 1948, pp. 437–439.

[7] James Bryant Conant, *The American High School Today*, New York: McGraw-Hill Book Company, 1959, p. 51.

[8] California State Department of Education Bulletin, Vol. XXVI, No. 7, Sept. 1957, p. 14.

of the teacher, but the results are far more rewarding than a monotonous correction of common errors. When the teacher stops spending so much of his time in this way he is left with time and energy for the constructive criticism of organization and quality writing that is far more acceptable to students. We should know by now that the pupil learns only from those corrections that he accepts.

It is purposeful practice, including the correction of his own errors, that teaches a student how to write. In addition, the pupil must be told the extent to which he has succeeded. Many compositions might be marked only on this basis.

That is to say, the teacher reads the paper, then writes at the end of it something of this kind: "Your paragraphs are improving. The second has a clear topic sentence. You stick to the point, and finish appropriately. Your language lacks force and color. Try a few more adjectives next time, especially the less hackneyed ones." If we, as adults, try to recall comments by teachers that have stuck with us to haunt us as we write, we shall probably be able to remember, vividly, certain kinds of comments. "John, I'm afraid you will never make a writer." "That phrase of yours about the tree in winter 'with its branches tracing a pattern of lace across the clear blue sky,' was quite effective." "Here is one I want to read to the class. It's not a masterpiece, by any means, but the writer is trying hard, and he succeeds in one or two places." A great part of a writer's difficulty stems from the fact that he must have something worth saying if he is to say it well. Planning a topic with a student will possibly save the teacher much time when he comes to the task of reading what the student has written.

Pupils could probably learn much from each other if the teacher shared the reading of the papers with them. There seems no good reason why older students, student teachers, and perhaps some mothers who have time available could not be drafted to help in this most vital yet onerous task of helping the younger ones learn to write.

2. ***Listening:*** Intelligent, courteous, and thoughtful listening must be learned in a variety of ways; hence in the modern classroom we encounter radio, motion pictures, television, panel and group discussion, and individual or group reports. Visual materials assist in focusing attention and clarifying concepts.

Pupils learn to listen critically in order to judge the accuracy of information and the logic of ideas presented. They listen carefully in order to visualize and interpret scenes and action described. They attempt to share the mood of the speaker, actor, or reader.

3. ***Speaking:*** Oral language expression contributes to maturity of self-expression, self-confidence, and poise. Also, it enables individuals to clarify their ideas. The teacher should attempt to support each pupil's efforts to improve oral communication through the medium of content suitable to his own purposes and problems. Normal activities of life such as persuading, interviewing, reporting, introducing, conversing, discussing, and directing are vital classroom activities. Evaluation of each experience and observation of progress made, with suggestions for further improvement, are vital to continued growth toward maturity.

CONTRIBUTION FROM OTHER DISCIPLINES

THE DEVELOPMENT OF THE LANGUAGE ARTS PROGRAM in the secondary school should not be left solely to the English teacher. A program wherein all teachers set up guidelines for accomplishment, realizable goals of maturity, and a planned sequence of language activities produces far superior results. Each teacher plays a vital part. The English teacher then assists other teachers through evaluation of needs, planned skill-building activities, and purposeful drill as accompaniment to the English program. Literature, speech arts, drama, personal problems, orientation, journalism, story writing, vocational exploration, and contemporary problems courses are logical curriculum areas for the English teacher. Within each course should be several units designed around the needs of the pupils and topics of interest and of concern to youth in developing language maturity. Activities should be pupil-centered and rich in group participation. Understanding and usage develop as corollaries to planned and teacher-guided activities. Improvement in grammar, correct spelling, expression, and knowledge should be an aim of both student and teacher in each course.

THE FOREIGN LANGUAGES

TOO FREQUENTLY FOREIGN LANGUAGES are not considered a part of the language arts program. Instead these language courses are considered as something apart from reading, writing, speaking, listening, and thought development, and they function on their own without a planned relationship or coordination with the rest of the curriculum.

There are two promising developments which indicate a closer relationship for the future. One is the trend in the last five years toward the introduction of conversational language programs, such as conversational Spanish, French, Russian, and German, at the elementary level. Another is that finding themselves involved in world relationships with little or no ability to understand other peoples of the world, U.S. adults have suddenly realized the importance of learning to speak a foreign language.

Language teachers have also come to recognize that the teaching of the English language arts is similar to that of other modern languages. Conversation is developed first and then come reading, writing, and the study of grammar. A basic vocabulary promotes acquisition of the other elements of a new language more readily. In addition, modern languages are more effectively introduced in relationship to the experiences typically discussed in social studies. For example, San Diego relates its language instruction at the fourth and sixth grades to social studies units; the fifteen minutes of instruction in Spanish conversation grows naturally out of and supplements the social studies program. The separate conversational Spanish class at the eighth grade easily ties in with American history and culture.

Modern-language teachers now propose this sequence: speaking and listening, reading, writing, and then the study of formal structure. This pattern is parallel to development in the English language.

Instead of beginning language instruction now with formal structure, writing, and reading, and little emphasis upon speaking, many school programs—whether high school or college—begin with

the development of conversation centered around an understanding of the people who use the language in their daily lives; they also develop a speaking vocabulary which will help students to acquire other skills in the language. Through conversation, pupils also learn to exchange ideas and to organize their thoughts within the structure of the language.

With a basic vocabulary upon which to build, reading is then introduced. The conversation serves as a readiness program to reading—just as it does in the English language arts. With a basic vocabulary, the peculiarities of the alphabet, word formation, and sentence structure are more readily understood.

With an adequate speaking, listening, reading, and writing vocabulary, the development of formal language structure may be more readily undertaken. Just as in English, the structure—especially formal structure—is the most difficult of all the skills to master. In fact, the pupil may be able to get along very well in the language without mastering all the intricacies of structure. Thus, the pupil will have accomplished much more than if he had begun on structure and never learned conversation, reading, or writing.

This new sequence for the teaching of language indicates one of the most promising changes in modern language teaching for many years in the American public school. Many private schools have followed this sequence for years.

The modern language program which is closely related to the English language program of the school not only offers great promise, but is reinforced by the total instructional program of the school. Foreign languages become less foreign and more closely related to the life of the pupils.

SUMMARY

SINCE LANGUAGE IS A SOCIAL AND INTELLECTUAL TOOL for learning, it is essential that the scope, sequence, materials, methods, and learning environment of the total language arts program be carefully planned, thoughtfully evaluated, and closely coordinated from the pupil's first day in school. During his school years each pupil should become increasingly skilled in speaking, listening, reading, writing, and critical thinking. He should learn to use

his language effectively in making decisions. He should also develop interest skills which will enable him to increase, improve, and expand his language abilities long after he has left the classroom behind.

In this chapter, almost no attention has been paid to the study of literature, either in English or in a foreign language. This important branch of teaching will receive more complete consideration in Chapter 11 entitled "The Fine Arts."

EXERCISES

1. Why is the study of a foreign language considered to be a part of a liberal education?
2. Criticize the goals of the language arts curriculum as listed by the National Council of Teachers of English.
3. Using your own subject-matter specialty, show how the subject can be taught so as to enhance pupil facility with language.
4. Use the age level at which you either teach or expect to be teaching to list those concepts of child growth and development which should be considered in language teaching.
5. What sources can be used to determine the vocabulary development that can be reasonably expected at particular age levels?
6. What does contemporary research say concerning the teaching of punctuation?
7. What is meant by the term "critical thinking"?
8. Contrast and compare what children in grade two and in grade twelve might be expected to know about the getting of information.
9. What might a child in grade six be taught about taking notes while listening to a speaker?
10. Where can one go to find reading lists suitable for use with children at various grade levels? How seriously should the language arts teacher regard such lists?
11. Comparatively few people in America read poetry for pleasure. How might the number be increased? Should school-

teachers try to increase the numbers of those who read poetry for pleasure?

12. How might an improper emphasis on grades discourage all-out performance by good students?

13. Distinguish between an active and a passive vocabulary. Would you expect these to grow more nearly alike with increasing mastery of a subject-matter area? Which vocabulary is stressed by the use of objective tests?

14. Should children be urged to speak in a certain way at all times or should a variety of oral styles be encouraged?

15. What are some of the ways in which the child's ability to listen can be improved?

16. List the various purposes of reading.

17. Suggest appropriate treatment for a child in the sixth grade who is reading at the level of an average pupil in the third grade.

18. What is the responsibility of a chemistry teacher with respect to the language development of a student?

19. How can the teacher help the child to learn to want to spell correctly?

20. How might the teacher encourage the pupil to use expressive words?

21. As a teacher in the upper elementary grades or in high school you are likely to encounter pupils with a wide range of language habits. What are some of the ways you might provide for differences in language patterns of both speech and writing?

22. Are there any of the newer techniques for the teaching of a foreign language that might usefully be adapted for the teaching of English?

23. What do "forgetting curves" tell us concerning reading as a method of acquiring information?

24. When high school classes in English are arranged according to levels of ability, to what extent is there a need to provide for differences within a single classroom?

TOPICS FOR DISCUSSION

1. Social evolution is possible to the extent that peoples are able to communicate.
2. Language and education are practically synonymous.
3. Development of an interest in reading.
4. Good taste in reading.
5. One purpose of language instruction in schools is to teach people to speak clearly and forcefully before others.
6. Standards of good English language usage.
7. Research in educational psychology as a force toward uniformity.
8. The concept of readiness.
9. Development of skill as a writer.
10. The extent to which the child's values must be acceptable to society.
11. Correction by the teacher of writing by the pupil.
12. The importance of speech patterns for those who would be socially mobile.
13. Pronunciation of foreign words such as names of places and people while conversing in English.
14. The extent to which oral skill in a foreign language is desirable for American citizens.
15. Development of skill in critical thinking.
16. Aids to the teaching of language arts.
17. The library as a center of the school program.
18. Language as a tool of learning.

ADDITIONAL READING

Dale, Edgar, HOW TO READ A NEWSPAPER (New York: Scott, Foresman & Co., 1941). *A text for a journalism class but so informative and well-written as to be worthy of any teacher's private library.*

Flesch, Rudolf, THE ART OF READABLE WRITING (New York: Harper & Brothers, 1949). *This is the same Rudolf Flesch who wrote "Why Johnny Can't Read," but he does much better with suggestions for teaching Johnny how to write.*

Harris, A. J., HOW TO INCREASE READING ABILITY (New York: Longmans, Green & Co., Inc., 1940). *A useful, practical book with helpful ideas for increasing reading ability at different levels of achievement.*

Hayakawa, S. I., LANGUAGE IN THOUGHT AND ACTION (New York: Harcourt, Brace & Co., Inc., 1949). *Semantics has been almost as much a movement as it has been a discipline. Hayakawa is an important leader in the field, and this book is a classic.*

Herrick, Virgil E., and Jacobs, Leland B. (ed.), CHILDREN AND THE LANGUAGE ARTS (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1955). *A collection of articles by twenty-one people, thirteen of them professors of education. One is a professor of English and one is a college president. Five of the others are teachers or administrators in the public schools. Despite the frankly one-sided view that results, the book is eminently worth careful study by the teacher of the language arts.*

Hildreth, Gertrude, TEACHING SPELLING: A GUIDE TO BASIC PRINCIPLES AND PRACTICES (New York: Henry Holt & Co., Inc., 1955). *Based on careful and accurate summaries of research in spelling, this book shows how the teaching of spelling should be an integral part of the language arts program.*

Hoggart, Richard, THE USES OF LITERACY (Fairlawn, N.J.: Essential Books, 1957). *A description, by an Englishman, of life among the English lower classes. The author emphasizes the danger of excessive tolerance of trivial activities, which can only weaken the individual and, in the end, restrict freedom.*

National Council of Teachers of English, the Commission on the English Curriculum, THE ENGLISH LANGUAGE ARTS IN THE SECONDARY SCHOOL (New York: Appleton-Century-Crofts, Inc., 1952). *This is a well-known but somewhat controversial report. Dora V. Smith is usually credited with writing this report on the teaching of English. The volume includes an overview of the curriculum from pre-school through graduate school and*

attempts to show how local curriculum committees can make use of the information and suggestions that are put forward.

Russell, David, CHILDREN LEARN TO READ (Boston; Ginn & Company, 1949). *Like other books by the same author, this one is scholarly, readable, and complete.*

Russell, David H., and Russell, Elizabeth F., LISTENING AIDS THROUGH THE GRADES (New York: Bureau of Publications, Teachers College, Columbia University, 1959). *A useful compendium of 190 aids to listening.*

CHAPTER 7

Factors That Influence the Teaching of Science

INTRODUCTION

NATURAL SCIENCE is one of the major areas of study and teaching in schools and colleges. It has developed steadily since the dawn of civilization, and at an enormously accelerated pace during the past half-century. Scientific knowledge forms that part of the intellectual capital of civilized nations that is based upon reproducible observations (essentially the same results from repetitions of an experiment) of material things. It is therefore a very sure kind of knowledge. The ultimate appeal is always to objective perception of phenomena rather than to emotion and intuition.

There is more to science than experiments. The mental content of science consists of a web of abstract relationships which facilitate manipulation and understanding of the world we see about us.

It is important to remember that science is a branch of learn-

ing rather than a part of learning, wholly self-contained and set off by itself. For this reason, attempts to isolate science by distinguishing it from other forms of rational thought encounter serious difficulties. For example, science is sometimes distinguished from verbal logic, from mathematical logic, and from language. Yet all sciences make use of all three of these branches of knowledge. Scientific communication concerning phenomena is possible only by using to the utmost the facts that have been invented and discovered concerning precise definition, grammatical sentence structure, and so on. From one set of observations, other observations may be predicted, but only by making use of the deductive skills of verbal and mathematical logic.

There is no space at present to follow the argument in all its details, but the way in which science depends on philosophy and leans even on art could readily be demonstrated. Does this mean that science and thought are one and the same—that all thought is science, and science all of thought?

The answer is of course negative. Science is not just another name for all the accumulated learning of mankind. The difference lies in the focus or emphasis upon the testing of scientific laws and generalizations by observations and experimentation with material objects. The observations must be reproducible.

Consider these two statements:

1. When potassium chlorate is heated, oxygen is produced.
2. God is good.

Apart from variations in profundity (although the first is quite profound to one who is acquainted with the history of the chemistry of burning), the two propositions have an entirely different quality. To one who doubts the former, we merely suggest that he heat the potassium chlorate and then plunge a glowing splint into the vapor that is produced. No such simple test can be offered to one who doubts the latter. But an intelligent doubter might say of the glowing splint test: "Yes, I see the splint bursts into flame, but how do you know this isn't caused by an atmosphere that is particularly free from some material substance that is produced in burning?" After a lengthy series of explanations and tests and arguments, we should have to say to the doubter of the first statement, if he stuck

to his guns, "Well, this is really the best explanation of what happens that I can give you,"—which is not far from the way in which a person who believes in God would explain an act of mercy to an unbeliever. Had we used, as an example of a scientific proposition:

3. Molecules are composed of atoms.

We would have been forced to reach this point much more quickly.

The foregoing paragraphs were written to try to show the subtlety of the difference between scientific and nonscientific propositions. One or two additional remarks are perhaps in order. At the present time, all reputable scientists believe that molecules are composed of atoms. Although the concept of an atom held by a Linus Pauling may differ markedly from the concept of an atom held by a freshman student in a chemistry class, the future experiences of the latter may be so ordered that the two concepts will become quite similar. They must, if the student is to become a successful scientist, for there is a complex web of physically demonstrable phenomena that the concept of the atom must be able to explain.

We can also say that all reputable theologians believe in God. But not all of them believe in God in the same way. We could say that the experiences of a novice could be so ordered that he would eventually have much the same concept of God as that proclaimed by his teacher, but the experiences leading to this would of necessity occur entirely within the mind of the learner. To some extent, the experiences of a religious neophyte can be under the control of his teacher, but not in the way that those of the scientific learner can be controlled. The budding scientist and his teacher can turn the same knobs, read the same dials, and measure the same photographs. There is so much material external to the personality of the student of science that his teacher can manipulate with great precision. Only those characteristics of events that can be recorded on dials are taken into consideration. The feelings of the science student, his essential human qualities, must be either kept strictly under control or rigidly accounted for if the experiment is to be successful. On the other hand, the feelings and personal experiences of the theological student are of major concern to his teacher.

Thus we see that although science relies exclusively on repro-

ducible observations and thus stresses experiences which are in a public world, outside of an individual scientist, the distinction between science and nonscience is not at all easy to make. The dependence of science upon other branches of learning has also been pointed out. It seems, therefore, a serious curricular error to provide the child with science experiences in isolation from the rest of his learning. Specialization may be necessary in the advanced study of a science, but for purposes of general education it would seem most important that the child be encouraged to weave his growing knowledge of science into his more general view of life and the world about him.

Obviously, not all of science can be included in the child's curriculum. Hence, choices must be made.

Curriculum choices in the science area are affected by children, society, teachers, schools, and organized science itself. Each of these influences on science teaching will be considered separately. The points brought up are applicable to the succeeding chapter which describes science teaching in the elementary school as well as the curricular uses of the various sciences that are taught in high school and college.

CHILDREN AND SCIENCE

MOST CHILDREN EASILY BECOME INTERESTED in scientific things. They are interested in the known because it is familar, and in the unknown because of its mystery. In fact, the teacher must usually be careful that he does not dampen the ardent curiosity his pupils already possess concerning the physical world about them.

There seems to be a natural desire on the part of children to bring some sort of order to the chaos they see about them and their questions are endless. "Why does a cow have a split hoof?" "Why does a bunny have such nice soft fur?" "Why does the sun blister my skin?" "Why does the tide go in and out?" "Why is grass green?" The manner in which the teacher responds to these questions can heighten the interest of the child or destroy it, and, even more important, it can either stimulate the child to think deeply about his environment, or leave him a shallow onlooker at the surface of

things, forever beset by circumstances he can neither understand nor control.

The teacher cannot disregard the questions of children, but he must be careful how he responds. If the teacher is too eager and too obviously pleased, the children will quickly learn to ask questions for the sole purpose of pleasing him. If the answer is withheld too long, the interest of the child will flag and perhaps die. If the answer is given too readily, the child's dependence upon the teacher will grow when it should diminish. The more aggressive children must be restrained, and the timid be encouraged. Explanations must be adroitly developed so that the child is weaned, eventually, from a hodgepodge of miscellaneous investigations to a sustained inquiry of related phenomena.

CHILDREN'S QUESTIONS ON RELATIONSHIPS

MOST OF THE QUESTIONS asked by children have to do with things and events they experience daily. It is important for the teacher to remember that what the child is usually after here is a reassurance that the phenomena he experiences are related to others that he knows about or that can readily be induced. He is not usually looking for profound causes. The one who wants to know why the cow has a cloven hoof can usually be satisfied if he discovers that all cows are like this and not just this particular cow. The adroit teacher will of course lead the child to examine the feet of cows, pigs, sheep, goats, horses, cats, dogs, rabbits, hamsters, and chickens. As a result, the child will be able to classify the animals of his acquaintance into those with or without cloven hooves. The cataloguing should be ended long before the list of domestic animals is complete, of course, or the child will grow weary of it all, but his search can be directed easily toward other similarities and differences among the two groups of animals he has so far distinguished, the presence or absence of horns, for example.

Most childish questions are prompted by the child's urge to order his familiar environment. When the teacher can point out relationships between events that were previously unknown to the

child and events familiar to him, an interest in the unknown can soon be provoked. This careful transition should usually be made by the teacher. However, children sometimes express an interest in the totally unfamiliar. Here the allure comes from that which is mysterious. Thunder and lightning can be terrifyingly attractive to the young child. The teacher must be singularly adroit to utilize such hesitant fascinations for the purposes of science education. He can easily go so far as to destroy all mystery and all piquancy. One can "explain" lightning in terms of atmospheric electricity, but the awe and wonder should be enhanced rather than diminished. It is true that the natural extravaganza can be related to the electric light in the room and to the spark plugs in the automobile, but the essential nature of electricity remains tantalizingly mysterious. On the other hand, the teacher must be careful that he does not force the child to accept the ready-made assurances of superstition. And he ought to be careful about trampling upon the susceptibilities of various religious beliefs.

NEED OF CHILDREN TO UNDERSTAND

THE MYSTERIOUS MUST BE MEANINGFUL if it is to fascinate. To some children, the insides of a frog are much more exciting than the insides of an atom, and although the effect of interstellar dust may be highly intriguing to the advanced student of astronomy, it may be as dry as its earthly counterpart to the child who has not yet grasped its significance. The teacher must sometimes work hard to attach meaning to a scientific concept. Familiar things like automobiles, stoves, and animals are obvious instruments of meaning.

DIFFERENCE IN INTERESTS OF BOYS AND GIRLS

IN OUR SOCIETY boys usually come to school with a fairly well-developed interest in automobiles, but girls seldom have any interest, at least from the mechanical point of view. Basically, there is no reason why girls should not be just as interested as boys

in mechanics. Their experiences before entering school have not developed such interests; and adults have usually discouraged such development as being unnatural.

Hence, the boys will be full of questions about automobiles to which the teacher, if she is a woman, will perhaps not know the answers, and she may be uninterested in finding out the answers. However, she is presumably interested in children and can be expected to direct problem-solving by groups of the boys themselves. She will supply the necessary books and help the boys to read them, but will probably leave the actual leadership of the project to one of the more knowledgeable boys. When she and they encounter difficulties that are beyond them, help can probably be obtained from the principal or from one of the men on the faculty, or from a member of the local community.

The automobile is an extremely useful means of exemplifying an enormous number of the abstractions of science. Gasoline is a liquid mixture of chemical substances known as hydrocarbons. This liquid is sprayed into the cylinders along with air, and the explosive mixture is ignited by means of an electric spark. Combustion or burning results when oxygen of the air combines rapidly with other substances. This is Lavoisier's explanation. Before his time, men thought that when substances burned they gave up a mysterious emanation called phlogiston. The explanation of burning is one of the major problems of chemistry and therefore of physical science.

Ignition of the gasoline mixture inside the cylinders of the automobile was not possible until men knew how to generate and control electric currents. Electricity can be generated when a conductor of electricity such as a copper wire crosses a magnetic field. This abstraction, to which the boys can be led by means of their interest in automobiles, is at the very basis of man's understanding and control of electrical energy. Without it, conversion to electricity of the energy of falling water or of coal would not be possible and neither would the transmission of electricity across the countryside. To a large extent, the industrial age depends on this understanding. More importantly perhaps, an understanding of the relationship between magnetism and electricity is one of the basic pillars of man's knowledge of atomic structure.

The previous discussion is not intended to exhaust the possibilities for capitalizing on the mechanical interests of boys to lead them to study problems in science. It merely illustrates the way in which interests *already possessed* by the boys can lead them to fresh intellectual adventures. But what about the girls?

Most girls are interested in color. They like arranging flowers. They are concerned with color in their dress, and they will soon begin to experiment with make-up. With such strong interests to go on, the teacher can easily arouse an interest in the source of color. This, of course, is sunlight. The manner in which white light from the sun can be broken into separate colors by means of the glass prism is an experiment that holds attention. The girls watch the glass gyrating like a jewel and can be led to think about the far greater brilliancy of diamonds. The generalization that white light is composed of a great many different wave lengths not only is basic to a host of technological developments such as color photography, but also is another keystone in the arch of our understanding of atomic structure.

A study of the phenomena of the dispersion of light into colors by means of glass or water (rainbows) leads almost inevitably to an examination of the phenomena of refraction. A sunglass or magnifying glass is intrinsically interesting as it focuses the rays of the sun for burning or mysteriously enlarges the printed word. Experiences with binoculars, telescopes, and eyeglasses follow naturally, and no teacher should have difficulty getting girls and boys to understand the generalization that when light passes from a less dense to a denser material the path of the light changes direction toward the perpendicular. One of the most fascinating things to show children at this point is the mirror-like quality of the underside of the surface of water when it is viewed obliquely. One would normally expect that it would be possible to see through a bowl of water, no matter how it was viewed. If, however, the bowl is placed on a shelf just above eye-level, the underside of the surface appears as a mirror. This can be demonstrated in a startling fashion by pushing one of the fingers through the surface of the water.

The fact that girls already enjoy colors can be used to lead them along quite a different line of investigation, namely the investigation of dyes and dyeing. It is true that the chemistry of dye manu-

facture is exceedingly complex, but many parts of the dyeing process can be understood by children and illustrate, at the same time, significant scientific generalizations. One of the more widely applicable of these is the fact that liquids exhibit surface tension. The amount of this tension varies from liquid to liquid. Hence, some dyes can be used directly on cotton but not on wool and so on. With certain dyes and certain materials, mordants must be used. Many of these mordants are materials that are in fairly common use.

A study of dyeing can easily lead to a prolonged investigation of the general properties of solutions. Most soluble substances are more readily soluble in hot water than in cold. Solutions can be unsaturated, saturated, or even supersaturated. Inoculation of a supersaturated solution of sodium sulphate, for example, is fascinating to children as they watch the "freezing" of the water take place before their very eyes. Rapid crystal formation may lead to questions concerning slow crystal formation. If a saturated solution of alum is prepared at room temperature, an additional tablespoonful of alum added, and the mixture heated until it is clear, beautiful crystals of alum will form on a thread or string suspended in the cooling solution. If the quantity of alum dissolved is not too great or too little, all but one of the crystals can be removed and it, over a period of weeks, will grow to a respectable size. It is necessary to keep the jar at a fairly uniform temperature if the growth of the crystal is to be regular.

Studies of surface tension and solution are further related to the experiences of the girls by applying these generalizations to the use of detergents in the washing of dishes and the laundering of clothes. This allows the reuniting of boys and girls in class, for detergents find an abundant use in the so-called heavy-duty oils used to lubricate automobile engines.

With some ingenuity, and a fairly wide knowledge of science, curriculum committees can plan experiences for boys and girls that are both highly interesting and scientifically educational.

SCIENCE TEACHING AND VOCATIONAL PREPARATION

LESS OBVIOUS BUT OFTEN USEFUL are vocations—either those of parents or vocations which the child has idealized for himself.

Each of the crafts or trades can be linked with various science concepts. Bricklayers and carpenters both make use of the level and the plumb bob. These tools rely on the fact that the force of gravity acts along the line connecting the centers of mass of the objects which are near each other in space. Because the earth is a sphere, such lines are perpendicular to the earth's surface. Buildings are held together solely by friction. Gravitational forces must be transmitted through the walls to the foundations, and cross-bearing of various kinds is needed to keep buildings from collapsing. Scientific bases for the work of electricians are easy to locate, and much science can be introduced by referring to the problems of office workers. To list a few concepts at random—graphite for pencils, levers on typewriters, rollers to reduce the friction of filing drawers, plastics to cover chairs, foam rubber for seat cushions, lighting problems, signaling from executive to stenographer, inter-office communication, calculating machines, and even some of the more fabulous I.B.M. accounting machines.

Some of the girls may wish to become airline hostesses, and some of the boys may be intrigued with the prospect of shipping off to the far corners of the earth as sailors in the Navy or in the merchant marine. Both these occupations can be combed for an almost unlimited harvest of scientific application.

Among the more popular professions for boys at the present time are engineering and architecture. Both those occupations demand a firm and extensive knowledge of physical science, and the teacher should have no difficulty capitalizing on such ambitions to emphasize for those who hold them the value of learning particular scientific concepts.

Finally, the most dazzling of all occupations at the present time to both boys and girls are those having to do with rocketry. The fact that this technological development is so very recent is a clear indi-

cation of the rich mine of scientific application that is here available to the teacher. Special fuels, aerodynamics, weightlessness, oxygen supply, velocity, acceleration, and the resilience of man himself as a physiological being are but a few of the riches to be explored.

Bacteria can sometimes be sensed more vividly by looking at a picture of the gauze mask on the face of a nurse or surgeon than at a picture of a stained microscope slide.

Teachers need to display imagination and originality as they seek their way to the core of children's attitudes. The example of an indirect approach just given is one of thousands that might be employed. First, the teacher must find out, almost at random, what the interests of the child are, and then think out ways of using these threads of interest to help the child develop a pattern of meaning.

The way in which children display fashionable interests can sometimes be deceiving. Not all the boys who go about with their arms extended and making noises that are supposed to sound like rockets are interested in anything other than doing what the others are doing. With such children, the teacher must be particularly discreet when she discovers that what they really like is to make a collection of different kinds of leaves. The child who desires passionately to be in the swim of things may not be willing to admit, even to himself, that he possesses an unusual interest.

Finally, the interests of children are sometimes difficult for the teacher to accept. This unwillingness to identify briefly with the child is especially apt to occur when women are dealing with boys and men with girls.

PROBLEM-SOLVING

CERTAINLY, CONCEPTS MUST BE REAL and not too abstract for the child to grasp if he is to use them in his thinking. Practice in thinking is provided when children, either alone or in groups, make use of the problem-solving approach to knowledge about science. Again, the problems must be real to the child. They must be his own problems.

"Teacher, why does ice float in water?" is apt to herald more genuine learning than, "Johnnie, open your book at page 5 and read

the next three pages." As the child works away at problems he is concerned to solve, he integrates his subject matter in a natural manner, he is ready to see relationships and principles, he can practice transfer of training under the eye of the teacher, and he can test his system of values as he sees the results of the decision they have led him to make. He can be taught to think. *When he is ready and interested,* he can be taught to think. Johnnie may be interested this week in thinking and working with electricity. A week ago he was not. Something happened in between to arouse this interest and direction of thinking. It is now time to work on science problems related to electricity. These problems build from Johnnie's present knowledge, pushing on to fresh experiences and interests as the child grows with the solution of each succeeding difficulty.

Once an interest in science has been aroused, the opportunities for problem-solving are almost endless. Some problems can be solved by individuals working alone, but there are many that require group cooperation. Use of a basketball to explain the motions of the earth is a good example. One child can stand in the center of a circle of his fellows to represent the sun. Marked so that the North Pole is on top, as it seems to us in the United States, the ball should be traveling round the circle in a counterclockwise direction. A good exercise of the imagination is to ask the children to think of themselves in Australia with the ball held so the North Pole is now underneath. Now the ball must travel clockwise round the circle, for to someone on the Northern Hemisphere the earth is traveling counterclockwise round the sun, but to someone on the Southern Hemisphere, the earth is traveling clockwise round the sun. Yet the sun always has a retrograde motion against the background of fixed stars. In January it lies between the earth and Aquarius, in February between the earth and Pisces, passing successively Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, and Capricorn, before once more getting back in front of Aquarius. The fact of this identical retrograde motion of the sun among the signs of the zodiac, whether viewed from the Southern or Northern Hemisphere, is difficult to reconcile with the fact that both the rotation and the revolution of the earth are counterclockwise to someone in the Northern Hemisphere and clockwise to someone in the Southern Hemisphere until one realizes that an

observer in the Northern Hemisphere facing toward the sun at noon has the eastern horizon on his left hand, whereas an observer in the Southern Hemisphere facing toward the sun at noon has the eastern horizon on his right hand. Another way of saying the same thing is to say one faces south to the sun in the Northern Hemisphere but north to the sun in the Southern Hemisphere. All of this is very difficult to communicate in words, but when more children are asked to represent the outer circle of fixed stars (they enjoy the odd names for the various constellations of the zodiac) the whole business becomes quite clear.

Other features of the solar system can eventually be studied in this exercise. First, the tilt in the earth's axis can be used to explain the seasons, and second, a satellite can be attached to the earth to demonstrate the manner in which we see the moon or the man-made satellites of the last few years.

The climax of the problem is reached when the children attempt to demonstrate the explanation of the international date line at 180° E. or W. longitude. A child will enjoy standing with one foot at 10 o'clock Thursday and another at 10 o'clock Friday. The gradual disappearance of a whole day as he moves slowly across the line (or rather as the line moves across him) can be both exciting and educational.

Additional games with important educational outcomes can be played if the children imagine themselves successively on the equator, at the North Pole, and at the South Pole. Problem-solving provides plenty of opportunity for making decisions.

EXAMPLES OF LEARNING TO MAKE CHOICES

HERE ARE TWO ILLUSTRATIONS of the way in which pupils can be called upon to make decisions as they solve problems. One is easily recognizable as a science problem, obviously involving a number of fairly simple and well-directed choices. The other is a problem with less obvious and more difficult choices. It is a real problem which makes use of some of the methods of science. The hope is that with these two guides to follow, the teacher will be able to think through the problems that he and his pupils choose from the point of view of learning to make decisions.

For the first illustration we will show how the botanist makes use of a key to identify a particular plant. Let us say that a child has brought an unidentified wild flower to school and wishes help from the teacher in the identification of the plant. The teacher should not say immediately that the plant is a blue dicks or a fiddle-neck, even if he is quite sure of his information. Instead, he should help the child to locate a reliable source of information and then, if necessary, show him how to make use of such a source. A number of choices are already implied. First, where should the student look for the source of information? Unless the classroom has an unusually fine selection of reference books, the child will probably need to go to the school library. Here, he can simply ask the librarian, or he can search for himself. The decision as to when to demand the services of the librarian is one that plagues the scholar all his life. Hence, children should be led to practice making this choice quite early in life. On the one hand, it is possible to waste a lot of time of both reader and librarian by calling for the services of the professional at all times. On the other hand, a stubborn searcher can waste hours hunting for a rare reference that the librarian can locate in a couple of minutes. There are many reference books for readers, such as books of quotations, containing alphabetized references, and the student is often helped by knowing more of them than just the dictionaries and encyclopedias. The information in these ready references is necessarily brief and cannot, therefore, be expected to contain any considerable amount of stimulating detail.

Sooner or later, the researcher will make use of the card catalogue. He must decide whether to use the author index or the subject index. There are a great many reference books which list articles appearing in periodicals. Which of these is appropriate? What is the general character and the standard of excellence of the various periodicals that are listed? When should the reader stop listing titles and authors and go to the shelves of books? Which of the books on the shelf should he skim through, which should he read, and are there any he should study? Having selected a book, what does he do with it?

To some extent, the foregoing is a digression, for botanical keys are readily located, providing the library has them available. On the other hand, the student will probably want to know more

about his flower, once he has identified it, and for this purpose, literature other than the botanical keys must be used.

Once the pupil has the key in his hand, the correct use of the key is a technical matter, and a series of fairly clear-cut decisions as to the phylum, family, genus, and species will permit him to track down the name of his new friend.

For the second problem we will suppose that a group of children have expressed curiosity concerning a foreign country, say Holland. We will further suppose that instead of reading about Holland in a standard geography textbook the children and their teacher decide that it would be interesting and informative to plan an imaginary trip to the country. Many adults are actually faced with such a problem, and the truth is that many are overwhelmed by it. So they do one of three things: they stay at home, spending their vacation in a more conventional manner; they join a prearranged tour, which can be just as dull and a good deal more troublesome and expensive; or they engage the services of a travel agent to plan the trip for them. The third is perhaps the best solution of the three, but it shows a lack of spirit and cannot be creative in the sense of being anything like a complete expression of the individuality of the traveler. If the adult does do his own planning, he must be careful to steer a course between prearranging too many of the details, and insufficient planning and preparation. The first will keep him hurrying so fast to maintain a schedule that his patience and receptivity to new experience will be completely exhausted, and the latter is bound to land him into a series of problems concerning food, transportation, and shelter. A solution which may occur to a child would be to write to the head of government saying, "Please tell me all about your country." Let us assume that the teacher carefully forestalls the sending of the letter to the Queen, that she is familiar with the travel books in the library, and that the group of children have enough genuine interest in the problem to hurdle the initial difficulties.

Because a group of children is engaged in the task the first decision concerns the distribution of labor. At this point the teacher may be tempted to issue a list—transportation, shelter, food, baggage, expenses, itinerary, things to see and so on—but a far better procedure, educationally, would be to have the children work out

their own list, and for the teacher to complete the list after a reasonable length of time. Decisions concerning the distribution of labor can then be made.

Let us assume that each child accepts the assignment given to him by the group and goes about his job, making use of the various library skills that have previously been mentioned. In the beginning each will do some more or less sporadic reading, but this the teacher should assure them is a normal part of the problem-solving.

When he gets down to cases, the transportation child will soon find himself faced with an almost endless list of choices. Shall the trip be made by train and steamer, by air, by bus, or by some appropriate combination? Will cars, bicycles, motor-scooters, or even horses be used? Choice of suitable transportation for this imaginary trip to Holland shows a complexity which is typical of the problems facing adult citizens in their private and political lives. On the one hand, the child in charge of transportation should be restrained from turning himself into a dictator and making all the decisions himself. On the other hand, he should avoid presenting alternatives to his fellows in such a way that the complexity is confounded rather than neatly resolved. And he must certainly be ready with plenty of information when the need for it arises.

Not only will the teacher find it necessary to help all the children to find appropriate sources of information, but he must actually teach the children to solve their problems as a group. Two obvious necessities are, first, for coordination of the various activities, which is very largely a matter of making group decisions in the proper order, and second, for each of the children to whittle the various possibilities down to three, four, or five of the most appropriate alternatives.

Actually, the stage is now set for worth-while practice in group activity. First the teacher should see to it that no one strong-minded youth makes all the important decisions and simply tells the others what to do. Second, he should restrain the highly verbal, and encourage the silent ones.

Hence, we see that when children plan an imaginary trip to a foreign country they become involved in decision-making in a way that is highly instructive. They must decide how to go, what to take, where to stay, and what to see. They must study the customs,

the currency, and the history of the country they intend to visit. They must assign various tasks among themselves, and they must learn to work together effectively and efficiently.

The major criticism of the foregoing is that the activity does not culminate in a pragmatic test. In other words, no one actually makes the trip. Hence, the children are robbed of fulfilment of their efforts, and they have no way of checking their theories. The best way to substitute for such a test is to find out whether one of the children is going on a trip, to let him help with the planning, and then to get him to report on the success of the plans when he returns. This will probably mean that the child's parents will have to cooperate in the school project, but such cooperation may be a help to the parents, in the long run. Another substitute for the actual trip is for the group to report their imaginary trip to the class. An added touch of realism can be obtained if a person who has visited the country is invited to come to class to listen to the report.

SCOPE OF INFORMATION CHILDREN MUST ACQUIRE

PRACTICE IN THINKING is probably the best preparation that can be given to the child both for his future education and for his life as an adult. However, much fairly precise knowledge of the physical environment will be demanded of the child wherever he goes. Hence, the teacher must be careful to see that the gaps in the pupil's knowledge of science are not too frequent, too wide, or too deep.

Content selection in science, as in other subjects, gives teachers an opportunity to involve the members of the local adult community in decision-making. Sharing in the making of decisions that affect the schools is the closest link with government that remains to the majority of the American people. No doubt, the content should be arranged in a suitable sequence. But the psychological development of children is more important in this respect than the inner logic of a body of subject matter. When teachers involve parents in decisions about the selection of science content they usually develop a more appropriate sequence.

Within the framework of science content established by state and local committees there is still room for pupil planning. Unless the content builds student interests, deepens understanding, and leads to natural solutions to problems, the content may have little meaning.

Finally, evaluation of science teaching and learning should be made in light of all the established objectives. Acquisition of a body of factual knowledge is but one of these objectives.

There is no use ignoring the fact that many teachers and parents place the learning of factual content at the head of their list of educational purposes. Those who accept a wide range of purposes must realize that these purposes can be achieved only as the children acquire a broad body of information. Again, what is being said is that while information, factual knowledge, content, can be acquired without any growth in the child's ability to use the knowledge acquired, the reverse is not true. If the child is to learn skill in the intellectual processes that lie behind the making of choices, if he is to learn to think, he must acquire a body of information.

Although different children will become interested in different topics at different times, the stock of information required by educated people is to some extent standardized. We do not advocate a direct assault on this stock of information, but we do suggest that the pupils be tested from time to time, partly to keep the teacher from making use of content that the pupils already know, and partly in order that he may suggest activities that will provide the pupils with opportunities to remove lacunae that may later prove embarrassing.

SCIENCE AND SUPERSTITION

SOME OF THE BOOKS on the teaching of science exhort the teacher to work hard to remove childish superstitions. This is likely to be a task against which little headway can be made. However, if the teacher can get the child to the point where he is reluctant to confess to superstitions in a group situation, much has been accomplished even though, when nobody sees him, the child continues to avoid black cats, keeps a rabbit's foot handy, and is especially cautious on Friday the thirteenth.

Varieties of superstitions that are believed constitute one of

the many differences displayed by individual children. In the teaching of science, as in the teaching of all other subjects, the teacher must be alert to variations in interest, ability, knowledge, opportunity, aspirations, and fears. It is not a class that he faces, but a group of thirty or so children each of whose individual characteristics has been deeply stamped by the heredity that was his birthright and the environment that kept him alive.

DEVELOPING INTERESTS

So far as children's interests are concerned, it is important for the teacher to realize that those already possessed by the children are to be used as runways from which additional flights of exploration may be expected to take off. Just because boys in the third grade dress themselves in high boots, gaily colored shirts, and sombreros, and wear toy pistols, there is no justification for the teacher to build all the social studies and science themes exclusively around The Ranch. The recent popularity of space men and of Zorro is clear proof that children can develop new interests. Whereas the movies, television, and pulp literature must be produced so as to sell themselves, the teacher has a captive audience. Hence, the mass media have been forced to study the development of interest and they have become, from their special point of view, quite clever at recording hits. Until recently, the teacher has ignored interests, not realizing that though the body of the child could be easily coerced, to shackle his mind, supposing it possible, is to work counter to the basic purpose of education, which is to free the mind. Further, we are only just beginning to realize that until the child develops an intrinsic interest in a subject, until he experiences a genuine desire to solve an intellectual problem, no lasting educational benefit can be claimed.

Because children, like adults, are always capable of developing new interests, long lists of interests possessed by children at various stages of their development should never be accepted by the teacher. Instead, he should thoroughly master one or two general principles on the subject and then find out how to go about developing new interests.

Generally speaking, boys in America like machinery, tools,

weapons, and objects made of wood and of metal. Girls like clothes, jewelry, dolls, household decorations, and objects made of cloth and of ceramics. Both like objects made of plastics, and many of both sexes enjoy animals, plants, rocks, and birds. There seems to be an almost universal instinct to collect things, to disguise one's individuality in order to remain unnoticed in the group, and to regularize the environment in order to be able to deal with it on a more or less habitual basis. With these general principles in mind, the teacher must then be on the watch for variations, for it is by nourishing the observed mutations that he can expect to encourage the development of fresh and lasting interests.

Only the genius can develop fresh interests in isolation. However, the needed association with other personalities can sometimes be achieved vicariously. That is to say, children can often find new interests in books. To be at all lasting, these interests usually must be strengthened by some concrete activity—individual or group play, model-making, experimentation, or even reference to another book. It is extremely important for the teacher to remember that a thread of meaning is needed if the child is to acquire a new interest. Fortunately, the teacher need not be precisely aware of how this occurs with the majority of the children. A rich environment is provided and the new interests seem to develop spontaneously. But some children are difficult, and with these the teacher must exercise patience and understanding. With clever children who seem slow at developing new interests, the teacher must be prepared to accept imaginative leaps that appear incomprehensible. Teachers need to be especially broad-minded in this respect when dealing with members of the opposite sex. The logic of a brilliant girl may escape the mind of the male teacher.

VARIANCE IN CHILDREN'S I.Q. SCORES

HISTORICALLY, SCHOOLS HAVE SHOWN concern for a special kind of mental ability, and standardized intelligence tests measure differences in this ability. Because intelligence test items are validated with measures of achievement, there is a circularity involved in the use of intelligence test scores which is not usually pointed out to teachers. By and large, they measure the extent to

which pupils are successful in schools. Hence, they measure the ability of children to acquire factual knowledge. They do not measure growth in creativity or skill in thinking, though the abilities that are measured may be partially associated with skill in these two processes.

Variations in intelligence test scores provide the teacher with important information. Achievement beyond a fairly definite level seems to be required for success in activities included as preparation for most of the professions, and there are indications that a fairly high intelligence test score must precede the successful learning of a trade. However, none of the correlations suggested is completely reliable, and the exceptions continue to plague selection committees, curriculum-builders, and teachers generally. On the one hand are those referred to as "late bloomers"; on the other are those who fail to live up to their early promise.

For one reason or another, educational opportunity, despite recent reforms in America and in other countries, is to some extent influenced by the class of society into which a child is born. One school of sociology has tried to identify five, six, or even eight separate social classes. Another school repudiates the concept of classes entirely. However, since all sociologists talk in terms of families with varying status, we can accept the evidence of our senses and proceed on the assumption that some families are better off than others, live in finer houses, are able to travel, can afford fine automobiles, and are generally better educated.

The number of years of an individual's education does not depend exclusively on the class of society into which he is born. We have many stories of people lifting themselves by their bootstraps. But the Horatio Alger notion that money is a handicap in getting an education is almost entirely false. One reason junior colleges and other home-town colleges are so popular is that the children attending them can live at home and spare their parents the expense of paying for board as well as for tuition. In the book *Elmtown's Youth,* the two Hollingsheads point out over and over again the manner in which the children of the poor drop out of school because they cannot dress as well as the other children, and cannot afford participation in many of the extramural activities. Class rings, annuals, and senior banquets are quite beyond their means. In addition, the

few dollars a week they can earn at unskilled labor must be harvested the moment the law allows them to go to work.

Even among the children of those parents who, though reasonably well off, have little education themselves, the chances that they will go far in school are slight. In the first place, many such parents see little or no value in formal schooling. They themselves have progressed, despite a lack of schooling, so they see no reason why their children cannot do as well, with little education. On the other hand, when the parents of such children do express a strong demand for additional schooling, the children themselves are under severe handicaps. They pick up none of the bookish interests in the home that will be needed to sustain them academically, and worst of all, they see the educational differences between themselves and their parents as a growing barrier to association and understanding with the ones they love.

SCIENCE AND SOCIETY

A GUIDING SOCIAL PRINCIPLE to which few people will object is that the actions of a people are strongly affected by a desire for group survival. The group wants to go on living. Here, reference is not to the way an individual person fights to keep himself alive, but to the need for group survival which often transcends the individual need. Since the dawn of history, heroes have died fighting to protect their loved ones, their friends, their group.

Always, the question arises, "What is my group?" Against the Achaeans, fighting for their Helen, it meant the Trojans. In our Revolutionary War, Englishmen fought against Englishmen. In 1864, the "group" meant *some* Americans.

To a few Americans today, "the group" means themselves and their friends. Other Americans are concerned with the welfare of mankind. These are not necessarily opposing views. The unconscious extension of an individual's sense of group can be infinite. It may well be that, because of the growth of scientific understanding and its resulting technology, the survival of "some Americans" is inextricably bound with the survival of the human race.

Certainly, survival of American society means that we must

continue to train technical workers and scientists. Without the continued use of machines, many of them almost frighteningly complex, our economy would break down and our society be severely handicapped. An even closer link between science and survival is the reliability of knowledge based on scientific investigation. No nation, at a critical time, can survive on guesswork, no matter how inspired.

Few of the nation's children will grow up to be scientists, but nearly all will grow up to be self-governing citizens. If citizens are to continue their support of scientific investigation, all of them must be made aware of the value of science.

Equally important is the need for all citizens to learn to conserve natural resources. With dwindling land, water, forest, mineral, and even air resources, and with a rapidly expanding population, wide use of the resources that remain grows more imperative.

An awareness of the value of scientific investigation accompanies an awareness of the limitations of science. As the sphere of scientific knowledge and understanding expands, its boundaries accordingly project outward. Some people find in science the ultimate answer. Others, seeking certainty, make use of other, nonscientific approaches to knowledge.

VALUES TAUGHT THROUGH SCIENCE

CONTRARY TO POPULAR BELIEF, science activities may be used to illustrate the need for socially desirable values: persistence, patience, getting along with others, and, above all, honesty.

Psychological evidence is lacking to show definitely that habits of persistence, patience, and honesty can be learned. The experimental differences arise because the directors of the experiments do not pay sufficient attention to the purposes or attitudes of the children. Each child has a scale of values. He may think of these to himself, if he thinks of them at all, in abstract terms. He may even think of them in transcendental terms. He may say, for example, "I will be honest at all times." In practice he develops a scale of values couched in extremely practical terms. He remembers thousands of situations with which new situations can be compared, or he re-

members hundreds of rather detailed generalizations. Many of these have long since receded from his conscious thoughts so that when he acts, he will think that he is acting instinctively. This value system that each of us possesses is gradually built up through our experiences with respected adults, parents, teachers, clergymen, and men and women who hold high rank in the work we have chosen for ourselves, but most importantly our system of values is built up through social contacts with our peers. Our conduct is dictated by our value system. Most people deliberate at some length prior to making an important decision. Tolerance for the ambiguity that must be accepted before the decision is reached varies greatly from person to person. Hence, the quality of deliberation prior to choice-making is a dimension that varies between extremes not only from person to person, but from choice to choice as made by a particular person.

Decisions often must be made between conflicting values or standards. These are often intensely difficult. Consider the case, for example, of a young married woman whose husband has been offered by his company a job in a far-off city. His own parents are dead, and the position is quite clearly a promotion. The girl's own parents live nearby and she enjoys seeing them at fairly frequent intervals. Shall she honor her parents, and persuade her husband to stay where he is, or shall she cleave only to her husband and follow him willingly to the ends of the earth? In part, the decision depends on the extent of the promotion—is it a big one or a little one—but by the same token the decision also depends on the value system of the girl herself.

The most difficult decisions to make are those which involve choices that seem equally valuable. But only an ass starves between two identical bales of hay, and the teacher should persuade children to make up their minds rather quickly, once they have decided that the two choices are almost equal in their consequences.

Despite the ambiguity of the experimental evidence, it seems safe to assert that children should practice making important choices under the direction of the teacher. This direction should very largely lie in helping the children to become conscious of the values they are using, and in making sure that they become aware of all

the possible alternatives, that the child deliberates for a reasonable length of time, and that he is thoroughly aware of the consequences of his actions in so far as they can be made clear to him.

With this point of view now before us, let us see what the relationship is between scientific choices and the qualities of persistence, patience, getting along with others, and honesty. The need for possession of these virtues by a scientific worker is readily documented by reference to the recent discovery of the antiproton. Surely never before has so much patience been needed to wait for just the right set of complicated conditions, so much perseverance in chasing this short-lived ghost of a particle, so much ability to maintain good relationships among the host of scientists, engineers, and technical workers required to run and maintain the giant cyclotron at Berkeley, California, and so much honesty not only in reporting results, but also in the collection of the actual data.

It should be made clear to children why it is essential that scientists report their findings honestly and accurately. In the first place, research scientists are primarily motivated by a desire to search for truth, and in the second place, in science, as in all other areas, honesty is the best policy. It was pointed out earlier that scientists accept as true those results which can be obtained generally. If a man says he obtained a result which he definitely did not, he will be compelled to do some awkward explaining when others try to repeat his observations. In any event, because of their passion to find out what is happening, scientists are seldom tempted to lie concerning their findings, for they realize, especially now that scientific experiment is so complex, that all the work going forward must be correlated if any appreciable gain is to be established.

Emphasis on the research spirit in the approach of students to scientific studies will tend to foster the fine qualities we have been discussing. Suppose two boys are arguing as to which would fall fastest toward the earth, an iron wrench or a hammer with its wooden handle. Sooner or later one of the boys or some onlooker will suggest an experiment. First of all, patience is required to find a place from which the two objects can be dropped simultaneously. Persistence is required to carry the objects up to this place, for not one try but many will be demanded. Both boys must be honest, for the one who lets drop the hammer and wrench may be

strongly tempted to give his favorite a slight head start, and the same will be true of the one reporting at the finish line. Sooner or later, if the boys have sufficient trouble in reaching a decision, some kind of mechanical launching device will have to be invented, such as a trap door that can be released, and a recording device to indicate, unequivocally, which object reaches the ground first.

TEACHERS AND SCIENCE

SOME TEACHERS KNOW VERY LITTLE SCIENCE and others know a great deal. Elementary-school teachers are occasionally aware of their lack of scientific knowledge and this awareness may cause them to avoid science content as much as possible. This avoidance is unfortunate. There are other ways of meeting the difficulty.

One of the best ways is to get help from other teachers. Those colleagues who are keenly interested in the subject and whose rooms seem to be cluttered with snakes and test tubes are always willing to help. Much of this cooperation will be among teachers in the same building. Similar cooperation between elementary-school teachers and high-school teachers and between high-school teachers and college teachers has been most effective. Science teaching has thereby improved, as well as the coordination of various educational levels.

Despite the fact that elementary-school teachers are required to teach all subjects, any given teacher will almost invariably be better at one subject than another. Some curriculum-workers are of the opinion that because of this inevitable specialization the work, at least of the middle grades, say five to eight, should be departmentalized. Unfortunately, such departmentalization has been found to raise as many problems as it solves. Hence there will be no rush, in the foreseeable future, to erect subject departments in the elementary school with the possible exceptions of art and music. The general teacher must therefore exchange information and understanding with his fellows.

Except upon rare occasions, teachers should not exchange classes, for this merely circumvents the administrative decision against specialized departments. The teachers must consult with

each other outside of class. These consultations can be informal, but the exchange is more likely to be mutually beneficial if the meeting is more than a casual chat at lunch or over a cup of coffee or a cigarette. Some teachers, anxious to teach science well, yet aware of their own shortcomings, arrange weekly visits with the member of the faculty who is really good at science. If two or three teachers can arrange their visits to coincide, tiresome repetitions can be avoided even though each parcel of advice be directed to a particular teacher.

COOPERATION AMONG SCIENCE TEACHERS

THE GULF THAT SEEMS TO BE CLOSING slowly between elementary-school teachers and secondary-school teachers exists partly through the fault of the teacher-training institutions and partly because of salary differentials between teachers at the two levels. For years, the universities prepared teachers for secondary schools, but left the preparation of elementary-school teachers to normal schools. Only recently have the universities begun to see the results of their neglect of the elementary-school teacher and have attempted to establish control over his education. But in the Education Departments of the Universities, as well as state colleges and teachers colleges, courses for elementary teachers and secondary teachers are strictly separated, and attempts to combine the trainees for even the most general of courses such as those in educational psychology and educational sociology meet with determined opposition. It seems ridiculous that the curriculum-worker must spend much of his time and energy pulling down what certain of his coworkers have so laboriously built up. He will find difficulty getting elementary and secondary teachers to pool their resources for the teaching of science.

No lasting cooperation can be established on a one-way basis. If the secondary-school science teacher sees himself exclusively in the role of leader, with information and understanding to provide but none afforded him, the association can be expected to be of brief duration. In return for the opportunity of providing the elementary teacher with information, understanding, and suggestions for activities having to do with the stars, the materials of the earth's

crust, motion, electricity, or chemical reaction, he should be in a position to share the specialized insights of the elementary teacher concerning the teaching of reading, and methods of providing for individual differences. A more permanent bond than this can be established when both seek fresh understandings together. Whether the association is permanent or temporary, the importance of each knowing what the other is doing cannot be overestimated.

What has been said regarding the closer cooperation between elementary- and secondary-school teachers is very largely applicable to cooperation between secondary and college teachers. Traditionally, the secondary-school teacher has been the student of his subject and the university or college teacher the master. This distinction and all the difference in status that it implies is disappearing to some extent. Partly this is the result of an increase in specialization at the colleges and universities. The secondary teacher, holding at least a master's degree in a science subject, may find himself possessed of greater understanding of certain broad scientific fields than the college or university teacher with his Ph.D. in a highly specialized segment of the subject. A few youthful and modest college and university teachers seem willing to admit that their teaching is not excellent beyond compare and that the high school teacher who is concerned almost exclusively with teaching may have something to offer. In general, however, it must be stated that the efforts of the great scientific societies such as the American Chemical Society and the American Association for the Advancement of Science have largely reinforced the instructive role played by the college and university teacher. The summer institutes, which began so bravely as workshops in Oklahoma in 1950, now emphasize the lecture and other forms of directed study to the almost complete exclusion of groups for the discussion of broad purposes, the sharing of methods, and the planning of improved curriculums and teaching methods. In a world gorged with technological discoveries, such an emphasis upon science content displays a naive faith in the inevitability of progress that could easily prove the downfall of the races of mankind.

BOOKS TO HELP THE SCIENCE TEACHER

IN ADDITION TO RECEIVING HELP from their colleagues, teachers can obtain much help from the many excellent books dealing with the teaching of science. Although beginning teachers will need to start with Blough, or Richardson and Cahoon, they will find that other writers have penetrated more deeply into the philosophy of science.

One of the more popular of these and one that is read easily and quickly is the short discussion by James B. Conant called *On Understanding Science.* This book developed through his leadership of the general education movement at Harvard University. The question it seeks to answer is, "What is it about the study of science that is basically important in education?" Conant's efforts to answer this question should be read with other attempts such as those emanating from the University of Chicago.

Conant speaks of the tactics and strategy of science. The tactics consist largely of efforts to design instruments that will standardize observations of natural phenomena in order that such observations may be rendered reproducible. The strategy consists of a steadily accumulating body of theory which serves partly to direct fresh observations and partly to enable the man of science to predict and, to some extent, control his environment. Hence, the observations are dictated partly by the machines available or which can be invented, and partly by the existence of successful theory. Both these observational controls serve to restrict the nature of man's understanding of his environment in ways that Conant is not always careful to point out. Further, the book gives little attention to the way people learn. The organization is logical, with a *post hoc* kind of logic, rather than psychological. But the book contains important insights and has affected the thinking of many people.

General Education in a Free Society, commonly known as the Harvard Report, contains a highly significant chapter on the teaching of physical science. There is a strong emphasis on the teaching of process in this chapter, with special attention to the teaching of reflective thinking and creativity. This writing, too, has exerted a strong influence in the dozen years since it was written.

For those who wish to trace the influence of scientific thinking

upon certain of the social studies, one of the best books to read is *Methodology in the Social Sciences* by Kauffman. This writer displays unusual understanding of what it is that distinguishes science from nonscience, and his book is full of ideas for the application of scientific methods to the solution of social problems.

Numerous bibliographies of science textbooks are available. Such guides, especially when they are annotated, may be used to pick out three or four possibilities. Final choice is best made with the books in hand. Curriculum laboratories are becoming more common at state, county, and local levels. Most college university libraries now contain samples of new textbooks. Curriculum consultants in county and local districts usually help teachers to get hold of sample textbooks. Curriculum laboratories, libraries, and consultants are therefore three excellent sources when teachers or committees of teachers are about to choose new texts.

There are several ways in which the person choosing a textbook for a given course can be helped to reach a decision. He may simply wish to find out the name of the most popular text and then give its sale a microscopic boost by requiring it for his courses; or he may choose on the basis of a single characteristic—coverage, accuracy, illustrations, readability, format, or choice of language. One or two teachers are said to be influenced in their decision by the grace and charm of a book salesman, but because textbooks are usually chosen by a committee of teachers and administrators, these irrelevant factors are less effective than they are often thought to be.

Choice of a textbook is so extremely difficult that the question of finding a single book for successive classes of students, that is capable of supplying all the information and reading needed on a subject, is one that should not be raised. At least two or three sets of different texts should be available and these should be strongly supplemented with an abundance of library material. The prospect of thousands or even millions of children relying on a single textbook for all their information on a given subject is bleak indeed.

When a teacher is able to keep several sets of textbooks available, these should probably be written at various reading levels. A number of readability formulas are available, none of which is wholly reliable, but which may indicate ways in which the teacher can learn as he works with children and books through the years.

The teacher must usually induce the child to read and study the book. School marks, promotion, praise or blame from the teachers, honors, entrance to a profession or to pre-professional training, are all artificial aids to learning that have been invented through the ages. The wonder is not that some children renounce all intellectual activity once they leave school, but that any of them should develop a taste for learning at all. Textbooks evidently, if they are well written, appeal to some of the children. What is needed is not more like-minded children, but a variety of books with a varied appeal.

More and more teachers are using combinations of reference books and science readers instead of the usual textbook. Elementary school children will find many of their science questions answered in encyclopedias. Although children's encyclopedias are written in the language of children, adult references will probably be needed also. Students in high school can make use of a variety of adult references, for example:

1. Textbooks for science classes in colleges and universities.
2. Encyclopedias.
3. Popular reference books.
4. Standard works of reference.

To stimulate and sustain their interest as well as to suggest problems they may want to solve, high school science students can make extensive use of trade books such as:

1. Biographies of famous scientists and engineers.
2. Stories of discovery.
3. Fiction with real science as part of the theme.
4. Science fiction.

INSTRUCTIONAL MATERIALS

MANY EXCELLENT FILMS and other visual aids are available for use in the teaching of science at all levels. Among the more popular visual aids are sound films, silent films, filmstrips, slides, and flat pictures. All of these can be in black and white or in color. Despite its lack of sensation, the former should by no means be despised.

One of the best known of the sound films is one put out years ago by the Encyclopaedia Britannica films called *Sound Waves and Their Sources.* A second edition has been made, but it is not nearly as good as the first, although the children find a few of the anachronisms of the first mildly amusing. The great advantage of this film for teaching purposes is the way in which animated cartoons are used to explain the movement of molecules. There are so many demonstrations of musical instruments, and of everyday things such as automobiles and airplanes, that the children have no difficulty tying the abstract concepts about waves to their own experiences. There are other important films having to do with the discharge of electricity. Motion and sound seem to be necessary for good visual aids such as these, which are intended to explain phenomena in terms of moving particles.

Color films are exciting, but the teacher should beware of falling into the trap of trying to compete with the regular movies on these terms. The distinction between more or less idle pleasure and scholarly activity should be recognized and made clear to the student. This is not to say that dullness is to be tolerated in the science films that are shown at school, but they should call for more active thought on the part of the student than those he sees exclusively for purposes of relaxation. The distinction is not sharp, for certain films that are highly educational have their frankly amusing parts and vice versa.

Filmstrips are a most convenient way of showing still pictures to the class. These too can be in color or black and white. When color is called for, there should be logic behind the demand and not just a desire for novelty. *Life Magazine* has excellent filmstrips on the structure of the atom and there are several series that are most helpful in teaching about the stars.

Teachers should probably begin a collection of their own color slides quite early in their careers. Almost any 35mm camera can be used to take excellent color shots, and where the teacher has his own projector or can obtain the use of one readily, a library accumulated on week ends and during vacations can bring interest to the most prosaic of studies. Almost every drugstore sells views taken in foreign countries. A careful selection of these, or better still, those taken by the teacher or by friends of his during travels abroad, can

give the geography lesson a personal vitality. History, literature, and, above all, science studies can be made vivid and exciting by the showing of a few appropriate color slides. With many of the new projectors, the room need not be especially dark for good reproduction to be possible.

Most people can soon learn to take good pictures. Simple rules such as keeping the horizon level and using an accurate focus and an exposure meter are readily observed.

If the teacher wishes to build a file of flat pictures, heavy plastic covers turn out to be a worth-while investment. Small children just can't keep their moist fingers off the surface, and the teacher is saved much admonishing and disappointment when the protective covers are used.

Tapes and records, especially when they have been specifically prepared for the local situation, are useful in the teaching of science as in other subjects. Something is lost, it is true, when the local dignitary does not deliver his talk in person, but, like the radio and television producer, the teacher may find that freedom to edit a talk is a wonderful compensation for the lack of a live appearance. Best of all, strategic parts of the talk can be run off over and over, if the class or even certain members of the class are desirous of making a detailed study.

Use of the problem-solving approach relieves the teacher of the role of information-giver as well as stimulating pupils to think critically and to make decisions. The results of the problem-solving may be presented to the rest of the class by means of oral reports or with a panel. Scientific demonstrations or the exhibition of projects can well accompany these reports.

FIELD TRIPS

SCIENCE STUDY IS OFTEN EASIER outside the classroom than inside it. Field trips to industrial plants, museums, bird sanctuaries, highway cuts, and so on should be carefully planned. A check list sharpens the observations made by the children. Occasionally, if an expert is to guide a tour, it is helpful if he visits the classroom before and after the trip. These guides often make effec-

tive use of audio-visual aids as they prepare the children or return to answer questions.

When children carry out an elaborate science project, the results sometimes should be shown to a wider audience than their own class. School fairs, local science fairs, and county, state, and national fairs sometimes stimulate the children to give a better performance. However, the teacher needs to be reminded that understanding and the development of research and library skills are the objectives of science teaching. Competition at a level which is highly publicized is not always the best method of reaching these objectives. Concomitant learnings of high-level competition may not even be desirable.

Adults in the community provide a rich resource of science material. Clubs for rock hounds, birdwatchers, photographers, and hot-rods are to be found in most communities. Where there are industries, the professional scientist will prove most helpful when called upon, either as an individual or through such organizations as the American Chemical Society or the American Association for the Advancement of Science.

These, then, are the resources at the disposal of the teacher of science: other teachers, books, films, pupils, and the community.

SCIENCE AND THE SCHOOLS

SCHOOL BUILDINGS ARE GOING UP faster than ever before. The new ones differ from the old in many ways that affect science teaching, but the rapidity with which new schools are being built as well as the extensive use of state funds means that one new school is very much like another. Most elementary classrooms open directly onto the out-of-doors. Hence, the environment of the children attending these schools is infinitely enriched. Some of the high school science rooms now have the laboratory benches placed around three sides of the room, leaving the front of the room and a space in the center for lectures, demonstrations, and discussion.

Whether the building be new or old, the nature of the school building and the way in which classes are organized affect the

teaching of science. Only the teacher can say how much. With inflexible classrooms the teacher's ingenuity is taxed in an effort to keep the instruction from a sterilizing formality. Occasionally, the science experiences that the child undergoes in school seem to him to be completely unrelated to the world he finds outside school. Under these circumstances only the highly intelligent will be able to transfer their training. Even for them the applications of their new-found knowledge is needlessly difficult.

Equal in importance to the effect of school buildings on the curriculum is the effect on it of the way in which schools are organized. Whatever the merits of separate elementary schools, junior high schools, high schools, and colleges may be, they certainly present many problems when attempts are made to relate the curriculums of one to those of another. The way in which the science teaching in one school prepares for that in another is important. On the one hand, overemphasis on this preparation prevents an approach to other objectives of science teaching. On the other hand, complete disregard of future educational needs of children may place them at a severe disadvantage. The best way to resolve this dilemma is for teachers at different levels to meet regularly to arrange for scope and sequence.

SCIENCE AS A BODY OF KNOWLEDGE

CONTENT HAS BEEN MENTIONED. It will be treated in much greater detail in the following chapter. Three important concepts that children of the twentieth century need to learn to live with are those of molecules, evolution, and cosmogony. Daily work in science must develop the child's thinking through applications of such principles as these. As he sees the young child comparing frogs with salamanders and rabbits with chickens, the alert teacher will be alive to the relationship of these isolated pieces of information to the major scientific concepts and generalizations.

SCIENCE AS A METHODOLOGY OF INQUIRY

SCIENCE CONCEPTS AND GENERALIZATIONS form the web of relationships that makes up the body of scientific knowledge. How they do so constitutes the methodology of science. Conant refers to this as the tactics and strategy of science. Children need to become familiar with scientific method partly because this is an educational end in and of itself, and partly because it is a means that people can use in the solution of problems that confront them daily.

Any quick analysis of scientific method apart from a careful study of a body of science content is easily criticized. However, the method includes: collection of the data, classification of the data, precise communication about the data, the establishment of relationships among the data, formation of useful hypotheses, development of major theories, and the use of instruments. Thus we see that science content is among the most suitable for an emphasis on process, especially the processes involved in critical thinking. In fact, many of the current analyses of thinking, the Dewey analysis for example, are actually attempts to analyze the methodology of science.

Collection of the data

Part of the scientific process consists of the collection of data. Children keeping a record of the daily weather, drawing maps of the stars, plotting the positions of one of the planets, keeping a diary of observations of baby brother, describing the characteristics of a pet hamster, can all be learning to collect data. If the skill is to be generalized, collection of other data in the same kind of orderly objective fashion must be practiced. Problem-solving, either alone or in committees, provides abundant opportunities for practice under the guidance of the teacher.

Classification of the data

Classification of these primary data should not be performed mechanically if skill in process is to be acquired. The child who keys down a wild aster or a lesser Canada goose in order to find out its scientific name may be doing so in a routine fashion with no

glimmer of understanding. Without this understanding, transfer of the process to an arrangement of his collection of phonograph records will not be possible.

Communication about the data

If children are made conscious of the need to use scientific terms with precision and if they are interested in the terms, skill in communication may possibly be acquired. Just possibly, some children may be more interested in learning the names of automobile parts than in learning the names of the chemical elements, or of the different kinds of clouds. Unless one set of names is intrinsically of more educational value than another—for the particular child—insistence on learning one set of names rather than another is difficult to justify. For most children in elementary school being able to recognize the scientific word when it is encountered is all that is necessary. Few elementary children need to be able to think up the scientific word for themselves. Traditionally, words in the life sciences have been emphasized in the elementary school rather than words in the physical sciences. There seems to be no sound argument in support of this practice. Many children (girls as well as boys) are interested in outer space with its comets, galaxies, and nebulae. When they are, a steady diet of ant-lore and birdwatching will frustrate them. The words "atom" and "molecule" seem at least as common these days as the words "planet" and "solar system." They may be as important to some children in elementary school as the words "pupa" and "calyx." In high school, development of a scientific vocabulary may be expected to continue.

Relationships among the data

Relationships among data may be simple or complex. Not all numerical relationships are complex. Very young children may be led to see simple numerical relationships for themselves. For example, "All insects have three pairs of legs" is a simple relationship that many young children can be led to make for themselves. When they do so, the discovery is often exciting. They should not be denied this thrill. The ability to see relationships can often be developed with practice. The more difficult relationships need careful teaching. An example of a more difficult relationship is the equality between the weight of a piece of ice and the weight of the water that it dis-

places when it is floating in water. Simple or complex, these relationships are powerful aids to thought.

Formation of a hypothesis

When people think in a scientific way, they sometimes guess that a given relationship holds true before they know for sure. A guess of this kind is called a hypothesis. Much scientific research consists of testing hypotheses. In science teaching, children should be provided with many opportunities to test hypotheses. Skill in testing hypotheses can be taught only in this fashion. From their experience, children may suppose that a magnet will pick up any piece of metal. This supposition is a hypothesis. It can easily be tested. As the children try to pick up pieces of iron, brass, copper, and zinc, they learn that a magnet attracts only some of the metals. If the teacher helps the pupils to be conscious of process, they not only learn important scientific facts, they also learn to think scientifically and to appreciate scientific study. They can appreciate that formation of a hypothesis enables the scientist to ask the right question. In addition, they can learn that a tested or verified hypothesis makes prediction possible.

Knowledge of the established relationship between a magnet and a piece of ferrous metal enables the child to predict to his less informed fellows that a magnet will not pick up a silver dime. Linking an experimental fact with a known relationship in this fashion is a scientific explanation. "Why did Henry get the measles?" "Because he was playing with Jimmy after Jimmy became infected." When relationships of this kind, sometimes called cause and effect, are known, a measure of control is possible. Knowing that Jimmy has become infected with measles, the other children stay away from him and preserve their own health.

Development of major theories

Scientific hypotheses may themselves be linked together in a complex fashion to constitute a theory. This linking must be done logically, step by step. It is often done with the aid of mathematical symbols. It is all done mentally. It is scientific thinking and it is deductive thinking. The results of experiments, experimental data, are usually introduced at various places into the chain of logical deductive reasoning. The logic may lead to the formation of a new

hypothesis. Children need practice in thinking and reasoning of this kind. Although they can make simple generalizations for themselves, they can scarcely be expected to work out complex theories. However, they can eventually be led, for example, from observing the action of an electric current on a magnetic compass to the building of an electromagnet. Logical reasoning such as this develops the child's intellectual ability.

When the results of many experiments always indicate that a given relationship is true, this relationship is spoken of as a scientific law. For example, when metals are heated they become red hot. Hence, we have a simple scientific law. Use of the data to establish this law is known as induction or inductive thinking. Unfortunately, the general process cannot be tested apart from itself. Nevertheless, inductive thinking has been, and still is, one of our most powerful scientific tools. On the other hand, deductive thinking can always be tested empirically, that is, by reference to things.

Instruments

We began this discussion by telling of the need to teach children to observe. We will round out the discussion by telling how instruments may be used to sharpen these observations.

Talk about scientific instruments sounds as if their use must be difficult. Some instruments are complex but others are quite simple. One of the simplest is a ruler. Another is a watch. Both of these will register to a much finer extent when a magnifying glass is used to read them. Young children are familiar with the instrument panel of an automobile. From these simple beginnings, a few pupils in elementary school may be able to progress rapidly and still understand what they are doing. By the time children leave high school their understanding of scientific instruments and ability to use them are often highly developed. Incidentally, the intrusion of an instrument between the observer and the object raises some difficult philosophical questions concerning the nature of the object. Recent psychological studies indicate that the philosophical difficulty was always present. While it is true that the use of instruments calls into being a kind of priesthood of scientific observation, the priests and their disciples are all able to reach agreement.

SCIENCE AND VOCATIONS

MANY PROFESSIONAL, skilled, and semiskilled occupations are basically scientific. It is one of the tasks of the teacher to relate the teaching of science to these vocations. The purpose of this orientation is twofold: to use the vocational interests of children to stimulate an interest in science and to use exciting contacts with science materials to develop vocational interests.

Many young children have been impressed with the glamour of the medical professions through movies, reading, and television. Chemists, physicists, and other scientists have not always been linked with stereotypes that impress children favorably. Somehow, the word has got round that science is difficult and that scientists are usually antisocial if not downright peculiar. It is up to the teacher to correct this belief. Visits of classes to industrial laboratories and invitations to scientists and engineers to visit classrooms are helpful if the visits are carefully planned.

Pupil contact with the activities of carpenters, garage mechanics, bricklayers, plumbers, and so on, can usually be assumed. It is up to the teacher to show how progress in these trades depends on scientific development. The carpenter's level, hammer, and saw can be used to teach such concepts as gravity, inertia, and friction. The garage mechanic makes use of many different levers. Carburetors illustrate Bernouilli's principle. Ignition systems demand complex notions of electricity for their understanding.

SUMMARY

BY WAY OF SUMMARIZING this chapter of factors that influence curriculum choices in the science area we will supply lists of points to remember about children, teachers, schools, and organized science itself.

Points to remember about children

1. They are all different.
2. They like what they are interested in.
3. They learn what they are interested in.

4. They can discipline themselves if they want to.
5. They know a lot.
6. They worry about what other children think.
7. They are ambivalent toward adults.
8. They need approval of adults they like.
9. They want to be somebody.

Points to remember about teachers

1. Some teachers are well informed about science, others are not.
2. Teachers need to be able to cooperate in an organized manner.
3. Teachers can get help in the teaching of science from books, films, pupils, and members of the community.

Points to remember about the schools

1. School buildings affect science teaching because of their physical structure.
2. A respect for tradition rather than for rationality causes a certain school organization to persist.

Points to remember about science

1. Science is a body of knowledge, a methodology, and a body of practitioners.
2. Aspects of the method of science are: classification and collection of primary data, communication about the data, the establishment of relationships among the data, making hypotheses and testing them, the building of theories, use of instruments.

EXERCISES

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1. Formulate two propositions, only one of which is subject to scientific investigation.

2. List a series of questions that might be posed by a child, indicating a developing interest in formal scientific study.

3. The readiness of pupils to accept abstract generalizations varies greatly. How might a teacher at a given grade level

teaching, say, science in grade three or physics in grade twelve make provision for these differences?

4. How might the fascination of crystals for children be exploited in the study of certain fundamental generalizations of chemistry?

5. Choose a reasonably popular vocation and show how an interest in this vocation can be exploited to develop a growing interest in a study of science.

6. Choose an example, not given in the text, whereby a group of children can use their movement to demonstrate a difficult astronomical concept.

7. Describe a problem that children might be called upon to solve and indicate the practice in decision-making that might be involved.

8. In the planning of the trip to Holland described in the text, provision for individual differences was not specific. In such a project how can a wide variety of abilities be accommodated?

9. Make a list of twenty or more popular sayings. How many of these are half-truths at best, and how many are superstitious? Can you quote two that directly contradict each other?

10. Trace the development of one or two of your own major interests.

11. Locate one or two important investigations concerning the interests of children.

12. Examine some of the evidence with respect to social class and educational opportunity.

13. What are some of the handicaps that result when Negroes are educated in separate schools?

14. Describe the controversy that took place between certain religious and scientific thinkers over Darwinism.

15. Describe a difficult decision that you were called upon to make recently. Upon what basis was the choice made?

16. Describe a problem-solving activity that pupils might carry out in science and show how the activity would demand practice in certain generally recognized virtues.

17. Choose a recent investigation into the teaching of high school science in which high school and university professors

have cooperated and describe the roles played by each group. Suggest possible modifications of these roles.

18. Write a short review of a recent textbook for the teaching of a high school science.

19. Describe the use of a readability formula.

20. How might a teacher make use of several texts in a single classroom?

21. Describe a science lesson that makes use of: (a) a film, (b) a filmstrip, (c) a set of flat pictures, (d) a set of slides.

22. Plan a field trip that could profitably be taken by a class at a given grade-level. Tell how you would prepare the class for the trip, listing the things they could be told to look for, and describe an appropriate culminating activity.

23. What are some of the dangers of the high-level competition provided by science fairs? What are the advantages of science fairs?

24. Describe steps that might be taken in a given community to improve the articulation of science education in elementary and secondary schools.

25. Refer to one or more kinds of scientific process that can be useful in nonscience activities. Is this ever loosely referred to as "scientific" activity? Is the use of the term appropriate?

26. List a half-dozen words that have entered the general vocabulary of Americans, but which ten years ago were used only by scientists.

27. Provide an example of a scientific relationship, a scientific hypothesis, and a scientific theory.

28. Document the way in which a scientific theory can be a source of fresh hypotheses.

TOPICS FOR DISCUSSION

1. Science as distinguished from nonscience in the intellectual capital of civilized nations.

2. The dependence of science upon (a) art, (b) philosophy.

3. The place of technology in science education.

4. A major criticism of teaching machines is that the child gets little or no practice in formulating his questions.

5. Difficulties arising from differences in the interests of men teachers and girl pupils and vice versa.

6. Use of committees of parents and other adults in the selection of subject matter to be taught in schools.

7. Coercion of the child can lead to the development of lasting interests.

8. The use of books to develop lasting interests.

9. Both Alexander Hamilton and Thomas Jefferson referred to Aaron Burr as a man without principles. Yet the first two were political enemies. How does this situation relate to the discussion of values in the text?

10. Cooperation among teachers whereby special knowledge can be shared.

11. The gulf between teachers in elementary and secondary schools.

12. Is the concept of "a methodology of science" of any value?

13. The need to make scientific observations precise and accurate is sometimes said to impoverish the environment.

14. Scientific and technological development is causing serious and rapid dislocations among a number of ancient crafts. Unions are beginning to insist on new fringe benefits to soften the impact of these disturbances.

ADDITIONAL READING

Anderson, Kenneth E., "Frontal Attack on the Basic Problem in Evaluation; the Achievement of the Objectives of Instruction in Specific Areas," JOURNAL OF EXPERIMENTAL EDUCATION, 18: 163–74, March 1950. *An unexpected finding of this study was that many biology teachers themselves were unaware of process in science. They could neither state for themselves, nor recognize when stated by others, the characteristics of scientific activity. This study reports findings that could easily be overlooked in the present move toward a national curriculum in biology.*

Black, Max, CRITICAL THINKING (New York: Prentice-Hall, Inc., 1946). *A book on verbal and symbolic logic that is highly interesting. Probably the best of the books on the technical aspects of thinking.*

Blake, Ralph N., Ducasse, Curt J., and Madden, Edward H., THEORIES OF SCIENTIFIC METHOD: THE RENAISSANCE THROUGH THE 19TH CENTURY (Seattle: University of Washington Press, 1960). *A collection of thirteen investigations of the scientific method. Reports on the work of Descartes, Newton, Hume, and J. S. Mill are included. There are abundant, lengthy quotations from original writings, and ample reference to primary sources. Yet the book is highly interesting to read.*

Blough, Glenn O., Schwartz, Julius, and Huggett, Albert J., ELEMENTARY SCHOOL SCIENCE AND HOW TO TEACH IT (New York: Holt, Rinehart & Winston, 1958). *Because the authors are aware of the needs of some teachers, this book combines methods of teaching with a survey of science. The survey covers a wealth of topics, many of them technological rather than scientific. The unifying concept is the child in relation to his environment rather than scientific theory.*

Bridgman, P. W., THE NATURE OF PHYSICAL THEORY (New York: Dover Publications, Inc., 1956). *A reprint from 1936. The author is a Nobel Laureate in physics. The book is short and readable, and deals with some of the basic questions concerning the activity of physicists.*

Brown, Harrison, THE CHALLENGE OF MAN'S FUTURE (New York: The Viking Press, Inc., 1956). *Brown is a geological physicist at the California Institute of Technology. This is a popular statement and, of course, hypothetical.*

Cohen, Morris R., and Nagel, Ernest, INTRODUCTION TO LOGIC AND THE SCIENTIFIC METHOD (New York: Harcourt, Brace & Co., Inc., 1934). *An old friend which many have used as a textbook. The rules of logic are first explained, then applied to scientific inquiry. Hypothesis, law, and theory are clearly distinguished.*

Conant, James B., ON UNDERSTANDING SCIENCE (New York: New American Library, 1952). *First there are naked-eye observations. Men quarrel about their meaning. Instruments are invented to make the observations precise. New theories replace the old.*

Dewey, John, HOW WE THINK (New York: D. C. Heath & Co., 1933). *This is the source of the famous analysis of problem-solving that is so often quoted: sensing a problem, defining a problem, gathering data, forming testing and modifying the hypothesis.*

Harvard Committee, GENERAL EDUCATION IN A FREE SOCIETY (Cambridge: Harvard University Press, 1946). *At the close of World War II, Conant, then president of Harvard, brought together a large committee of the faculty to decide upon the elements of a general education. This now famous report records their deliberations.*

Kaufmann, Felix, METHODOLOGY OF THE SOCIAL SCIENCES (New York: The Humanities Press, 1958). *Probably one of the most careful and able analyses of the use of science in the assessment of human behavior.*

Kline, Morris, MATHEMATICS AND THE PHYSICAL WORLD (New York: Thomas Y. Crowell Company, 1959). *A readable yet rigorous explanation of the role of symbolic logic in scientific investigation.*

National Society for the Study of Education, SCIENCE EDUCATION IN AMERICAN SCHOOLS, Forty-sixth Yearbook, Part I. (Chicago: University of Chicago Press, 1947). *There are sections on aims, issues, organizations, elementary science, secondary science, teacher education, etc., and, in short, fairly complete coverage up to the date of publication.*

Richardson, John S., and Cahoon, G. P., METHODS AND MATERIALS FOR TEACHING GENERAL AND PHYSICAL SCIENCE (New York: The McGraw-Hill Book Co., Inc., 1951). *This book emphasizes the use of demonstrations, laboratory experiences, field trips, and other instructional aids for the teaching of chemistry, physics, and general science.*

CHAPTER 8

Science in the Schools

WAYS OF INTRODUCING SCIENCE

THERE ARE AT LEAST THREE WAYS of introducing science content into the curriculum of the school: (a) informally or casually, (b) in the social studies unit, and (c) in the science unit. Each of these three ways of introducing science content will be discussed.

INFORMAL SCIENCE

BY CASUAL OR INFORMAL SCIENCE CONTENT we mean that which is related to the events of the day, especially those events that happen to the children in the class. In the sharing period, the teacher will find it easy to capitalize on children's interests in their pets in order to introduce such science concepts as those having to do with classification, heredity, and reproduction. Other offerings by the children may include collections such as those of rocks or insects. Children often see or even collect such things as leaves,

flowers, or bugs on the way to school. These may be used in this informal science teaching. Weather disturbances, especially floods or storms, should not go unnoticed. Children find a story about a house floating down a river or sliding down a hill exciting and frightening.

SCIENCE IN THE SOCIAL STUDIES

WE WILL CHOOSE "THE HARBOR" as a typical social studies unit, though we might have chosen The Dairy, The Factory, or The Farm. There is a good deal of science content that comes into the study of any social studies unit.

From the point of view of history or geography a protected body of sea water—a harbor—is extremely significant. Nearly all the foreign trade in raw materials and manufactured goods related to food, clothing, shelter, and defense depends upon the existence of a good harbor. Formerly, the harbor was the focal point of much trade around the coast line of a country or state, and though with the development first of railroads and later of highroads, its position with respect to internal trade has diminished, the harbors of a country are still an important asset to the domestic economy.

Probably, a mere listing of some of the science items related to THE HARBOR is sufficient to indicate the richness of this medium for the teaching and learning of science: Tides, floating bodies, lighthouses, waves, fog, rust, paints (both above and below the water), disposal of wastes, earth movements, marine life, Tyndall effect, and ship machinery of all kinds.

But the value of this concept as a focus of so many ideas that are basic in civilization can be realized only if a few of the details are discussed. The discussion of this rich source of curriculum materials will be arranged under content, references, problems, methods of teaching, anticipated outcomes, and evaluation. In the discussion that follows, curriculum materials for a wide range of abilities and for children at nearly all levels of maturity will be readily discernible. A selection from the material available must always be made with the capabilities of particular children in mind. To prescribe ahead of time for a bright child just because his chronological age places him in a certain grade would be the height of folly.

CONTENT: THE HARBOR

Definition

A harbor is a body of navigable water, accessible from the sea by ships and from the land by vehicular traffic, and protected, at least in part, from the turbulence caused by ocean waves. This sounds rather like a formal definition, but, as will be pointed out later, this definition should not be memorized by the pupils. Rather, they should practice the thought and study which must precede the framing of such a definition for themselves.

Examples

Many examples of famous harbors might be listed. Young children should begin by studying harbors which are close enough to affect their lives and which they themselves might conceivably visit. Gradually, they should be led to an interest in distant and possibly more important harbors such as Amsterdam, Baton Rouge, Copenhagen, Dublin, Edinburgh, Frobisher Bay, Genoa, Hong Kong, Kobe, London, Montreal, New York, Oslo, Port au Prince, Rio di Janeiro, Seattle, Vancouver, Wellington, Yokosuka.

It is perhaps no accident that many in the list are the names of important cities. The child might easily want to study the historical development of these cities after having been introduced to them by means of his growing interest in harbors. Questions of population, exports, imports, finance, and internal trade could easily be raised in much the same way.

Relationship to shipping

Leaving for the moment the possible development of submarine freighters powered with atomic energy, harbors are needed for the safety and convenience of surface ships. Hence, each harbor must be related to the kind of ships that seek shelter in it. Small ships or boats can make use of small harbors with narrow, shallow entrances. Larger ships need more room both for entering and leaving and for maneuvering once they are inside. The difficulties of sailing vessels call for special consideration.

Many different kinds of water-born vessels have developed during the long history of man's efforts to navigate from one place to

another on the surface of the sea. Most boys and many girls find boats and ships completely fascinating. It is significant that several of the early developments have persisted to the present day in one form or another, some as vessels for commerce, some for war, and some for pleasure. The hollowed-log was one of the earliest devices and although all forms of shipping can trace their ancestry to this marvelous device, none can do it so readily as the pleasure canoe. The open canoe is distinct from the kayak which has recently become so popular, for this clever little vessel is a direct descendant of the skin-covered bark of the Eskimo.

For centuries, propulsion of vessels was accomplished by the efforts of slaves manacled to huge sweeps or oars. The great Roman triremes had three banks of oars, and the slaves kept time to the measured beat of a mighty gong. The Vikings, whose marine exploits are so justly famous, used oars, but they also made use of a gigantic squaresail to trap the force of the wind. Many people still enjoy rowing a boat for pleasure, and races between teams of rowers is one of the most enduring of sports.

Eventually, sails, masts, and rigging reached such an advanced stage of efficiency that for all practical purposes the oars were discarded. The history of the sail is long, complicated, and fascinating. Development of the sailing vessel is still going on, but only pleasure boats now use the force of the wind to go from place to place. Commerce and war have long since turned to methods of propulsion that provide a greater measure of control.

For many years, steam was the only alternative to sail, and at the height of its power, the British Navy was compelled to maintain coaling stations in all parts of the world—a practice that was closely linked with the commercial development of the British Empire. Most steam vessels today use oil as fuel, and more and more of them are converting to diesel engines which burn the fuel internally and which are therefore more efficient.

Internal-combustion engines are popular for the propulsion of pleasure craft and none are so popular as the outboard engines, so called because the engine actually sits on a bracket outside the vessel, and the need for a drive shaft that passes through the hull is eliminated.

All these various kinds of vessels must find suitable harbors

where they can load and unload, where they can periodically be lifted out of the water for painting and repairs, and where they can be safe from storms with the minimum of attention.

Natural characteristics

Most harbor entrances, being passageways to larger bodies of water, are scoured by currents as the tide goes in and out. Notable exceptions are the entrances to harbors in the Baltic and the Mediterranean, for the tides are negligible in these inland seas. At Frobisher Bay, the tide changes 35 feet or more, and this mighty rushing back and forth of the waters causes rapid currents in the passes. Ships, especially when they are traveling in fog, need to know the speed of the currents at all times with the utmost precision, and they also need to know, with equal precision, the depth of water that lies under the keel. To provide the mariner with this information, automatic recording devices keep track of the tides and currents over long periods of time, equations or formulas are written to match the changes observed, and with the aid of the formulas, tables of tides and currents are prepared for several years in advance. Variations between the predicted and observed values are reported to the U.S. Coast and Geodetic Survey by mariners as these variations are noted, and the formulas are constantly checked. One of the unpredictable variables is the strength and direction of the wind. A strong wind blowing for several hours in one direction can cause a serious difference in the height of a tide and also the time of high water. Tides are caused by the gravitational forces of sun and moon acting upon the earth. As the earth rotates on its axis, the waters rush toward the point which is facing the moon, and like a pendulum, they rush too far and have to come swirling back. The tidal wave results, with two peaks and two troughs. Hence, there are two high tides and two low tides in each 25-hour period. When the moon and sun both pull in the same direction, the tide is unusually large.

Passes usually lie between capes, or promontories. There are many famous capes—Cape Horn, the Cape of Good Hope, Cape Flattery, Cape Canaveral, and hundreds of others. A cape is a high and steep point of land jutting out into water. On one side of the Golden Gate, the entrance to San Francisco Harbor, stands

Point Lobos; on the other, Point Bonita. A narrow strip of land, jutting out to sea, is called a peninsula. Harbors are formed by these peninsulas. A single peninsula may curve round to form a crescent beach, or two peninsulas serve like the pincers of a crab to lock the harbor in safety no matter from which direction the wind is blowing.

Many harbors are estuaries at the mouths of rivers. Nearly all have rivers flowing into them. When the swift rush of a mighty river slows down before reaching the sea, mud and silt are deposited and an alluvial fan slowly accumulates. Rivers carry mud and sand along when the pace is swift, but even sluggish waters retain minute particles of clay in colloidal suspension. When the fresh water of the river collides with the salt water of the ocean, most of the colloidal particles are deprived of the electrical charges that have kept them apart; they unite and sink to the bottom, and a delta may be formed. Famous are the deltas of the Nile, the Mississippi, the Fraser, and the Ganges.

A harbor is best if it enjoys a temperate climate. Some harbors like Murmansk in Northern Russia are closed by ice for part of the year. Other harbors, like New Orleans, are so hot that special problems are encountered. Before the invention of radar, fogs in the English Channel and off the Golden Gate were a detriment to harbors like Portsmouth, Le Havre, and San Francisco. Even Duluth is sealed each winter in a frozen shroud. The climate of a harbor is a natural characteristic of great significance.

Man-made characteristics

To guide ships to harbor and to mark channels and treacherous shoals, a system of lighthouses, lightships, buoys, and markers has slowly developed. Each country publishes a list of lights and to each of these is assigned a special signal. Some flash once for two seconds every thirty seconds, some twice every twelve seconds, and so on. Each of these is recorded on mariners' charts and on the light list. Nearly all lights show a red sector. When the sailor sees the red glow he knows that he is in dangerous waters. Buoys are distinctive. On entering a harbor, red buoys are seen to starboard, or to the right, and black buoys to port. Rows of buoys are numbered, even numbers to right, and odd numbers to the left, and the buoys often

have distinctive shapes. In the archipelago that surrounds Stockholm so many thousands of buoys must be maintained by a nation that is neither large nor wealthy that nearly all these markers are poles kept floating upright. To make the poles more easily seen, a brush of twigs is tied to the top.

Foghorns, each with its distinctive note, are often associated with lighthouses and lightships, and echo boards may be provided in channels so that by timing the echo of the whistle of his ship, the pilot can determine the location of his vessel in heavy fog.

As more and more vessels make use of radar, sailors are able to place less reliance on whistles, bells, and echo boards than they were formerly. A most hazardous situation occurs when a sailing vessel, lacking auxiliary power, is becalmed in a fog, and those on board listen with growing dread to the wail of a great steamer bearing steadily down upon them. Half a century ago, steamers sometimes ran down full-rigged ships in the English Channel. Collisions between freighters, liners, and fishing schooners were once fairly frequent on the Banks off Nova Scotia, and sinking of pleasure boats by commercial vessels is not unknown at the present time. The sinking of the *Andrea Doria* by the *Stockholm* is one of the most disastrous nautical collisions yet recorded.

To hold back the deposition of silt in channels, jetties of stone are often built, and in most harbors, dredgers of one type or another can be seen chewing steadily year after year to keep the channels clear.

Where the foreshore shelves gradually to the deep water of a harbor, wharves have been built to facilitate the loading and unloading of ships. Through centuries of use, an aura of tradition and legend has accumulated about these man-made structures. The quiet water beside a wharf is called a dock. Sometimes wharves and dock floor combine to make a watertight structure from which the water can be removed by pumping. When this takes place, the entire structure rises and floats, carrying a ship with it and the whole wonderful invention is then called a floating dry-dock. On the wharves we often find a network of rails and on some of these rails are huge movable cranes that facilitate loading and unloading. At the ore ports of the Great Lakes, operators ride the giant shovels back and forth as they swiftly scoop out the contents of the specially con-

structed ships. Trains shunt back and forth along the wharves, and trucks roll along with their loads.

Over most of the world's great harbors, bridges have replaced the busy ferries, and the spans of these steel and concrete structures often serve as signal towers.

The signaling system of a great harbor is complex, efficient, and nearly foolproof. In addition to a complicated system of flags and markers by day, and lights of various colors and combinations by night, there is usually a center for the transmission and reception of messages by wireless. In recent years, ship-to-shore communication has grown almost as simple as telephoning from one house on shore to another.

Personnel

Operation of a busy harbor is accomplished by the employment of an army of specialists, skilled workers, and laborers. Included in the list are pilots, customs officers, immigration officials, doctors, police, lighthouse keepers, Coast Guard, stevedores, truck-drivers, crane operators, bridge-tenders, guards, watchmen, firemen, signalers, wireless operators, ships' crews, divers, ship chandlers, shipyard workers, stewards, and sailors. All these varied and interesting vocations may be used as interesting starting points for a host of individual and class studies.

Birds

Many different varieties of birds make their home on the waters of a harbor or on the lands that constitute its boundaries. The most common is the sea gull, without whose graceful scavenging the accumulation of refuse and garbage would be infinitely greater. Ducks, geese, cranes, and herons may abound in the marshes. Cormorants may nest in the cliffs. Loons may dive swiftly beneath the surface.

Plants and animals

Plants and animals of the sea can be studied along the shores of a harbor. Numerous varieties of kelp and seaweed accumulate where the destructive action of the waves is lessened, and sea anemones, sea urchins, and sea cucumbers can often be found in the quiet pools. Oysters, clams, limpets, and other mollusks that have come

down practically unchanged for many thousands of years can be found among the sands and rocks of the beaches, and crabs, lobsters, shrimps, and other crustaceans are still numerous. Fish can be caught with net and line, and sea mammals such as seals, porpoises, blackfish, and whales can sometimes be sighted.

Water

Numerous scientific observations of the water itself can be suggested. When the temperature of a natural body of water is recorded from day to day and at various places, the effect on the climate of the land is readily explained if a graph of these temperatures is compared with a similar record of the land temperatures. A sample of sea water, evaporated to dryness on a watch glass over a beaker of water, reveals the presence of salt in aesthetic rings, and when muddy water is left to settle slowly in a glass jar, the layers of sediment can easily be distinguished. The blue of clear water is partly a reflection of the blue of the sky, but it is caused in part by the Tyndall effect of the particles suspended in it. Both sea and sky contain submicroscopic particles so small that the shorter wave lengths of light stumble over them to be scattered helter-skelter. The red comes through more or less directly, as we see when the sun is setting, but the blue is scattered from one horizon to the other. Because of this, some seaweeds have developed that are able to use red light for photosynthesis.

Perhaps the most fascinating sight, from an aesthetic as well as from a scientific point of view, is the action of the waves of the sea. They form both rocky and sandy beaches, and as they curl in toward the watcher, bearing a crust of foam, they make a scene of endless fascination.

Ships

Ships, be they of wood or steel, can float in water because they displace a weight of water equal to their own weight. A study of the principles of flotation leads to an understanding of density, which is the weight per unit volume of a given material, and specific gravity, which is a number comparing the weight of a substance with the weight of an equal volume of water. If the specific gravity is less than one, the substance floats. The specific gravity of the human body is very close to unity. Hence, human flesh, like water, weighs

close to 62.5 pounds per cubic foot. Cedar wood is only half as heavy. Iron has a specific gravity of over seven. Iron ships float because when watertight they can enclose a large volume of air, and air has a specific gravity of not much more than 0.0013. As a ship is loaded, it sinks lower in the water. Because of sinkings that occurred when greedy owners put too much cargo in their vessels, ships of all nations now carry a Plimsoll mark to indicate the maximum submergence permitted by law. Fish, like submarines, go up and down by controlling their density with air sacs.

To stay on top of the water, ships must not only be light, they must be stable. The height between the center of gravity of the ship, and the center of gravity of the water it displaces is called the metacentric height. If this be too great, the vessel has an unpleasantly quick roll. If it is not enough, the vessel could roll right over in a bad blow. When heavy cargo is being carried, it must sometimes be stacked in the holds instead of spread across. The proper loading of a vessel spells the difference between a comfortable passage and one that is needlessly dangerous. To make ships watertight, they must be caulked. To stop them from being crushed by the hydrostatic pressure, they must be adequately braced. Difficult problems of bracing and of stability are met in the design of sailing vessels.

Ships must move through the water. Hence, the underwater shape of a surface vessel is critical. Long before a scientific understanding of streamlining had been achieved, ship designers tried first this shape and then that before the proper lines of bow and stern were developed. These lines were not such as to provide maximum cargo space. Hence, the marine architect was faced with the need to compromise between speed and capacity, as indeed he still is.

With the use of power generated within the ship came a problem which is seldom recognized by people unfamiliar with the ways of ships. That is the need to draw water past the ship. Oars, paddle wheels, and propellers must needs push the water away from them. This water is replaced to some extent by water flowing past the sides of the vessel. Hence, a sailing vessel traveling at a given speed creates less disturbance in the water than if the same vessel were propelled by steam or by an internal-combustion engine.

Ships are steered by means of a rudder attached to the stern.

This fact makes them awkward at slow speeds. When a vessel turns right or left, even at high speeds, the point about which the vessel pivots is usually in front of the middle, or forward of the beam, as a sailor would say. Rudders and the means for controlling them have undergone an interesting development down through the years. At high speeds, a much small rudder will suffice than at low speeds. This is one of the reasons ocean-going vessels usually require the services of one or more tugs when making a landing. Incidentally, an excursion steamer that carries passengers from London to Margate on the River Thames does the last ten miles back to London in reverse in order to avoid the cost of the tugs that would be needed to turn round in the Pool of London!

The possible content to be derived from an analysis of the concept HARBOR has not been exhausted in the foregoing discussion, but the suggestions indicate the range of interesting material for study not only with respect to point of view, but also with respect to the intelligence and maturity required on the part of the student.

REFERENCE BOOKS FOR HARBOR STUDY

ENCYCLOPEDIAS, TEXTBOOKS OF PHYSICS, chemistry, botany, zoology, oceanography, and biology must be among the many books available to the teacher and students if a study of one or more of the following problems is to be made possible. In addition, there should be a plentiful supply of books about ships and harbors that are written in an interesting and captivating way. Sometimes, the interest of a child can be caught by a novel of the sea. Surely the stories of the grain races, and the tea races and the clipper ships, are among the most romantic to be found.

Government reports should be available, for they usually contain accurate information and are often well indexed. But the language is such as to presume a keen and lasting interest in the subject on the part of the reader prior to his reference to the report. The needs of the child will be such that it will seldom be necessary for him to read one of these reports from beginning to end. He will need help if he is to use these documents efficiently.

Films, filmstrips, pictures, drawings, and sketches should be available in abundance. When these, along with apparatus, are

available, they and a study trip or two can be calculated to arouse vivid interest on the part of most of the students.

PROBLEMS FOR HARBOR STUDY

1. Why are harbors necessary?
2. What are some of the world's great harbors?
3. Why are international rules needed for the regulation of shipping? Who makes the rules and how are they enforced?
4. What harbors are within fifty miles of the school? (Surely in these days of artificial as well as natural lakes, few schools will have no harbors, even for tiny pleasure boats, within a fifty-mile radius.)
5. How do the times and height of tide relate to the phases of the moon? Has the sun an effect upon the tides?
6. What special difficulties are encountered in the navigation of narrow passages?
7. What are the principles governing the relationships between land and water so as to constitute a harbor?
8. Why does a body of water usually prevent the temperature from going much below freezing point?
9. How does land form at the mouth of a river?
10. How does sedimentation help in starting land movements?
11. What is the historical development of lighthouses?
12. What is a diaphone?
13. What is the difference between a nun buoy and a can buoy? What is a breeches buoy?
14. How do ships find their way in fog?
15. What is the difference between a wharf and a dock?
16. How are freighters unloaded?
17. Do ships ever unload without a harbor?
18. How do dredgers work?
19. How are big freighters and liners lifted out of the water?
20. What is a truss?
21. What various methods are used to open bridges to allow water traffic to pass?
22. How is a suspension bridge constructed?
23. What can you find out about one of the world's great bridges? Firth of Forth, Golden Gate, Brooklyn, Tower Bridge?
24. How do pilots get on and off the big ships?

25. What is the relationship of the pilot to the ship's captain?
26. What is the purpose of the customs officers?
27. Why does a port need an immigration officer?
28. What is the difference between a port and a harbor?
29. Describe the activities of a company of marine police.
30. How are fires at sea extinguished?
31. What are the duties of the Coast Guard?
32. What is the difference between a stevedore and a longshoreman?
33. When a ship comes into port flying a big yellow flag, what does this signify?
34. What can you find out about the habits of sea gulls?
35. How many kinds of sea birds can you identify?
36. Do all sea birds have webbed feet?
37. Is there such a bird as an albatross?
38. What forces of nature are constantly trying to destroy ships, be they of wood or iron?
39. Why are sailors sometimes called "tars"?
40. What tactics were used in naval battles between sailing vessels?
41. Describe the various kinds of sailing vessels: full-rigged ship, barque, barkentine, sloop, schooner, ketch, yawl.
42. One of the most interesting of all harbor boats was the Thames barge. Describe this useful and interesting vessel.
43. What is the Tyndall effect?
44. How can the saltness of the sea be used to estimate the age of the earth?
45. How is salt obtained from the sea in San Francisco Bay and at Murmansk?
46. Why are the loading marks on ships called Plimsoll marks?
47. How do reciprocating steam engines differ from turbine engines? What are the advantages and disadvantages?
48. How are wooden ships constructed?
49. During World War II, one or two freighters broke in half at sea. What happened?
50. How did Archimedes discover the principle of specific gravity?
51. How do construction engineers make use of the concept of specific gravity?
52. What methods are used to keep iron ships from crumpling?
53. Describe the Tacoma Bridge disaster.

54. What various methods are used to brace bridges?
55. Trace the development of the ship's rudder.
56. What is a gyrocompass?
57. How does radar work?
58. Why do ships still send messages in Morse Code?
59. What arrangement of visual signals is used to warn the mariner of impending storms?
60. How are ships that lie in the water kept free of marine growth?
61. What are some of the important species found in the sea?
62. What are plankton?
63. What is the food of whales?
64. Why is the porpoise called a mammal?
65. How does the clam get its food? How does it eliminate waste products? How does it reproduce?
66. What is the cycle of life in the ocean?
67. How does coral form?
68. How does a diesel engine function?

METHODS OF TEACHING

IN GENERAL, THE PROBLEM-SOLVING METHOD would seem best for most of the time spent on this extremely interesting unit. It is not anticipated that any one class will stay with this unit anything like long enough to exhaust all the possibilities. Instead, the materials suggested will cluster over and over again in the child's curriculum. It is probably a mistake to refer to each clustering of content by the same name. In planning with a particular class, the teacher will need to be guided by the past experiences of the children both in and out of school. Although for the purposes of this textbook, it has been convenient to group masses of content under the title THE HARBOR, many other titles and subtitles will suggest themselves to the teacher working with a particular class. Examples would be: Signaling at Sea, Clipper Ships, Crustaceans, Keeping the Harbor Clean, Floating Bodies, The World's Great Bridges, and so on. The wording of the unit should be commensurate with the maturity level of the majority of the children in the class.

By no means all the children in a given class should be expected to work on the same problem. Nor would the groups be all of the

same size. Conceivably, one or two of the children could be following up a particular line of study as individuals.

Once the teacher has aroused the interest generally by means of an illustrated lecture or a visit, the children will be anxious to share in planning their future activities. Chiefly, this will consist of selecting problems for study and division of the class into suitable groups. Plenty of references will be needed if the children are to go about their task with a minimum of frustration. Obviously, if a group of children wish to work on a problem that is completely unsuitable, the teacher will try to get them to switch to another, or she may, on rare occasions, find it necessary to exercise the veto. It is assumed that materials and tools are ready for the making of projects, cameras for taking pictures, drawing materials, transportation for visits, and so on.

Methods of sharing should be planned tentatively at the start of the unit and these plans should steadily crystallize as the work proceeds. Reports, exhibits of work, and class discussion will all be used.

Either at the beginning of the unit, or during its development, some members of the class may get the idea of something definite to be achieved outside class. Examples of such worth-while activities would be: the cleaning-up of a particularly dirty section of the water front; erection of a tablet near a spot with historic associations; collection of magazines for lighthouse keepers; insertion of a collection of marine life in the local museum; a social activity for sailors from another nation; preservation of a historic vessel; assistance in some movement for conservation such as improvement of a city's method of garbage disposal, or protection of a rapidly disappearing species of fish or bird.

ANTICIPATED OUTCOMES

1. Increase in children's knowledge of science as well as history and geography, as a result of their unit of study. They should write better and read better.
2. Growth of skill in the ability to locate information.
3. Improvement in verbal logic.
4. Better mathematical skills.

5. Increased mastery of various crafts.
6. Improved judgment.
7. Increasing ability to work with others as a member of the group.
8. Increasing interest in deliberation.
9. Growth in interest in the world about them.
10. Increasing willingness to accept civic responsibility.

EVALUATION OF STUDY OUTCOMES

SOME KIND OF BASE LINE should be laid down for each child for each of these outcomes. Growth can then be measured at the completion of the unit. Not all children should be expected to show gains in all directions. Some may even show a loss in all directions. For instance, there may be a failure with a particular child because of the imperfections of the evaluative devices, or because of an aspect of the life of the child that is completely outside the control of the teacher, such as a breakdown in the family relationship.

Where the teacher suspects failure on his own part, it may possibly be that he and the child are unable to communicate. Lack of communication can result from many causes. A direct personality clash is one. If the teacher feels he just can't stand a particular child, the feeling is probably mutual and transfer of the child to another class may be the only solution. Such transfers should not be necessary for more than one child in every two or three classes.

Lack of communication occurs when the teacher is too far ahead of the child. In this case the obvious remedy is for the teacher to slow down, use words of one syllable, and so on. But it also occurs when the teacher is too pedestrian. Nothing is so annoying to a bright child as an adult who seems slow and stupid. If the teacher suspects the failure to understand is his, he had better step aside quickly and let the child see what he can do on his own.

When the child accepts the responsibility for keeping a record of his achievement in all the outcomes listed, he can then be expected to show concern for improvement in all areas.

PLANNING A SCIENCE UNIT

SCIENCE UNITS ON SUCH TOPICS AS WEATHER, stars, rocks, climate, and electricity are commonly found in textbooks of elementary science. Less commonly found is a unit on motion. But a unit on motion can be made vivid and exciting to young children. The general ideas of running, sliding, bumping, and riding, and also uphill, downhill, and on the level, can be applied to children, automobiles, dogs, and airplanes. The excitement of the application and qualitative treatment of these ideas is limited only by the ingenuity of the teacher.

CONTENT: MOTION

CERTAIN OF THE POSSIBILITIES of a unit on motion will be discussed in the same manner as the former unit on the harbor. But the concept of motion is much more abstract than the concept of harbor. It is so much more abstract that it becomes almost a different kind of concept. Not only is the concept enormously fertile, and therefore perhaps to be rejected as a unit heading in actual school practice, but greater opportunities are provided to deal with significant ideas. For these are the basis of educational content. The trouble with programs for introducing abstractions directly into the curriculum of the child is that an appreciation of the logic of, say, Newton's laws of motion requires an adult attitude. If children are to be allowed to develop adult attitudes, their present child attitudes must be accepted and considered. In the following account of possible content for a unit on motion, each abstraction will be introduced only after phenomena have been listed that are vital and interesting to children.

In essence, children are intrigued by motion as opposed to things that are static. Fortunately, a prevalence for the dynamic remains with us most of our lives. Though our bodies may grow less energetic with the years, our interests in movement are maintained, whether in sport, industry, art, or in daily living.

Missiles

Observation of the natural motion of inanimate bodies—stones hurtling down a hillside, trees falling, rivers flowing to the sea, and all movement under the implacable force of gravity, must have soon shown man the use of missiles for peace and war. Hence there developed, in the course of history, the throwing of stones, spears, and boomerangs, and the swinging of clubs, axes, and hammers. Control of the motion of inanimate objects has been retained in many of our sports—baseball, football, golf, handball, tennis, badminton, and so on—but for hunting and warfare, we have gone through slings, bows and arrows, crossbows, and mangonels, to the use of explosives to provide the energy and rifled barrels to direct the missile.

Any part of the development of man's control of missile projection can become fascinating. In fact, many people take up archery as one of the most absorbing hobbies, while others hunt with shotguns and rifles. When the teacher is skillful, the child can be led to absorb with intense interest the whole history of an age through the passion he has developed during the construction of a working model of a crossbow. Perhaps of equal importance, he can be led to see the cranking down of a spring as the prototype of all methods of building up potential energy.

Animation

All animate objects are capable of self-propulsion by definition. The very word means movement. Not only are our own movements a delight—witness our pleasure in walking, running, and jumping, and in dancing—but when the motion is mechanically aided as in skiing and skating it can be exciting. Walking, running, and jumping are tiring because, in order to overcome friction with other materials, the limbs, or the entire body, must be rhythmically lifted and lowered against the force of gravity. Yet without the friction that makes the use of energy imperative, walking would be impossible.

Friction

Friction produces wear. Hence man, the soles of whose feet are but sparsely covered, soon invented shoes. The history of shoes

from moccasins, through sandals, clogs, and some forms with points so long they had to be tied to the shin with thongs, is almost the history of civilization.

Not all ground is level. To climb steep places, steps and stairs were invented. St. Paul's Cathedral in London has 365 steps to the Gallery, one for every day in the year. Going down the steps is nearly as hard as going up. Hence, small boys and girls often prefer to slide. On ice, the retarding force of friction is minimized, so that sliding on ice is countenanced by adults, whereas sliding down the banisters is not. When skates are attached to the feet, sliding on the level becomes easy and easily controlled. For sliding on snow, skis are necessary. For walking on snow, the trapper must have snowshoes.

In the water, friction is much reduced, but swimming, though pleasurable in temperate and warm climates, is harder than walking. Why is this?

Man soon learned to make use of the motive power of others. Both women and men, in an earlier day, were carried in litters, or in sedan chairs. Even now, hunters in the wilds of Africa have bearers not only for their goods but for themselves as well. Animals have been used since the earliest times, and of all animals, the noblest is the horse. Since time immemorial, a man bestride a swift horse has been a symbol of romantic power. Horses, oxen, reindeer, and dogs have been used to pull sleds. Over snow, the retarding force of friction is negligible, so sleds are still used, but over bare ground, friction on the sled is wasteful of much energy. We can imagine some early ancestor of ours getting stuck in the mud with his sled, lifting one end of it and putting a sapling underneath. His delight must have been boundless when the sapling rolled forward underneath the sled; but not as fast as the sled, and this is a most important point. When it came out at the back he must have hastened to reinsert it at the front. No doubt he soon thought of having two and three rollers on the go at one time.

One day, some ancient driver of a sled must have grown tired of lifting the rollers from the back to the front and must have invented, through laziness or intelligence—and who is to say where one starts and the other finishes—that most wonderful of all inventions, the wheel. All he had to do was to note the fact that although

the sled moves forward over the ground twice as fast as the roller, this disparity can be removed if the roller is free to roll underneath the sled. Now the only place where the sled can be attached to the roller and still permit this freedom is through the center of rotation of the roller. Hence, the axle. To minimize friction still further, rollers were later inserted between axle and hub.

What a host of inventions have followed the invention of the wheel! We have carriages, carts, and barrows moved by the energy of humans, of animals, and of fuels. Even more important has been the use of the wheel, first as a pulley, then as a gear to transfer energy from place to place.

On roller skates, scooters, speeders, and bicycles, human beings have learned to propel themselves with far less energy than it takes to walk or run. The walker must continually start and stop each foot and leg. On a bicycle, the feet keep going round and round. Furthermore, on a bicycle you can coast downhill, with no effort at all. Although walking champions can manage seven miles an hour, most people have difficulty maintaining three. On a bicycle a steady twelve miles an hour is fairly easy to maintain. With the aid of wheels, mothers not only push their babies with far less energy than it takes to carry them, but they shove along a heavy vehicle and often a load of groceries as well. Invalids can propel themselves or be pushed by others in a wheel chair, and rickshaws drawn by humans are still common in the cities of China. Barrows with a single wheel are indispensable in construction work, and barrows with two wheels are still part of the London scene for selling of fish, flowers, fruit and falderals.

Vehicles drawn by animals

Carts pulled by animals have long been used. Stories of the chariot racing in Ancient Rome have remained dramatic through the years. Covered wagons, haywagons, buggies, hackney carrriages, stagecoaches, sulkies, all are devices to increase the speed and comfort of man's movement from place to place.

Self-propelled vehicles

As for the vehicles which are automotive and self-propelled, there is so much to say, and the story is so complex, that only a few

of the numerous possibilities for lines of investigation by the teacher and class will be listed.

1. Steam engines for railroads, ships, farm tractors, and road construction.
2. Electric trams, trains, subways, broughams, and delivery trucks.
3. Diesel trucks, ships, boats, and trains.
4. Gasoline boats and automobiles.

By far the most significant of these for modern times is the automobile powered with gasoline. Its use has changed the face of America.

From concrete to abstract

Most of the content that has been described so far would be appropriate for social studies units in the elementary school. Much science has been suggested—the basic ideas of motion, friction, force, energy, work, and power. The difference between the action of a roller and a wheel is important and difficult to understand. No doubt the use of lubricants for the reduction of friction has been called to mind. A number of the basic mechanical elements will probably have been recognized: the wheel and axle certainly, the pully, the inclined plane, the lever, and perhaps the screw.

The units in social studies in the elementary school will have provided the background and developed the interest for a study, perhaps in high school, but perhaps earlier, of Newton's laws, of velocity and acceleration, of momentum and impulse. If the development of the child is to be sustained, it is most important that teachers in high school understand fully the work of the elementary school and vice versa. Further, there should be no abrupt change in method. The study of science must always consist, in part, of a dual attack upon the understanding of ideas, and in part, of experience with the historical interaction between ideas and industrial development. The operation of a complex machine demands highly developed technical skill. Hence, there will soon appear among the scholars, whether the educational program provides for it or not, a degree of specialization. Some will be attracted to a rigorous examination of the ideas of science, others will want to attain a high degree of technical skill, and a third group, finding that their major

interests lie elsewhere than in science, will be content with a general knowledge of the subject. It seems a serious error, even in the final grades of high school, to seal off groups of children into each of these three categories. Historically, development of the steam engine, and development of an understanding of the physics of heat, went on hand in hand. At the present time, in a cyclotron laboratory, for example, scientists and technicians are both required. It seems most appropriate for high school teachers to continue, to some extent, the close association between ideas and phenomena that was started in the elementary school. But each group of teachers need fully to understand the activities of the other.

Air travel

In much of the foregoing, the emphasis has been almost exclusively upon motion with respect to land. Thus motion over and under the sea and through the air has scarcely been mentioned. Some attention was paid to ships and shipping in the unit on the harbor. Hence, no repetition will be made of this particular content at this point, even though it seems appropriate. However, propulsion by wind as a general topic leads to certain interesting ramifications. Among them are windmills, gliders, and iceboats, all of which are still in use. Windmills are still used in certain areas for the generation of electric energy and for the pumping of wells. Gliders and iceboats are the means for two thrilling sports. Gliders make use of updrafts or thermals in much the same way as do eagles, sea gulls, and other soaring birds. When a lenticular cloud appears near the tip of a mountain, the presence of a strong thermal is indicated, and those glider pilots who are free don their flight jackets and take off. Occasionally, on the side of the mountain opposite from the lenticular cloud, the so-called standing waves are encountered. These consist of alternations of updrafts and downdrafts. Where they are strong, air-borne vehicles experience motion that could be thought of as that of a gigantic roller coaster.

Iceboats not only can sail very close to the wind, but when close-hauled they can also travel very much faster than the wind, and this is a difficult and important scientific point. It seems, at first glance, like an exception to the law of conservation of energy. Instead, it is because of the almost complete absence of lateral mo-

tion that a very large component of forward motion is available. Out of the excitement of iceboat travel, a skillful teacher can evoke an understanding of basic laws with respect to motion in much the same way that he can build on an interest in hot-rods and jalopies.

Newton

Most important of the laws of motion are the three enunciated by Sir Isaac Newton in the seventeenth century. When we recall that London was almost depopulated by the Plague in 1665, and nearly destroyed by fire in 1666, that the period was characterized by considerable political unrest, that books were scarce, roads impassable in winter, and creature comforts almost completely lacking, the genius of the greatest of all scientific minds shines all the brighter.

Galileo

Galileo, who died in 1642, the year in which Newton was born, had laid the framework for an explanation of Kepler's laws respecting the solar system by means of terrestrial mechanics. Galileo measured the pull of gravity, and explained the relationships between velocity, acceleration, and distance. He rolled steel balls down sloping troughs and timed the journeys with a water clock. He invented, or perhaps some would say discovered, the pendulum.

Kepler

Kepler, seeking justification for a geocentric theory of the solar system from the painstaking data of his master, Tycho Brahe, was led eventually to a heliocentric theory, of which the three main principles are as follows:

1. Each planet travels in an elliptical orbit round the sun, with the sun serving as one focus of the ellipse.
2. The speed is not uniform; instead, radii from the sun to the planet sweep out equal areas in equal time.
3. For all the planets the ratio of the square of the period to the cube of the distance between sun and planet is the same.

Newton explained these three laws by his three laws of motion:

1. Every body continues in a state of rest or uniform motion in a straight line unless compelled by some external force to change that state.
2. Change of momentum in a given time is proportional to the impressed force and takes place in the direction in which that force acts.
3. To every action there is an equal and opposite reaction.

No attempt will be made to explain the sequence of man's understanding of motion that has just been outlined. Teachers and curriculum-makers should be familiar with these ideas even to the point of understanding the basic algebra involved. If they are not, any text of high school physics will supply the needed explanations.

Perhaps the reader has had an unhappy experience with a forced study of these laws and ideas from a purely abstract point of view. It is most important that he spare his pupils a similar experience by laying a solid background in the elementary school, and by providing plenty of concrete illustrations in the secondary school. When the student's interests are studied carefully by the teacher and he is led step by step along the road by his need for understanding and information, he will realize, at least to some extent, the debt he owes to these men for the automobiles, boats, and airplanes from which he derives so much comfort and pleasure. In far more cases than at present, the teacher should successfully arouse a passionate understanding of these great ideas.

Transforming energy

In addition to the Galileo, Kepler, Newton series that has just been listed, modern civilization leans heavily upon ways of transforming energy. The potential energy of coal is changed to heat by burning and to the kinetic energy of motion through the generation of steam. The steam engine produced the Industrial Revolution. Although steam engines still are used directly in the production of motion, their most important use at present is to generate electricity at the coal mine. Much of the energy of coal is wasted, first in carrying the coals themselves and second in carrying the machines that generate the steam en route. Petroleum, another fossil fuel, is now of far greater importance than coal as a source

of energy. The way in which gasoline is refined from crude petroleum is an enlightening and fascinating story. Boys interested in gasoline engines should easily be persuaded to study this rapidly diminishing resource.

The energy from the sun is harnessed in a few places, and that of the tides in others. But the use of hydraulic energy to generate electricity is common wherever a lake or river can be dammed. Man's mastery of this vast and important resource provides the teacher with a supply of science content that is inexhaustible.

Rockets and atoms

Finally we come to rockets and to the use of atomic energy. Both these enormous topics are timely and both can be used adroitly for educational purposes.

Man's study of motion began with his quest for an understanding of the movements of heavenly bodies. With rockets he has struck the moon, and with his knowledge of the hydrogen bomb he has explained the sources of the sun's energy. The cycle seems in danger of being complete.

At the head of the arch of man's understanding of motion lies the Einstein concept regarding the relativity of motion. Not all of this complex theory can be understood even by those who have spent much time in the study of mathematical physics, but most elementary-school children can be led to grasp the absurdity of any thought of absolute motion, for such an idea necessitates knowledge of a point in the universe where all motion is completely lacking. Such points exist, of course, in countless numbers, but we have no way in which to locate them.

These brief references to content in science built around the idea of motion serve to illustrate the way in which teachers and curriculum-makers can return over and over again to a basic theme. As they do so, the child will become increasingly interested and grow in knowledge and understanding.

REFERENCE BOOKS AND OTHER SOURCE MATERIAL

BECAUSE THE CONTENT OF A UNIT on motion includes more abstract ideas than the unit on the harbor, teachers and pupils

at all levels will make greater use of traditional science textbooks. Because these books are designed to ease the burdens on the teacher, there will be a strong temptation to follow them step by step. The logical order of these books may even appeal to some of the children. Where it does, and when it does, a suggestion that a given child or group of children work through the book is quite in order.

The great mistake that most teachers make is to fail to provide for differences among children. This mistake has always been made, but it was less noticeable when children with similar tastes and backgrounds were selected for educational preferment. To some extent, they are still so selected. But more and more teachers are recognizing and accepting individual differences. They must learn to provide adequately for these differences.

Science textbooks have always been useful educational aids in the teaching and learning of some children. The inadequacies have arisen when all children in a given class have been coerced into working through the very same book at the very same pace.

The evil effects were just as great upon those children for whom the text was too easy and the pace too slow as it was upon those to whom the text was unintelligible. There seems to be no reason to keep a lively mind from a study of Newton's laws until he is eighteen years old. Further, there seems no reason why a brilliant ten-year-old should not get all he needs from the average high school physics text in a matter of weeks. For him and his kind the economy of effort that is to be derived from a study of subject matter arranged according to his own inner logic cannot be denied. The point is that he has the interest to carry him through the difficulties and the understanding to invest the abstractions with meaning.

For the great majority of the children, encyclopedias, biographies, novels, and even science fiction, must be provided if their interest is to be developed.

Again, films, filmstrips, pictures, drawings, and sketches must be available in abundance and all the children must have access to a store of apparatus.

A further word concerning apparatus is perhaps in order. Like the production of textbooks, the production of science apparatus is a profitable business and the talents of many ingenious men and women have been attracted to it. The skill of these people has oc-

casionally been so well employed that operation of the apparatus has become foolproof. Now a piece of apparatus that is foolproof is not likely to make much demand on a good intelligence. Its use as an educational aid is therefore brought in question.

On the other hand, there is a joy and pleasure to be derived from apparatus that is clean, smart-looking, and above all, accurate. There seems no reason for the child to be doomed forever to make all his measurements with clumsy devices of his own contriving.

In the choice of educational aid, the teacher must consider the purposes of a particular child or group of children. If a child is to learn how a magnet can be used to measure current or voltage, he had better start with some pieces of wire and a small compass and make for himself one of each. He is not ready to use a manufactured meter, for such use can leave him as ignorant of function as the modern-car driver of the machinery hidden beneath the hood of his automobile. But when the child clearly understands the relation of magnetism and electricity and wishes to test Kirchhoff's law, the teacher will do well to provide him with the means of making accurate measurements.

PROBLEMS FOR MOTION STUDY

1. Why is it sometimes easier to go from place to place on roller skates than it is to walk? Could it ever be harder?
2. How is friction minimized in the various working parts of an automobile?
3. Lubrication has become a separate branch of engineering. What are some of the basic principles?
4. At first the bicycle had two wheels of approximately the same size, then the diameter of the front wheel increased until it was quite large, but now the two wheels are again the same size. What is the reason for the cycle of development?
5. Trace the development of the heliocentric theory of the solar system.
6. Trace the development of the geocentric theory of the solar system.
7. How can a wheel and axle be used to decrease the effort needed to lift a weight? Give examples.

8. Try to invent a wheeled vehicle that has not yet been used. Someone will be doing this eventually.
9. How does the speed of a man compare with the speed of a horse?
10. How can the speed of a bicycle be varied?
11. What acceleration is possible for a bicycle?
12. Why have the wheels of automobiles tended to decrease in size?
13. What is the genealogical development of the modern race horse?
14. Describe a modern iceboat. How can it sail faster than the wind?
15. Why is a vehicle with large wheels easier to push or pull on a rough road?
16. How does an internal-combustion engine operate?
17. What are the various parts of a modern steam engine?
18. Why are mercury engines more efficient than steam engines? Why are they seldom used?
19. Why is sodium used in an atomic-powered plant?
20. What are the ways pulleys are used on a ship?
21. How does a sewing machine function?
22. Why is typewriting faster than handwriting?
23. Find out all you can about the operation of dogsleds in the far north.
24. Make a long list of the things we use that have wheels.
25. What is the special feature of a tractor?
26. How does a diesel engine operate?
27. What devices have been used through the ages to record the passage of time?
28. How does the balance-wheel watch compare with a pendulum clock?
29. What devices have been invented to measure speed?
30. How is the distance between two towns estimated?
31. Highwaymen of one kind or another have long preyed on the traveler. What steps have been taken to stop their activities? Have they been successful?
32. List as many sports and hobbies as you can that have had, or perhaps still have, a professional counterpart.
33. How many different breeds of horses are still in existence?
34. Distinguish the Eastern way of riding a horse from the Western. Why this distinction?

35. How are the inclined plane and the screw made use of in vehicular motion of one kind or another?
36. Trace the development of railroads in this country.
37. Contrast steam, diesel, and electric locomotion.
38. How did Tycho Brahe observe the movements of the heavenly bodies?
39. What are the facts in the dispute between the railroads and the trucking companies?
40. What is a thermal and how can a glider make use of it?
41. List and explain the various parts of an airplane.
42. Describe the first moon rocket. How do the scientists feel sure that it hit the target?
43. How does the orbital speed of a planet change when it approaches the sun?
44. How does Newton's first law of motion apply to the motion of trains and automobiles—starting and stopping and going round curves?
45. How does Newton's second law of motion apply to an elevator, when it is going up and when it is coming down?
46. How does the force with which an engine pulls forward on a train compare with the force with which the train pulls back on the engine, when the train is stationary, when the train is accelerating, and when the train is running at a steady speed? How is the train able to accelerate?
47. How does energy of translation differ from energy of rotation?
48. What is the principle which keeps a bicycle upright?
49. What makes a car skid when it goes into a curve too fast?
50. How does an electric motor operate?
51. How does an electric generator function?
52. Work out a model of an oil well.
53. What is cracked gasoline?
54. How long will the earth's supply of petroleum last?
55. If man starts using atomic energy, how will he get rid of the waste products?
56. What should we do about the smog problem?
57. Is the earth likely to run out of coal?
58. What devices have been used successfully to employ the energy of the sun and of the tides?
59. How does a rocket operate?

The methods of teaching, anticipated outcomes, and evaluation for a motion unit should be quite similar to those described in the previous unit on the harbor.

ORDER AND INTEGRATION AS PLANNING GOALS

ONE WHO HAS BEEN ACCUSTOMED all his life to teaching a set body of content may well ask how order is to be produced from the jumble of content just listed. The answer is, of course, that each individual child must achieve his own personal order if his education is to take hold.

Historically, the Jesuits were marvelous disciplinarians and they have always been splendid teachers, up to a point. But, in the words of Macaulay, "They discovered the precise point to which intellectual culture can be carried without risk of intellectual emancipation."

The avowed purpose of the educational program set forth in this book is intellectual emancipation.

It is believed that when children struggle, within their capacities, to order their school experiences, they will be better prepared than many are at present to order their adult experiences. In the end, knowledge must be related to experience so that it can function in the lives of people at every turn of their existence. Knowledge, sealed off from experience, no matter how neatly it may be pigeonholed, can be used only for intellectual games.

The question as to whether or not it is possible for the child to transfer his training is really an absurd question which should never have been asked. The ambiguous answers to this question supplied by psychological science should have warned scholars long ago that the question is unsuitable. If knowledge of an abstract principle or relationship is to have meaning, it must be learned in relation to some aspect of the experience of the learner. Now it is true that some people are so intellectually gifted that they can take off, as it were, at some point in their experience, and proceed through an amazing series of abstract ramifications before reaching a conclusion. But the link with the world of phenomenological experience is

there; it is permanent; and it is of the utmost importance. During the remainder of his life, the thinker will tie this particular piece of logic with new experiences. Such interaction may cause him to modify some of his abstract ideas. Eventually the links will cross with other sections of his thought and therefore with other aspects of his experience. At maturity, he will see life whole, and will deal with his problems as an entire man. He will not find it necessary to "transfer his training" from one neat filing cabinet to another. On the contrary, the whole of his thought will consist of a vast network of ideas. The point is that a well-integrated, genuine human being can never reach that stage by taking over in its entirety the order perceived by another. There is no royal road to an education. Teachers can help by showing what others have done and by listing alternatives, but each must establish his own order.

To insist that each child master a set body of content and to assume that when he has mastered that content his education is complete is as absurd as assuming he has learned to do crossword puzzles when he has been allowed to examine only completed puzzles.

Subject-matter content must be acquired in vast quantities, but what is appropriate for one child at a given place and time is not necessarily appropriate for another.

Up to now, schools have proceeded by the immersion process. That is to say, the child is retained in an academic environment for such a long time that eventually he becomes educated.

By consciously directing the acquisition of skill in the processes of communicating, using values, working with others, thinking, and making choices, teachers could probably be much more efficient, and the length of time needed for our boys and girls to reach maturity could be greatly reduced.

LOCAL-LEVEL PLANNING NEEDED

IF THE CHILDREN IN THE ELEMENTARY SCHOOL are to enjoy the richest possible learning experiences, all the science content must be planned for as carefully as possible. This planning is susceptible to a number of influences. In preceding chapters, pertinent

information concerning children, society, teachers, the school, and organized science itself was presented and summarized.

In addition, state, county, and district Boards of Education usually have much to say concerning what is to be taught in the schools. Usually, state control is limited to a written framework either for education as a whole or for a particular subject. Some state offices or departments of education issue a number of these broad outlines or guides in accordance with the expressed wishes of the state legislative body. County and local education offices may issue detailed courses of study.

The combined effect of these prepared statements generally leaves the teacher of a given class with some freedom to plan. In schools in a democracy, this freedom is most important. The teacher should be in a position to pass some of the freedom along to the pupils, so that within the limits of such responsibility as they possess they can share in the making of curriculum choices.

A word of warning is in order. The teacher is a part of a system, just as a citizen is a member of a society. Neither has more than partial freedom of choice. Both are morally and ethically bound to exercise freedom only within the area of their own autonomy.

In America, this area is much wider than it is in many other countries. If teachers deliberately exercise freedom in the choice of curricular content beyond the boundaries of the area assigned to them, they are sabotaging the system to which they belong and thus inviting anarchy. Membership in a system carries with it many rights and privileges. In return for these rights and privileges the teacher, like any member of an organization, must accept certain prescriptions. If these prescriptions are irksome, the individual has a number of acceptable alternatives open to him for attempting to modify the system. Such modification must eventually come as the result of group action. In a democracy, modification of the system is not subject to individual decision, no matter whether the decision be capricious or rational. Where modification of the system seems impossible, the teacher is usually free to move to another system.

Curricular freedom enjoyed by the classroom teacher can best be exemplified by reference to sex education. Suppose the local authorities say, for one reason or another, "No sex education in the

school." The teacher, knowing this is a wrong decision, says, "Nonsense, I shall teach these children about sex." For a while he gets away with it, as any individual may escape punishment for any other punishable act. He may even "get away with it" for years, until the system eventually sees the light and permits the teaching of sex education. This does not erase the fact that the teacher exceeded his authority, thereby planting his little bomb under a part of the system to which he belonged and from which he drew security. For this act he should be censured by those in authority over him or even be fired from his job.

Three methods of introducing science content have been listed and described in detail, and possibilities for teacher and pupils to plan within an administrative framework have been described. For one reason or another, elementary teachers have come closer to realizing these possibilities than secondary teachers. We will now discuss the teaching of science as it is usually conducted, first in the elementary school, and then in the high school.

The discussion of a fairly typical program for elementary-school children will provide an opportunity to introduce additional scientific content, and the picture of the formal approach found in the majority of high schools will permit the reader to view and judge the present science curriculum as a whole.

In the elementary school, as we said before, the science teaching may be informal, a part of the social studies unit, or in separate special science units. In the high school, the common courses in science are as follows: general science in the ninth grade, biology in the tenth grade, chemistry in the eleventh grade, and physics in the twelfth grade. Occasionally, physics and chemistry are interchanged. In some of the larger schools, a number of electives are available over and beyond this fairly common pattern of courses. Physical science, a combination usually of chemistry and physics but sometimes containing astronomy, earth science or geology, and meteorology, may be taught to either nonmajors in science or to those majoring in science. For either the majors or the nonmajors the general objectives are pretty much the same. However, the treatment will be quite different. In addition to physical science as an alternative, a few of the larger schools offer such courses as earth science, applied science, meteorology, and astronomy.

ELEMENTARY SCIENCE

TEACHERS OF ELEMENTARY PUPILS have a broad scope in their choice of science material. It is, therefore, impossible to outline a typical program. In the following discussion of elementary-school science, attention will be directed exclusively to a representative science unit. In the discussion of the teaching of the unit, reference will be made to a number of the objectives of science teaching previously outlined. A unit that is frequently used, especially for grade six, is a unit on the weather. Such a unit, although drawing very largely on material from meteorology, can nevertheless include information from both physics and chemistry.

In a study of a unit such as weather, opportunities must be provided by the teacher for the students to practice the making of decisions. Although we have no direct scientific evidence on this score, such practice is probably best acquired through the various skills involved in problem-solving.

PROBLEMS FOR ELEMENTARY SCIENCE

A LIST OF PROBLEMS must be prepared by a teacher with a particular group of students. As a matter of fact, decisions with respect to the nature and type of problems to be studied not only give students an opportunity to practice the making of decisions, but also provide them with a feeling that they are pursuing ends which are personal and therefore interesting. Nevertheless, it is sometimes rather difficult to think up problems, and so most teachers will wish to have access to lists of problems from which they can draw. Textbooks on the teaching of science are replete with suggestions of this kind. For example, a list of such problems might include the following:

1. Do we live in a warm or a cold area?
2. How much rainfall do we get?
3. How much snow do we get?
4. How fast does the wind blow?
5. How does our weather compare with that in other places?
6. How is weather information provided to groups of people like airplane pilots and farmers?

7. Do ordinary people need to know what the weather is going to be? How can they find out?
8. What is the United States Weather Bureau?
9. How does the Weather Bureau obtain information?.

In their solution of these problems the students are provided, or can be provided, with opportunity to practice various aspects of the scientific method. Again, we have no precise empirical information, but it seems likely that when students practice the various aspects of the scientific method, then they will perhaps be likely to develop a favorable attitude toward the use of this method; and this favorable attitude can conceivably lead to wider use of deliberate objective thinking in the solution of their personal problems.

For example, one of the things that the children will undoubtedly do as they seek solutions to problems such as those listed will be to collect data. These data can be collected firsthand with the use of suitable instruments such as weather vanes, anemometers, thermometers, and barometers, to name only a few. Other data will be gathered from men who are engaged professionally in a study of the weather.

In this way, the students will receive practice in the use of these resources. For example, one group of children in a science class on a visit to the airport were permitted to provide, over the airways, information to pilots on the local weather. We can imagine the thrill of a boy in grade six as he sits down to the console of a broadcasting booth and proceeds to read off a résumé of the most recent weather forecasts for the benefit of pilots flying around over his head.

In locating information and collecting it, these children, under the direction of the teacher, may learn new ways of acquiring information and they may be provided with an opportunity to test the various sources of information.

One of the things they will certainly want to do is to make some weather instruments. A rain gauge is a particularly interesting device and lends itself to home construction. An instrument to measure the velocity of the wind called an anemometer is another device that is quite easy to make. Certainly the children will want to try their hand at making a barometer, using a tube at least three feet long filled with mercury and inverted over a dish of mercury. In the preceding section no attempt has been made to exhaust the various

aspects of the scientific method with which students will be able to practice as they solve the problems, but enough has been said to show how the process functions.

GENERAL SCIENCE IN GRADE 9

THE CUSTOMARY METHOD OF TEACHING general science in grade nine is to use one of the fairly wide selection of textbooks for the course and from this textbook to make uniform assignments; to have all the children do all the exercises at the end of the chapters; and possibly to augment the learning from the textbook with a few demonstrations and also a few so-called experiments. Sometimes these "experiments" are written in a separate laboratory manual.

We recommend the problem-solving approach in general science as we did for elementary-school science. The advantages of the problem-solving approach have been set forth and there is no need to repeat them. Certainly where the problem-solving approach is used and where student participation is permitted in the planning of the course, the interest that students have in in general science increases markedly. There are a number of ways in which the course in general science can be made more vivid. The students might be requested to do projects. These projects can be fairly extensive and occupy the attention and time of individual students or groups of students throughout most of the course, or they can be comparatively short projects. In a study of the structure of the earth it would be comparatively easy to interest a group of students in the construction of a model oil well. There is a very simple method which has been described for the making of a Wilson cloud chamber, a device for showing the presence of various rays—cosmic rays, gamma rays, and particle tracks. The more extensive projects such as those that have been described could be displayed to a fairly wide audience. A number of the newer high schools now have display cases in the halls where such projects can be viewed by the entire student body.

In place of set and rather formalized experiments, the students could carry on, partly self-directed, a number of different kinds of activities. In one general science class, students became supremely

interested in the excavation of an Indian mound that was taking place near the school. They visited the mound and discovered a great many artifacts of one kind or another, and the amount of science they learned in looking up the nature of these artifacts and classifying them was great.[1]

For those students whose interest in project-building cannot be aroused easily, there are other devices that may be used. A debate can sometimes be lively. On one occasion, members of a science class in grade nine were engaged in a study of a unit on the conservation of our natural resources. These resources were listed as water resources, mineral resources, forest resources, and soil resources. After considerable time had been devoted to a study of these various resources and to the development of the appropriate attitudes with respect to them, the teacher suggested a debate among the students as to the relative importance of the kinds of resources. The debate was lively and fully occupied the attention not only of the students who were debating but also of the other members of the class who formed the audience.

Other activities which the students might carry on would include the writing of reports or the presentation of oral reports to the rest of the class. Again, these activities could be performed by individual students or by groups. These reports are sometimes made on the life stories of famous scientists such as Pasteur, Madame Curie, Franklin, and Millikan.

GENERAL BIOLOGY

THERE IS LITTLE DOUBT in the minds of most science educators that the course called general biology which is given in the tenth grade is usually quite successful. However, even this course, in the hands of a dull teacher, can be uninspiring. If the teacher makes uniform reading assignments from a single text, requires all students to perform identical activities in the laboratory by following either the pages of a laboratory manual or work sheets prepared by the teacher, and himself persists in giving dull, poorly prepared lectures, the results are bound to be discouraging. How-

[1] Robert Morris, "Regional Project in Secondary Education at Gridley Union High School," *California Journal of Secondary Education*, 28:251–6, May, 1953.

ever, the possibilities for varying assignments, for providing students with some freedom of choice in their laboratory activities, for linking the facts learned with the daily lives of the students, for using outside speakers, and for making field trips are abundantly present.

When twenty-five to thirty boys and girls all dissect identical specimens of the catfish, said specimens having been supplied at so much a barrel by the apparatus supply house, desirable science education may or may not be taking place. If the students are enthusiastic over what they are doing and are able to see the purpose of it, they may well be gaining insights concerning life and its meaning that they can gain in no other way.

Some biology teachers insist on a systematic approach to their subject. They begin with a careful distinction between the study of living and nonliving matter, and proceed to an enumeration of the distinctive properties of protoplasm. Afterward, plants and animals are studied separately from the point of view of structure, classification, and function. Occasionally, a study of the economic importance of the various plants and animals is added. A unit on the biology of human beings rounds out the course.

Other biology teachers, although they may begin in a similar fashion, make no attempt to keep a study of plants, animals, and humans in separate units. Under the direction of these teachers, students study the properties of cells, for example, regardless of where they are found. Photosynthesis is examined along with its counterpart, respiration. Life histories of plants and animals are studied by means of suitable and often striking comparisons.

Still a third arrangement is proposed by Professor Wells of Santa Barbara College which combines the two approaches.[2] The various units are considerably shortened and the functional approach follows a separate treatment of typical plants and typical animals. Details of the combination approach to the teaching of general biology are available elsewhere.

The American Institute of Biological Sciences through its Biological Sciences Curriculum Study has recently been testing new curricular materials for the teaching of high school biology. To date,

[2] Harrington Wells, *Secondary Science Education*, McGraw-Hill Book Co. Inc., New York, 1952.

three versions of the materials have been produced: the blue, with a major emphasis upon bio-chemistry and physiology; the yellow, from the point of view of development and genetics; and the green, stressing ecology and evolution. These experimental materials are being produced with financial assistance from the National Science Foundation, which also supports summer institutes at which biology teachers are instructed in the use of these materials. They are likely to exert a profound influence upon the teaching of biology in both high school and college.

For many years, separate courses in botany and zoology were given in high school. Such courses, dividing the study of animals from the study of plants, are now comparatively rare in high school science. The fused course, known as general biology, has provided teachers with such a degree of flexibility in content that material that is meaningful to a large proportion of the students can be included. Further, those biology teachers who wish to do so can use the problem-solving method already advocated for elementary-school science and for general science in grade nine.

HIGH SCHOOL CHEMISTRY

COURSES IN HIGH SCHOOL CHEMISTRY have remained much more stable. Most chemistry teachers make identical assignments from a single text; they expect all their students to do the same theoretical exercises and to perform identical laboratory experiments. In justification of such uniformity, the teachers, generally, say they teach a selected group of students more or less homogeneous with respect to intelligence and vocational aspiration. Further, they point to college requirements and college aptitude examinations as calling for a specific kind of high school preparation in chemistry.

Neither of these arguments will stand up under close examination. Although the range of intelligence is less than in many other high school classes, a range of thirty or forty I.Q. points is common. Because high school chemistry is called for in the preparation of those expecting to become doctors, engineers, nurses, home economists, dieticians, and laboratory technicians, as well as those preparing to do research in chemistry proper, the preparation required

can scarcely be called specific. Besides, high school chemistry ought to serve the general education requirements of some students going on with their education but not necessarily as science majors.

Much attention has been paid, in recent years, to the need of more people with scientific training. High school juniors have occasionally been accused of side-stepping chemistry because of its difficulty. If adolescents are interested in a topic, they are seldom deterred by its difficulty. The possibility of making high school chemistry appealing by increasing its apparent relationship to the lives of students and by introducing much needed variety into the course should not be overlooked.

The usual high school course in chemistry introduces a study of the physical laws relating to gas somewhere near the beginning. Undoubtedly, the relationships between pressure, volume, and the absolute temperature of a gas are vital to an understanding of chemical reactions. Classification of matter into elements, compounds, and mixtures usually follows. Arguments in favor of the existence of molecules are then presented. Then come chemical equations, the major difficulty for many students.

A study of solutions introduces innumerable concepts, including the electrical nature of ions. Nitrogen is often studied in detail at this point, the inorganic chemistry of carbon following. The periodic law usually precedes any treatment of the metals.

All of this may sound dry and formal, and unless the teacher has unusual gifts, most students find chemistry uninteresting. There are always a few bright boys and girls who delight in the study of chemistry. But even their pleasure in the subject is cloyed when they are forced to wait while the teacher makes long and patient explanations in an attempt to bring at least a part of the class along with him.

Development of an interest in chemistry by more than a very few students should be possible. Here, as in other science courses, the material must be meaningful, and hence the subject matter must be varied to suit individual needs and tastes.

There seems to be no reason why the problem-solving approach should not be used in chemistry as well as in biology and general science. To ensure the selection of meaningful problems, the students must help to choose them. At present, the only problems they

are expected to solve are those found at the ends of the various chapters in the textbook. These problems are without meaning or significance except for those who are already strongly disposed toward the study of chemistry as an intellectual activity. Even then, a high degree of docility is demanded of the student who is willing to spend the time to work out some of the problems that are presented to him.

Complete modification of the method and content of high school science has been suggested earlier in this chapter. The method envisages an individual approach, with each student making use of devices that have proved themselves with children in the elementary school, and the content is to be drawn as needed from the entire range of scientific knowledge.

Many teachers will find fault with these suggestions. Not, indeed, on the basis of research evidence, for little careful research is available and what there is tends to support conflicting propositions. Arguments against the new proposals will generally boil down to complaints because the institutional nature of the curriculum is under attack. The proposals have not been tried. The new ideas will bring unforeseen difficulties. Teachers are not prepared to teach in this way; they neither understand the method, nor have they sufficient breadth of scientific knowledge. The classrooms and laboratories are not built for it.

With all of this, one who has tried the method himself, and who has been rewarded not only with heightened interest on the part of all the students, but with amazingly rapid increases in pupil attainment of factual knowledge as well, grows a trifle impatient.[3] However, the time may be ripe for minor modifications in existing courses rather than for a revolution in science teaching. Curriculum choices must be made, and a further alternative must therefore be presented.

This alternative to a revolutionary method of science teaching, on the one hand, and a strongly traditional method, on the other, consists of a vigorous injection of the problem-solving method into standard courses of chemistry and physics. First, a modification of the standard chemistry course will be described.

[3] T. Bentley Edwards, "Physical Science for Art Students," *California Journal of Secondary Education*, 25:238–42, April, 1950.

The topics included exceed in number those that could possibly be covered in a year's course of chemistry on the assumption that selections will be made, not only of certain topics but also of certain problems listed under each of the topics. Only one or two representative problems have been listed for each of the topics. Many others will occur to a given teacher.

So far as method is concerned, the pupils must have free access to the chemistry laboratory most of the time and a wide variety of materials and apparatus must be available. Techniques which have been worked out so successfully in the industrial arts classes for assignments, for distribution of materials and apparatus, using student assistants, and for occasional lectures and discussions, preferably in a separate, glass-walled classroom, seem appropriate.

Evaluation should cover all aims of the course, and a base line for each of the aims should be laid down at the start.

An individual student, or a group of three or four, will choose, with the assistance of the teacher, a problem for investigation. When the teacher is fully prepared to teach in this way, he will have folders, all indexed and filed, for each of the problems. In the folder for each problem will be a list of key references, descriptions of special apparatus, questions calculated to excite critical thinking on the part of the student, special cautions, and a brief sketch of the theoretical connections of the problem. Successive generations of students will provide the teacher with information which may be used to edit the contents of these folders through the years. In order to add sufficient breadth to the study in depth by particular students, all pupils in the class should be familiar with the nature of all the investigations under way. The manner in which this familiarity is accomplished depends on the characteristics of the teacher. One teacher will permit the necessary degree of informal visiting between groups, another will set aside definite periods for formal reports, a third will work out a combination of these and other methods. A quick check of progress reports once a week ensures that no important investigation is missed by the class.

OUTLINE FOR CHEMISTRY COURSE

1. ***Pure substances and mixtures.***
   a. Separate the ingredients of gunpowder.
   b. Differentiate between a rock and a mineral.
   c. Find out how to make guncotton.
2. ***Elements, compounds, and solutions.***
   a. Distinguish between a solution and a mixture.
   b. Mix powdered zinc and powdered sulfur. Separate the ingredients. Mix them again and ignite. Describe the difference between a physical mixture and a chemical reaction.
3. ***The composition of air and the theory of combustion.***
   a. Trace the history of the phlogiston theory.
   b. Why has the theory of Lavoisier outlasted that supported by Priestley?
   c. What was the role of Cavendish in the development of our understanding of the composition of air?
   d. What happens when a high voltage of electricity is maintained across a space which is steadily being evacuated?
4. ***The composition of water.***
   a. Use the electric current to decompose water.
   b. Burn a jet of hydrogen in air to generate water.
   c. Trace the development of a scientific understanding of the composition of water.
   d. Determine the composition of water by weight.
5. ***Physical properties of gases and vapors.***
   a. Check Boyle's law experimentally.
   b. Check Charles's law experimentally.
   c. Check Gay-Lussac's law experimentally.
   d. Explain van der Waals' equation.
6. ***Solutions.***
   a. Make a supersaturated solution that can be solidified by inoculation.
   b. Prepare a graph of the solubility of potassium nitrate.

c. Prepare a number of colloids that show the Tyndall effect. Explain this effect.
d. Grow a large crystal of chrome alum.
e. Distinguish the effects of hard and soft water.
f. Prepare a collection of colored solutions.
g. Test the solubility at room temperature of a number of salts. Compare your results with those given in the handbook.

7. Acids, bases, and salts.

a. Prepare salts by as many separate methods as you can devise.
b. Starting with yellow phosphorus, prepare some phosphoric acid.
c. Starting with potassium, prepare potassium hydroxide.
d. Measure the heat of neutralization.
e. Prepare a standard solution of oxalic acid and show how to test the normality of an unknown solution of sodium hydroxide.

8. Law of chemical combination and atomic theory.

a. Use copper and sulfur to check the law of constant composition.
b. Decompose potassium chlorate to check the same law.
c. Trace the development of Dalton's atomic theory.
d. Check Gay-Lussac's law of volume.

9. Avogadro's hypothesis and molecular weights.

a. Heat substances to determine the molecular weights of gases. Oxygen, chlorine, hydrogen, water, etc.
b. What successive refinements have been employed in the determination of N (Arogadro's number)?
c. Repeat Millikan's oil-drop experiment.

10. Kinetic theory of gases.

a. Use a theory of molecules to explain pressure.
b. Explain Boyle's law, using kinetic theory.
c. Set up an apparatus to show the Brownian movement.

11. Oxygen and ozone.

a. Prepare oxygen in at least six ways.
b. Figure out some way of getting your lungs full of oxygen and describe the sensation.
c. What would be the effect on industry if the supply of oxygen

were cut off? (Great Britain had a strike of oxygen workers in October, 1959, which nearly paralyzed the nation's industry.)

d. Find out some interesting experiments that can be performed with liquid air, which is practically liquid oxygen.

12. Hydrogen.

a. Fill a balloon with hydrogen and time the rate at which it ascends. How can this method be used to determine the cloud ceiling?

b. In how many ways can you prepare hydrogen?

c. Try to hydrogenate some naturally occurring oil.

13. Water and hydrogen peroxide.

a. In what ways is water important to man?

b. Prepare hydrogen peroxide and test its properties.

c. Trace the historical development of the determination of the formula for water.

d. Devise a method of analyzing water by weight.

14. Chlorine.

a. Make bleaching powder and test its usefulness.

b. Make chlorine by the action of a number of oxidizing agents upon hydrochloric acid.

c. Burn a jet of hydrogen in a container of chlorine.

d. Sprinkle certain powdered metals in chlorine and test the product.

15. Electrolysis.

a. Set up an apparatus to carry on the electrolysis of water. Use alternating and direct current. Arrange to measure the volumes of gases produced, the temperature, and the pressure. Test the properties of the gases produced.

b. Arrange apparatus by which you are able to test Faraday's laws of electrolysis.

16. Molecular weights.

a. Use sugar to determine the molecular boiling point raising.

b. Use either the boiling point raising, or freezing point lowering, method to determine the molecular weight of a substance.

17. The periodic law.

a. Find out all you can concerning the life and work of Mendelev, the Russian chemist who is credited with much of the pioneer work on the periodicity of atoms.
b. How did Seaborg make special use of the periodic system to discover the transuranium elements?
c. Describe a few of the early methods of arranging the elements in order.

18. Sulfur.

a. Prepare several varieties of sulfur-rhombic, monoclinic, amorphous.
b. Determine the physical properties of sulfur.
c. See how many metals can combine with sulfur directly.

19. Oxides and oxygen acids of nitrogen.

a. Prepare as many oxides of nitrogen as you can distinguish.
b. Dissolve metals in nitric acid.

20. Carbon and hydrocarbons.

a. Find out all you can about diamonds.
b. How is graphite obtained that is used in lead pencils?
c. Write an essay on the coal situation.
d. How is cracked gasoline obtained?
e. What are some of the developments in the history of the use of anesthetics?

OTHER SUGGESTED REVISIONS

TWO EXTENSIVE REVISIONS of the high school chemistry course have appeared recently. Both have been prepared by groups of university, college, and high school teachers of chemistry, with financial support from the National Science Foundation.

The Chemical Education Materials Study under the chairmanship of Glenn Seaborg stresses the experimental basis of the science of chemistry. Through guided laboratory experiences, the students are to be led to discover a number of the principles of chemistry for themselves.

These materials were tested in twenty-five high schools and one junior college during the school year 1960–61, extensively revised

in the summer of 1961 on the basis of that experience, and are being re-tested during 1961–62.

The Chemical Bond Approach Committee with Laurence E. Strong of Earlham College, as Editor-in-Chief, begins the study of chemistry with a description of atomic structure. On the basis of this description, various methods of chemical bonding are established and these bonding theories are used to explain various kinds of chemical reactions. A gathering together of the somewhat loosely related fields traditionally included in the high school chemistry course is thus attempted by this theoretical approach.

These, and other experimental approaches to the teaching of chemistry should be considered carefully by curriculum committees.

HIGH SCHOOL PHYSICS

THE STUDY OF PHYSICS in high school is often more formalized and stylized than the study of chemistry. Almost invariably the course opens with a section on measurement, followed immediately by a long unit on mechanics. In some ways it seems too bad to use the great work of Galileo and Newton as practice exercises for the novice. For this is what happens. High school students learn to solve simple proportions and to manipulate units by making use of such grand concepts as Newton's laws of motion. Few students in high school are able to develop an appreciation for the work of the pioneer thinkers in classical mechanics. It is as if we used a Beethoven sonata to develop the fingering of a novice at the piano.

High school physics then proceeds with the study of heat. Nearly all the energy of students and teacher is here directed toward the acquisition of familiarity with calories, specific heat, convection, and the British thermal unit. Attempts to build a theoretical understanding of heat energy on the mechanical foundation previously laid are limited to an untidy struggle with the researches of Joule. Such an actual historical development which makes use of the steam engine as the linking device is buried under an overburden of detail, most of which is entirely precocious, and because it makes no use of the calculus, is almost lacking in scientific rigor.

Much the same can be said of the treatment of electricity and of light. In recent years the need for citizens to have at least a nod-

ding acquaintance with some of the experiments, reasoning, and concepts basic to an understanding of the release of nuclear energy has made the situation worse. It would seem that if students succeed only in developing a distaste for the subject of physics in high school, drastic revision of the manner in which the subject is taught is long overdue.

Suggestions similar to those given for chemistry will now be made for the course in physics. Standard topics will be listed, and each of these will be followed by examples of one or two problems. It should be pointed out that each student, or group of students, will complete very few problems. Over thirty topics have been listed, but only the unusual student will be able to complete thirty problems. And the student choosing one problem from each of thirty topics will be rare indeed. The teacher will probably wish to establish a rule as to coverage. Some will be content so long as the students choose examples from four or five general areas. Others will show more concern for choice of a wider variety.

Here lies the great difference between the procedure suggested and the traditional course. When the student is unhurried, when he has the time to bore deeply into a topic and to become aware of some of its many links with other parts of his world, his interests may be expected to grow and his understandings deepen. More important than either of these is the opportunity provided to learn and practice thinking, communicating, choosing, creating, and working with others.

OUTLINE FOR PHYSICS COURSE

A. MEASUREMENT.

1. ***Units.***
   a. Show how measurement using units is basic to all scientific activity, and discuss the problem of accuracy of units.
   b. Distinguish the fundamental units in physics from the derived units.
   c. Measure the height of a multistoried building.
2. ***British and metric units.***
   a. Contrast the manner in which the two systems were established.

b. Discuss the possibility of a change to the metric system in countries where the British system is in use. What minor changes have been made in the U.S.?

3. Density.

a. Discuss all possible ways of finding the density of floating bodies, bodies that sink, and bodies made up of various materials, part heavier than water and part lighter.

b. In what ways does an engineer make use of the concept of density?

4. Specific gravity.

a. Explain Archimedes' principle.

b. Relate the principle of specific gravity to diving, to ships, and to metallurgy.

B. MECHANICS.

1. Machine elements.

a. Arrange various systems of blocks and tackle.

b. Study the differential pulley.

c. Make a jack.

2. Parallelogram of forces.

a. Work out the forces acting on a truss.

b. Develop the principle for finding the resultant.

3. Work and energy.

a. Describe the units used.

b. Calculate the potential energy of water behind a dam.

4. Power and friction.

a. How high could a kilowatt-hour lift a ton?

b. Why is walking hard work?

5. Newton's laws of motion.

a. How does the principle of inertia affect the operation of an automobile?

b. How does a jet engine operate?

C. MOLECULAR PHYSICS.

1. Gas laws.

a. How are gas laws used in the distribution of heating gas? Do not forget temperature changes.

b. What various methods have been used to reach absolute zero?

2. ***Surface tension.***
   a. What causes fog?
   b. How and where are wetting agents used?
3. ***Kinetic molecular hypothesis.***
   a. Use the KMH to explain the gas laws.
   b. Explain the distillation of alcohol by means of the KMH.

D. HEAT.

1. ***Expansion, thermometry, and heat transference.***
   a. Trace the development of thermometers.
   b. Houses have been built to use the heat of summer to dispel the cold of winter. How is this done?
2. ***Specific heat, heat of vaporization and of fusion.***
   a. Determine, with a high degree of accuracy, the specific heat of pure copper.
   b. Study and describe the operation of a modern household refrigerator.
3. ***Mechanical equipment of heat and efficiency of heat engines.***
   a. Determine the mechanical equivalent of heat.
   b. Work out the efficiency of a diesel locomotive.

E. SOUND.

1. ***Nature of sound.***
   a. Determine the speed of sound.
   b. Study the acoustical properties of horns for high fidelity.
2. ***Wave forms.***
   a. How do the molecules behave in a longitudinal standing wave?
   b. Why does sound travel more quickly in water?

F. LIGHT.

1. ***Propagation.***
   a. Why is the sky blue?
   b. How does a light meter work?

2. *Reflection and refraction.*
   a. Make a telescope.
   b. Trace the development of artificial lighting.
3. *Optical instruments.*
   a. Describe a modern high-class camera and its use.
   b. How does a modern astronomical telescope operate?
4. *Color.*
   a. Why do clothes appear different in color in artificial lights?

G. ELECTRICITY.

1. *Static.*
   a. Make a machine to generate high voltages of static electricity.
   b. Investigate all aspects of atmospheric electricity.
2. *Current.*
   a. Make a meter and check Ohm's law with it.
   b. Check the accuracy of an electric wattmeter.
3. *Magnets.*
   a. Investigate the properties of some of the new magnets.
   b. Make an electromagnet.
4. *Generators and motors.*
   a. Why is electrical energy useful?
   b. Make an electric motor.
5. *Electrochemistry.*
   a. How and where are cells and batteries used?
   b. Try to do some creditable electroplating.

H. NUCLEONICS.

1. *Brownian movement.*
   a. Arrange apparatus in a number of ways for the observation of the Brownian movement.
2. *Electrical discharge through gases.*
   a. Explain the action of a radio tube.
   b. Photograph de Broglie waves.
   c. Repeat Millikan's oil drop experiment.

3. Radiation.

a. Set up a crystal to diffract X-rays.
b. Make a photoelectric tube.
c. Repeat Rutherford's experiment with alpha particles.
d. Explain the Balmer series.
e. Make a Wilson cloud chamber or a bubble chamber.
f. Use a Geiger counter for mineral exploration.
g. Make a collection of fluorescent minerals.

4. Fission.

a. Make a model of a cyclotron.
b. Contrast a cyclotron and a linear accelerator.
c. Make a spinthariscope.
d. Explain the modifications of the cyclotron which result from a relativistic change in mass.

5. Fusion.

a. How is tritium prepared?
b. Explain the Bethe-Weizacher carbon-nitrogen cycle for the sun's energy.
c. Why was the meson postulated by Yukawa?
d. How many kinds of mesons are there?
e. Distinguish an energy barrier from a critical meson.
f. Is an atomic explosion likely to be set off that would destroy the whole world?
g. How will nuclear testing affect human life?

PSSC PHYSICS

FOR SOME YEARS a committee of university, college, and high school teachers of physics has been working under the leadership of Jerrold R. Zacharias of the Massachusetts Institute of Technology on the preparation of curricular materials for the teaching of high school physics. They have finally published a textbook, and, as with the new program in biology and chemistry, summer institutes for teachers have been arranged where teachers can learn the proper use of these new materials.

The Physical Science Study Committee, as its name implies,

has not hesitated to introduce material usually departmentalized as astronomy, geology, or some other physical science, providing this material is pertinent to the theories under discussion. By this means a number of the advantages of the study of physical science rather than physics or some other single physical science, can be expected to accrue. In addition, the new course displays a theoretical unity not so far perceived in the usual course in high school physics.

PHYSICAL SCIENCE

PERHAPS BECAUSE THOSE WHO CONTINUE to teach chemistry and physics in the high school are reluctant to disturb their established routine, a new course called physical science has been suggested. Most of the support for such a combined or generalized course has come from those who wish to provide students of average or below average intelligence with an opportunity to study science in the senior years of high school.

Although a common plan for the new course has not developed, two distinct outlines can already be seen. The first is the survey approach. Bits of information from physics, chemistry, astronomy, geology, and meteorology are more or less thrown together and little or no attempt is made to provide a thread on which these beads of information may be strung. The second is known as the block and gap approach. Arbitrarily, blocks or sections of scientific achievement are selected for fairly intensive study in order that students taking the course may be provided with an authentic scientific experience. Much science is omitted on the assumption that these gaps will be filled later.

Neither of these approaches seems particularly successful at the moment. Before any decision can be made we shall have to clarify our objectives and learn how to evaluate pupil progress toward these objectives.

A logical proposal for the teaching of physical science can be made which avoids the haphazard agglutinations of the survey and which retains many of the clear advantages of the block and gap approach. The scheme has the additional merit of proceeding from the known to the unknown and from the particular to the general. The course retains the insularity of physical science as a whole, and

at the same time, the divisions of it are easily recognized as traditional scientific disciplines. For those reluctant to stray too far from the beaten path, this is a distinct advantage; for those who regard subject matter as a means to an end, this alone should not render the proposal unacceptable.

The course has five main sections: astronomy, meteorology, geology, chemistry, and electricity.

Each section begins with a description of phenomena which can readily be observed by the pupils. It is assumed that the pupil will actually witness these phenomena, as they occur naturally, as demonstrations performed by the teacher, or as experiments performed by himself. Obviously these phenomena are the ones that were studied early in the history of the particular science and so this section of the course has strong overtones of a historical approach.

The phenomena are listed in such a way as to lead easily to one of the great theoretical conflicts that have taken place in the history of the particular science. In astronomy, there was the replacement of the geocentric theory by the heliocentric theory. In meteorology, there was the addition of the idea of fronts between opposing air-masses to the older cyclonic theory of storms. In geology, there was the bitter controversy between the neptunists (flood theorists) and the vulcanists (fire theorists). In chemistry, there was the conflict between the phlogistonists and the proponents of an oxygen theory of combustion. In electricity, there was the argument concerning the existence of electrical particles. The histories of these great conflicts by no means exhaust the history of each of the sciences, but they illustrate the general method by which scientific studies have proceeded. No attempt is made to teach all about the sciences, and what is to be taught will be taught most thoroughly, but the meaningless and often arbitrary selection made by the block and gap method is replaced by a selection of subject matter that has a logical basis.

None of these great arguments could be settled on the basis of impressions received by unaided senses. In each case, instruments were needed so that the private sensations of each individual observer could be brought out into the public world and described by means of a number on a designated scale. Hence, the third part in

each unit describes the use of instruments to refine observations. In astronomy, the telescope is described in detail. In meteorology, the barometer is the key instrument. In geology, the instrument, strangely enough, is the geologic map. In chemistry, we have the chemical balance; and in electricity, there is the electrical meter. Each of these instruments is a key instrument and the one properly associated with each specialty. The absence of a distinct section on physics may worry some teachers. But physics is already a general science, for it includes mechanics, heat, light, sound, electricity, and nucleonics. Mechanics and light will be dealt with in astronomy and heat in meteorology and geology. Sound and nucleonics are the only sections omitted.

The introduction of an instrument has sometimes enabled laws to be written by means of algebraic formulas. Once these equations have been written down, other equations can be derived from them. Now it is true that most of the derivations call for the use of calculus, and this art seems beyond the powers of most high school students. Nevertheless, the equations at the beginning and at the end of a train of deductions are often quite simple and may be grasped readily by students whose interest in science is not overtaxed.

In each case, the readings of the instruments did not settle the issue one way or the other. Instead, modifications were proposed and the theory steadily grew. Hence, the fourth part of each section describes developments that have resulted from the interaction between recordings of phenomena taken with the new instruments and theoretical equations constantly modified to meet the new demands.

Such a course as the one proposed lends itself admirably to a problem-solving approach; because there are no textbooks written along these lines, a variety of references must be available to the pupils; yet the nature of the course is such as to stress the most important concepts of the scientific method.

Because no reference is available with which the reader can be provided, this proposed course will now be outlined in slightly greater detail.

OUTLINE FOR PHYSICAL SCIENCE COURSE

Astronomy

A. CELESTIAL OBSERVATIONS.

1. Spherical nature of the earth.
   a. Voyages around the world.
   b. Distant ships.
   c. Seeing farther from a mountaintop.
   d. As one travels south the pole star sinks.
2. Size of the earth.
   a. The pole star is sighted from *A* and from *B*.
   b. The angular difference is noted.
   c. The distance *AB* is measured.
   d. The distance for 360 degrees is calculated.
3. Apparent movements of the sun.
   a. Daily rising and setting and times.
   b. Variations in length of day with seasons.
   c. Differences in height of sun in sky summer and winter as measured by length of shadow.
   d. Retrograde movement of sun among stars.
   e. Observation of sunspots.
4. Stars.
   a. General rising and setting each day.
   b. Variations at different times of the year.
   c. Counterclockwise rotation about N-pole star.
   d. A few simple constellations.
   e. The ecliptic.
   f. The planets' retrograde motion and loops.
5. The moon.
   a. Rises and sets each 24 hours 50 minutes.
   b. Sun catches moon once every 29½ days.
   c. Phases of the moon.
   d. Earthlight.
   e. Eclipse of the moon.

6. The tides.
   a. High tide and low tide.
   b. Variations in tide at different places.
   c. Methods of recording the tides.

B. THEORIES OF THE SOLAR SYSTEM.

1. Ptolemaic explanation of the foregoing observations.
2. Copernican explanation.
3. Comparison of the two theories of the solar system.

C. INVENTION OF THE TELESCOPE.

1. Galileo's telescope.
   a. Eyepiece.
   b. Objective.
   c. Moons of Jupiter.
   d. Phases of Venus.
2. Need for modified heliocentric theory.
3. Kepler's laws.
4. Refracting telescope.
5. Reflecting telescope.

D. SIZE OF THE SOLAR SYSTEM.

1. Cross-hairs.
2. Declination, right ascension, hour angle, meridian.
3. Sidereal time.
4. Parallax.
5. Distance of earth to moon.
6. Distance of earth to sun.
7. Sizes of planets.
8. Distance of planets.

Meteorology

A. OBSERVATION OF THE WEATHER.

1. Crude estimates of diurnal changes in the temperature during a period of settled weather.
2. Changes in temperature, wind direction and strength, cloud formations, and precipitation during a period of unsettled weather.

3. Seasonal estimates of variations of temperature and of frequency of periods of unsettled weather.
4. Thunder and lightning.
5. Snow and frost.
6. A hailstorm.
7. Hurricanes and tornadoes.

B. EARLY ATTEMPTS AT WEATHER PREDICTION.

1. Variations in the strength of the sun's rays.
   a. During twenty-four hours.
   b. From place to place on the surface of the earth.
2. Effects of altitude.
3. Land and sea breezes.
4. Ocean winds, Beaufort's scale, trade winds, regions of calm, and the Roaring Forties.
5. Wind systems of the earth.
6. Folklore about the weather.

C. WEATHER INSTRUMENTS.

1. Thermometers.
   a. Gaileo's air thermometer.
   b. Mercury thermometers.
   c. Maximum and minimum thermometers.
2. Temperature scales.
   a. Fahrenheit scale.
   b. Centigrade or Celsius scale.
   c. Absolute scales.
3. Relative humidity.
   a. Methods of calculating.
   b. Wet and dry bulb hygrometers.
   c. Heat of vaporization and specific heat.
4. Wind measurements.
   a. Use of weather vane for direction.
   b. Anemometer for velocity.
5. Barometers.
   a. Mercury barometer.
   b. Aneroid barometer.

6. Standard pressure of the atmosphere.
   a. Millimeters of mercury.
   b. Inches of mercury.
   c. Millibars.
7. Rain gauges and snow gauges.
8. Synoptic weather charts.

D. FORECASTING THE WEATHER.

1. Air-masses in the temperate zones.
2. Cyclonic disturbances.
3. Short-range forecasting.
4. Jet streams.
5. Long-range forecasting.
6. Attempts at weather control by cloud seeding.

Geology

A. OBSERVATIONS OF NATURAL LAND AND WATER FORMATIONS.
(Some of these cannot be directly observed. Pictures will be substituted.)

1. Varieties of rock formations.
   a. Kinds of crystalline structure.
   b. Striated rocks.
   c. Hard and soft.
   d. Heavy and light.
   e. Colored.
   f. Coal.
   g. Petroleum.
   h. Fossils.
   i. Synclines and anticlines.
   j. Nonconformities.
   k. Deep, long scratches.
2. Mountains.
   a. Sharp, jagged.
   b. Softly rounded.
   c. U-shaped valleys.
   d. Hanging valleys.
   e. V-shaped valleys.
   f. Boulder-strewn stream.

g. Glaciers.
h. Fiords.
i. Limestone and lava caves.
j. Man-made cuts and caves.
k. Outcrops.

3. Lowlands.
   a. Alluvial plains.
   b. Meandering rivers.
   c. Deltas.

4. Beaches.
   a. Sand.
   b. Pebble.
   c. Rock.

5. Earthquakes.
6. Floods.
7. Volcanoes.

B. EARLY THEORIES.

1. Handicaps imposed by religious beliefs.
2. Theories of the vulcanists.
3. Theories of the neptunists.

C. GEOLOGIC MAPS.

1. Strike and dip.
2. Cuvier's map of 1810—fossils correlate the layers.
3. Smith's map of 1815—control points to locate contacts. Use of his ideas to locate railways and beds of coal.
4. Topographic maps—contour lines when close together indicate a steep hill.
5. Geologic map in which horizontal beds are correlated.
6. Geologic sections—useful to miners and builders of roads, bridges, and dams.
7. Other maps—isopach, biofacies, tectofacies, etc.
8. Principles employed by geologic map-makers.

D. MODERN GEOLOGIC THEORY.

1. Lyell's law of uniformity.
2. The story of the earth as told by fossils.

3. Thickness of the earth's crust.
4. Speculation regarding the interior of the earth.
5. Mountain building.
6. Age of the ancient sediments.

Chemistry

A. SIMPLE EXPERIMENTS INVOLVING COMBUSTION.

1. Burning wood, paper, and coal in air.
2. Light candle, place upright in dish water, and put jar over candle.
3. Make floating crucible—put in trough with water, add piece of phosphorus, cover with open bell jar, cork bell jar with glass rod through cork, after heating tip of glass rod which ignites the phosphorus. Measure level of water. Test water for acidity.
4. Shake iron filings into moist test tube and invert over jar of water.
5. Perform Priestley's experiment on heating of mercuric oxide over water.
6. Burn magnesium in air and test solution of white ash formed with litmus paper.
7. Drop small pieces of carbon and of sulfur into fused potassium nitrate.
8. Heat zinc oxide with charcoal and distil off the zinc.
9. Heat iron filings on magnet attached to a balance. Asbestos pad on balance pan.

B. RIVAL THEORIES.

1. Phlogiston.
2. Oxygen.

C. CHEMICAL BALANCE.

1. Development of the balance.
2. Distinction between mass and weight.
3. Standard weights.
4. Standards of accuracy.

D. HISTORICAL EXPERIMENTS.

1. Boyle.

a. Heating tin in closed vessel.
b. Sulfur under vacuum jar.

2. Mayow.
   a. Mouse in bladder of air.
   b. Gunpowder burned under water.

3. Scheele.
   a. Tubes with liver of sulfur, phosphorus on copper wire, and moist iron filings inverted over water.
   b. Flask filled with foul air was lighter.
   c. Phosphorus in flask, corked and warmed. White phosphorus pentoxide (P_2O_5) on walls and flask opened under water.
   d. Potassium nitrate and sulfuric acid heated and red fumes (nitric acid) absorbed by milk of lime. Residual gas supports brilliant combustion.
   e. Heated calx of mercury gave mercury and fire air.
   f. Insects in fire air (with food) and milk of lime.
   g. Air from boiling water richer in fire air.

4. Priestley.
   a. Burning glass to heat small phials of mercury calx (*mercurus calcinatus* per se) inverted over liquid mercury. Called gas dephlogisticated air.
   b. Action of metals on acids to produce phlogiston.

5. Lavoisier.
   a. Calcined metals increase in weight. Equal weight of air is absorbed. Only part of air can be absorbed.
   b. Burned phosphorus in a confined volume of air. White powder formed weighs more than original phosphorus. (New idea: substances on burning take something from the air.)
   c. Repeated Boyle's experiment on calcining metals in closed retorts but *weighed the retorts.* No change of weight until air entered; hence, no fixation of igneous particles.
   d. Lead calx and carbon to give lead and "air." Reaction accompanied by loss of weight.
   e. Famous experiment of 1789 on heating and weighing with red oxide of mercury.

(Note difficulty of explaining that zinc calx and acid give salt

but no inflammable air. This reaction readily explained by phlogistonists.)

E. MODERN THEORIES OF COMBUSTION.

1. Hydrogen burns in oxygen to form water. This is the key reaction.
2. Heating potassium nitrate to produce oxygen.
3. Heating red oxide of mercury to produce oxygen.
4. Action of hydrochloric acid on zinc to produce hydrogen.
5. Burning of sulfur in oxygen to produce sulfur dioxide.
6. Oxidation of sulfur dioxide to sulfur trioxide.
7. Solution of sulfur trioxide in water to form sulfuric acid.
8. Burning of iron in oxygen.
9. Magnesium burning in air or oxygen.
10. Phosphorus burning in air or oxygen.
11. Phosphorus pentoxide dissolving in water to form phosphoric acid.

Electricity

A. ELEMENTARY OBSERVATIONS.

1. Magnets—attraction and repulsion, induction, magnetism of the earth.
2. Twin effects of glass rod rubbed with silk and bakelite rod with fur or wool.
3. Electroscope—direct and induced charge.
4. Oersted's experiment.
5. Induction, electromagnet, Lenz's apparatus.
6. Faraday dynamo.

B. RIVAL THEORIES.

1. One-fluid theory.
2. Two-fluid theory.
3. Particles.

C. THE ELECTRICAL METER.

1. Home construction.
2. Ammeters or voltmeters.

3. Early instruments of great accuracy.
4. A modern multipurpose meter.

D. MORE COMPLEX APPARATUS.

1. Leyden-jar condensers.
2. Voltaic-cell batteries.
3. Electrolysis of water.
4. Generator.
5. Motor.
6. Alternator.
7. Transformer.

E. GIANT MACHINES.

1. Steam generator.
2. Water generator.
3. High-voltage transmission.
4. Automobile electrical system.

SUMMARY

IN THIS CHAPTER we have described, briefly, the content used for the teaching of science in the public schools.

In the elementary school there are three ways of introducing science concepts: the informal, the social studies unit, and the science unit. Generally, the problem-solving method is used exclusively.

High school science is usually provided in four typical courses: general science in grade nine, biology in grade ten, and physics and chemistry in the last two grades.

With rare exceptions, these subjects are formalized; however, teachers of general science and of biology have sometimes been able to do a thorough job of tailoring their courses to suit the needs and interest of their pupils.

At the beginning of the chapter a revolutionary method for the teaching of science was suggested. This method extends to higher grades the method used with success in elementary classrooms. Units are selected, either of broad coverage of the environment, including social as well as nonsocial characteristics, or of almost exclusively

nonsocial characteristics. With a wealth of instructional materials to draw on, children attack problems of the unit either individually or as members of groups.

Toward the end of the chapter, less sweeping changes were suggested through the description of courses in chemistry and physics with a problem-solving emphasis.

The chapter closed with a fairly complete description of a course in physical science which could be adapted for students in the upper grades of high school or the lower division of college or university.

EXERCISES

1. Make an extensive list of the ways in which children in a given grade of the elementary school might be expected to enjoy informal science experiences.
2. Choose a familiar social studies unit from the curriculum of the elementary grades and examine the unit for science content.
3. Is it important for the elementary-school teacher to help the child to clarify the distinction between physics content and geography content?
4. Can you think of aspects of science that have not been touched by the discussion of harbors provided in the text?
5. Describe in detail one or more methods by which science has contributed to safety at sea.
6. Make a list of the tests that might possibly be used to measure child growth and development during the progress of the unit.
7. When was the automobile invented? Compare the length of time that man is known to have made use of the muscle-power of animals with the length of time he has made use of the automobile.
8. Outline a unit of science teaching around such a concept as heat or light. Show how such a unit can be returned to over and over again as the pupil grows and develops. List appropriate content, references, apparatus, problems, and method.
9. Try to make a case for a more abstract approach to learning

than the approaches suggested in the text. What additional outcomes may be expected from such an approach?

10. You might try writing answers to some of the problems listed in the text.

11. Describe a science unit customarily taught in a given grade in elementary school.

12. Describe a number of projects suitable for the teaching of science to pupils in grade nine.

13. Describe a student with somewhat unusual tastes, and show how these tastes may lead to an interest in the study of science.

14. Obtain data concerning the I.Q. range of students in the typical high school chemistry class.

15. Choose a section of the course in chemistry or the course in physics and write titles for half-a-dozen problems suitable for investigation by students in high school.

16. Examine two texts in college chemistry, one published twenty-five years ago, and one published recently. In what ways does the choice of content vary? Are the methods suggested for teaching the course any different?

17. Choose one of the problems suggested for the course in chemistry or physics and search the history of the science to show how one man has devoted a lifetime of study to the solution of this problem. Does this mean that the problem is not appropriate for study by a modern student in high school?

18. Show how the proposed course in physical science relates strongly to the description in the previous chapter of science as a process of inquiry.

19. Examine one of the sections in the course proposed for physical science and show the logical development, first from simple observations through early theories to the invention of more complex apparatus and the growth of more complex theory; and then show how each part develops according to increasing complexity of the ideas.

TOPICS FOR DISCUSSION

1. A formal step-by-step approach to the teaching of science is more efficient and therefore more desirable than an attempt

to incorporate part of the science teaching into the teaching of the social studies unit.

2. Informal science teaching decreases the possibility of an adequate treatment of scientific theory.

3. Is anything less than complete freedom on the part of the teacher over the control of the curriculum to be regarded as thought control?

4. Each right must be matched by a responsibility.

5. Demands by the teacher need not result in decreased interest on the part of the student.

6. The newer, chemical-physical trends in the development of the life sciences.

7. Chemistry as a subject in the education of nurses.

8. Ways in which the teaching of a physics class may be varied to suit a number of individual tastes.

9. Formal chemistry, physics, botany, and other sciences should be started in the primary grades.

10. An individualized approach to the teaching of a science other than the problem-solving approach. What are the advantages and the disadvantages?

11. Broad coverage of a subject, with the cramming of information for examination purposes, versus deep probing of a limited number of topics.

12. The problem-solving approach provides the student with only fragments of knowledge about the subject.

13. Science is growing and changing so rapidly that much of what the student learns in high school and college today will be out of date in ten or fifteen years.

14. Broad subject fields, such as physical science, can present only a confused mass of information to the student.

ADDITIONAL READING

American Institute of Biological Sciences, HIGH SCHOOL BIOLOGY (Boulder, Colorado: Director, Biological Sciences Curriculum Study, University of Colorado, 1960). *These materials, which come in three versions, were extensively re-written in the summer of 1961. The point of view is stated most clearly in the*

introduction and it is to the effect that both content and method are important and both must be taught.

Association of Assistant Masters and the Science Masters Association, TEACHING OF SCIENCE IN SECONDARY SCHOOLS (London: John Murray, 1959). *A second edition of a book written by a committee of teachers in England. Topics dealt with include housing, apparatus, teaching methods, examinations, and teaching science in rural schools.*

Brandwein, Paul F., Watson, Fletcher G., and Blackwood, Paul E., A BOOK OF METHODS (New York: Harcourt, Brace & Co., Inc., 1958). *One of the few books on the teaching of science that stresses process. On page 250, and throughout the book, the teacher is urged that content must be made to live by making the pupils conscious of process—thinking, communicating, and so on.*

Chemical Bond Approach Committee, CHEMISTRY: TRIAL EDITION (Portland, Ore.: The Reed Institute, 1960). *With Laurence E. Strong as editor-in-chief, a committee of teachers of chemistry from universities, colleges, and high schools has prepared a series of chemistry texts. In this series, the emphasis is on theory and the concept of the chemical bond is used throughout.*

Chemical Education Materials Study, CHEMISTRY: AN EXPERIMENTAL SCIENCE (Berkeley: The Regents of the University of California, 1960). *Under the chairmanship of Glenn T. Seaborg, previously of the Berkeley campus of the University of California, a committee of college, university, and high school teachers of chemistry have prepared several volumes of text materials. Theory, based on experiment, is stressed throughout. It is anticipated that a library of more than forty monographs will eventually be made available.*

Craig, Gerald S., SCIENCE FOR THE ELEMENTARY SCHOOL TEACHER (Boston: Ginn & Company, 1958). *This has been a standard text on the subject since 1940. The author has assumed that all the needed information should be in a single volume. It is profusely illustrated.*

Croxton, W. C., SCIENCE IN THE ELEMENTARY SCHOOL (New York: McGraw-Hill Book Company, Inc., 1937). *An old book, but still unique in that so many scientific activities are listed. Over a hundred are grouped under the headings, fall, winter, and spring. Modern elementary science may stress concepts and*

theories, but lists of activities, such as are supplied here, are still needed.

Deason, H. J. (compiler), INEXPENSIVE SCIENCE LIBRARY; A SELECTED LIST OF PAPERBOUND SCIENCE BOOKS, *second edition* (Washington, D.C.: American Association for the Advancement of Science, 1515 Massachusetts Avenue, N.W., 1958). *A list of over 300 titles ranging in price from 35¢ to $4.00. Most are under a dollar.*

Freeman, Kenneth, Dowling, Thomas I., Lacy, Nan, and Tippett, James S., HELPING CHILDREN UNDERSTAND SCIENCE (Philadelphia: The John C. Winston & Company, 1954). *A general textbook on the teaching of elementary-school science. This book has an excellent point of view and many practical hints.*

Greenlee, Julian, BETTER TEACHING THROUGH ELEMENTARY SCIENCE (Dubuque, Iowa: Wm. C. Brown, 1954). *A chatty, simply written book. In it are phrases an experienced teacher might use to help a beginner get started.*

Mathematics and Science in the Public Schools, Field Service Leaflet No. 8 (University of California, Berkeley, Department of Education, Field Service Center, May, 1958). *A formal statement issued by a committee of professors from the departments of education, mathematics, chemistry, and physics.*

Physical Science Study Committee, PHYSICS (Boston: D. C. Heath & Co., 1960). *This group has also put out a laboratory guide and a teachers' guide. Achievement tests for the course may be obtained through Cooperative Test Division, Educational Testing Service, Princeton, N.J.*

Thelen, Herbert A., "A Methodological Study of the Learning of Chemical Concepts and of Certain Abilities to Think Critically in Freshman Chemistry," JOURNAL OF EXPERIMENTAL EDUCATION, 13 (Sept., 1944), 53–75. *One of the few carefully performed experiments upon the teaching of process.*

United Nations Educational Scientific and Cultural Organization, UNESCO SOURCE BOOK FOR SCIENCE TEACHING (Paris: The Organization, 1956). *A useful compendium of information for the teaching of elementary-school science. It is an illustrated list of hundreds of science activities all performed with simple, homemade apparatus.*

CHAPTER 9

The Curriculum for the Social Studies

A FRENCH-BORN NEW YORK FARMER, Jean de Crèvecoeur, wrote these thoughts in 1782. "The American is a new man, who acts upon new principles; he must therefore entertain new ideas and form new opinions. From involuntary idleness, servile dependence, penury, and useless labor, he has passed to toils of a very different nature, rewarded by ample subsistence.—This is an American."

This statement was made at a time in American history when many other socially conscious persons were frankly pessimistic about the future of America. It was also at a time when many others were pushing the American frontier westward with untiring energy and unfailing hope. The farmer, the pessimist, the explorer, were insulated from each other's experiences, difficulties, and ideas by poor communication.

Despite poor communication, varied cultural heritages, dif-

fering goals, and a wide variety of personal accomplishments, these Americans forged ahead on many fronts. Today this nation is one of the leading nations of the world. The key to this American development has been the mastery of the skill for arriving at group decisions in the best interests of the group. The judgment of the "masses" has proved sounder than the judgment of "classes," especially on broad problems of policy. American social inventions have been among the most distinctive contributions to world culture. The American schools have played a leading part in this development.

More characteristic than the American invention of the assembly line has been the development of the philosophy of the common man. This country has been the first to dedicate itself to that conception of a society where the lot of the common man could be made easier, where the same opportunities would be available to all, where the lives of all men and women can be enriched and ennobled. Although the conception has not been fully realized, enough has been achieved to prove to the world that the concept is sound and will work. Thus the concept of the "free man" has become a reality and a definite realizable hope of all mankind.

During the last half-century Americans have been experiencing social change of a vastness difficult to understand. These social changes have had their origins in the problems and needs of human beings and in the behavior of other human beings—human beings throughout the world.

In a complex society such as that found in the United States the need for correct interpretation and thoughtful adjustment to the demands of others is especially important and critical.

Today, man is not only made more aware of his difficulties through highly efficient systems of communication, but also his difficulties are compounded by supersonic transportation as well as by many other developments of a technological age.

The nagging threat of the cold war is overshadowed by the ever-present specter of complete annihilation by the atomic bomb.

Inter-racial tensions occur at home as well as abroad. Certain citizens, otherwise respectable, feel justified in creating false impressions concerning "minority" groups. Frequently they are even able to sell such incorrect statements through the communication media which pass them on as factual "news."

Social ills, such as divorce, have spread to an alarming degree and millions of children are emotionally disfigured by the mental and psychic scars that often accompany such a traumatic experience. Drunkenness and drug addiction are apparently on the increase. Now, when they are needed most, schools and teachers are in short supply. Shortages of adequate housing, pollution of rivers and bays, and air pollution continue. It is apparent to many citizens that many social problems remain to be solved.

On the other hand, an optimist might argue that never before in the history of man have we been so close to a set of conditions that could mean health, welfare, and happiness for all. An era of unprecedented medical discovery has banished much of the physical pain that men and women considered normal; machines have been invented to do most of the drudgery; ease, comfort, and luxury seem to lie almost within the grasp of millions. Boredom, once the curse of idleness, is giving way before the development of creative and recreative interest. Many citizens claim that existing problems are only minor and that our youth will soon learn to solve them for us.

However, in many parts of the world men have not yet reached the cultural advancement of the Neolithic age. In still other parts of the world men are only now reaching the cultural development of the Bronze Age. It is conservative to estimate that half the peoples of the world have never experienced the benefits of the industrial age. Rapid transportation and world-wide mass communication have introduced the concept of a better culture to all these fellow men. Today these peoples are expressing themselves through open rebellion. The United States has suddenly found itself involved in every part of the world and has found itself being called upon to act as a leader in world cultural development. Tomorrow our country may be required to deal with the universe.

In a period of history so critical, education in the social studies is not only important but also essential.

WHAT ARE THE SOCIAL STUDIES?

THE TERM "SOCIAL STUDIES" generally designates that phase of the school curriculum concerned with the relations of human beings to one another and to their environment. The social studies are concerned with the wide dissemination of information,

the development of social skills, and the understanding of social behavior. History, geography, political science, economics, sociology, and anthropology are specialized areas of the social studies and contribute to social-studies knowledge and method.

In addition to drawing from the contributions of scholars in all the specialized areas, the social studies program uses firsthand materials from the local community. The emphasis is upon using subject matter from many sources in order to increase social literacy, to develop socially desirable behavior, to demonstrate social processes, and to promote understanding and skill in dealing with social problems.

Social studies is a process of organizing social learnings and developing social skills. It is not a separate body of isolated knowledge. The social studies program is related to current interests and experiences of pupils in order to provide a learning laboratory for systematic development of skills and understandings. The laboratory provides a firsthand opportunity for learning the processes of critical thinking and problem-solving. In addition to acquiring useful information and essential knowledge, each child is helped to acquire the abilities needed for participation in life as an American citizen, prepared to take his part in making and acting on decisions.

The goal of the social studies is to develop intelligent, responsible, self-directing citizens. Much detailed knowledge of the various social disciplines is needed. But the opinions of specialists, as well as educational experience, indicate that the social studies should not be taught as several isolated bodies of knowledge. Instead the program should be a coordinated and planned program of expanding studies centered around the understanding and solution of major social problems. The historical, geographic, economic, political, and sociological aspects are all centered around the selected area of study and as they apply, are brought to bear on an understanding and solution of the problems that have been chosen for investigation.

CONTENT AND PROCESS

IT IS SAFE TO SAY that social scientists have discovered, recorded, written, and learned more the last half-century about how

people live, grow, learn, think, and perform social functions than was known in all previous recorded history. Thus the possible content and body of knowledge encompassed by social studies is so great that it is impossible for any person or school program to include everything in a social studies course of study. It is necessary to be selective in determining the content of a social studies program. It is also to be expected that the content of the social studies programs in various schools will differ.

At the present time their exists no ideal "social studies program" encompassing the most desirable content. For example, the California State Department of Education has had a large statewide committee of citizens, social scientists, and educators working several years on developing a new social studies framework for the schools of the state. As we shall see, the magnitude of the job of determining the content framework has been graphically shown by this committee. The committee has discovered that determining the best framework from the content approach is practically impossible. The committee has found that the process approach offers the best hope of determining the scope and sequence of the social studies program. The state program is now being developed by organizing the scope and sequence to answer these questions: (1) "How do pupils develop an understanding of the problem-solving process?" and (2) "What are the experiences and types of knowledge which can be studied by pupils at each age level in order to develop intelligent social behavior, appropriate social understanding, and skill in solving social problems?"

It has become necessary to base the social studies curriculum and teaching methods upon research in the areas of learning, child growth and development, group interaction, and social development. When the social studies have been organized around the process of learning and acquiring skills, it is then possible to select problem areas and systematic bodies of information through the study of which the process of social growth can be guided.

Embodied in the process of the social studies program is the ability to use materials, including the mass media of communication. This stresses the need to learn and to use the arts of communication as they apply to guided study and to acquiring factual background for solution of problems.

Social problems constitute the content of the social studies. As

students work on these problems under the leadership and supervision of the teacher, they acquire skill in critical thinking. A study of social problems emphasizes the need for skill in working with others in order to see many points of view, to clarify issues, to share and make use of knowledge, skills, and understandings of others, and to recognize that consensus may frequently be requisite to action.

Nowhere is the need for standards, values, ethics, and critical thinking as easily demonstrated as in group study of social problems. Such demonstration is needed for the rational development of the attitudes and motives that constitute ethical character.

Knowledge about and understanding of human action is acquired with greater useful insight when associated with making decisions and planning action. Although pupils learn about Columbus by a study of his early explorations, there is little understanding of his action or the significance of his exploration unless the study is associated with the social problems he was attempting to solve by his explorations. To oversimplify, finding the answer to "Why did Columbus seek a new land?" has much more potential for aiding the social growth and understanding of pupils than learning all the facts and dates about Columbus. In the process of finding the answer to the question, pupils learn the facts and in addition—and more important—they learn to know the man himself and why and how he did what he did.

A textbook does not provide a social studies program. At best it is a source of material. Textbooks are important as a source for acquiring background information or possible leads, but the real growth comes from arriving by group process at the solution to the problem being considered. The same or similar statements can be made regarding other instructional aids.

The teacher must establish in the classroom a market place for ideas and an environment for arriving at solutions to problems. This includes making available a wide variety of resources, permitting plenty of opportunities for discussion, bringing carefully selected resource people to class, taking pupils into the community, and assisting in the overall development of a breadth and depth of learning activities.

It is also the duty of the teacher to see that pupils are aware of the possible alternatives and the consequences of the solutions

they reach. The pupils should be made aware of all possible consequences of a proposed course of action in response to a given situation. The pupils will discover many of these for themselves.

In considering the social studies as one of the broad fields of the school curriculum and the content as a planned, organized, sequential process of finding solutions to social problems, these essentials must be provided:

1. The elementary teacher must be aware of the goals sought and the complexity of these goals. The school curriculum is so full of essential learnings that experiences must be carefully selected and provided to meet definite goals. There is no time or room for unguided, unplanned, nonessential activities. Simple methods may be employed, but the results that should be expected and achieved are far from simple.
2. This insight is even more essential to the teacher in high school and college. Participation in the democratic process demands understanding and practice in the process, otherwise mere manipulation of uncultivated minds is inevitable.
3. Character development is important. This includes motivation, attitudes, personality, and social habits. It should result in self-perception, self-integration, and an objective view of the self as to values and standards.
4. Emphasis must be on the individual. In our culture, individual human life has unique significance. When individual values compete, decisions must still be reached. Freedom means deliberate choice of a course of action, the results of which can, to a large extent, be anticipated. The individual enjoys his freedom in America within broad limits of choice as long as he is responsible for his actions. Thus each individual must learn to express himself and guide himself by his own choice.
5. Society must be understood. This is essential if the individual is to live intelligently within the social environment. This understanding must account for things as they are generally perceived, not as they are imagined to be. The individual must understand society and the individuals as well as groups within the society. Identification only with mass conformity—hence a demoralizing loss of identity—results in war hysteria, bobby-soxers attacking crooners, gang fights, and so on.

Understanding includes the realization that social prob-

lems usually involve a web of circumstances—consider the involvements in the treatment of minorities. Economic issues are often at one and the same time political and social issues. Even with as much knowledge as is available, with as careful study as possible, and with as sound conclusions as can be arrived at, social processes often bring unanticipated results. Much can be learned, however, by studying other cultures both in place and time. Pupils can learn to profit from experiences of others and selves. Learning to face the consequences of decisions leads to social understanding. Does what the pupil learns help him provide order to his world as he sees it? If it does not, the work of the school has little value.

6. Insights into the democratic process are essential. Such insights are gained through understanding alternative political forms, varying cultural heritages, and varying cultures; through understanding of the development and use of the checks and balances system; through understanding that the content of political behavior changes, but the process is relatively stable since it is based on the psychology and sociology of human beings. However, the greatest insight into the democratic process comes from repeated and consistent experience in applying the process in group action.

SCOPE AND SEQUENCE

TO PREVENT UNDUE DUPLICATION of experiences, to provide a proper developmental sequence of guided learning activities, to develop a gradually increasing maturity in social skills and process, to provide proper balance for the entire program, and to provide a basis for the selection of materials, it is necessary to develop a scope and sequence for the social studies program for each school. This scope and sequence serves as a guide for teachers and assists in defining the specific goals to be achieved by each teacher.

Primary grades (1–3)

Schools throughout the United States seem in general agreement on what the social studies program should be in the primary grades. In these grades the program is built around a sequence of social studies units or study areas. These units generally cover the immediate environment of the child, his home, his school, and his

neighborhood. The scope of the program is generally built around important aspects of the child's environment and is expressed as questions or subtopics under the unit title. Each unit introduces the pupil to the people about him, what they do, why they do it, how they do it, and what the action of these people contributes in solving simple problems of living, such as eating, living safely, and so on.

The sequence of units generally progresses from the child's immediate environment toward places, events, and people farther removed in time and space. Usually two or three units are studied during the course of each year. For example:

GRADE 1: The Home
The School
The Neighborhood Grocery Store

GRADE 2: The Postman (Policeman or Fireman)
Life on a Farm

GRADE 3: Life in the City
Life in a Contrasting Primitive Community (e.g., An Indian Village
Life in Another Land (e.g., A Boy and Girl in a Small Town in Holland)

The scope of the units generally expands from solving the immediate problems of living toward solving problems of community life and the simple social functions of educating, protecting, and providing a place for living safe and healthy lives.

Intermediate grades (4–6)

In the intermediate grades there is far less agreement on the social studies program. These programs have been under frequent attack and curriculum planners seem still to be seeking better programs. In some schools there is a strong move to integrate the entire program around social studies units as is done in the primary grades. In other schools there is departmentalization of the work into the areas of history, geography, and civics.

Various approaches are used to define a program of social studies. Some schools rely upon a separate textbook for each subject—

history, geography, civics, health, safety, and so on—to determine the scope and sequence. Some schools use separate units for each subject area. Some schools use correlated subject matter units such as Early California, Mexico, The Colonial Period, and so on, where the separate historical and geographic topics are closely interrelated. Other schools use broad comprehensive units such as Our Community, Life in Early Days, The Period of Discovery, Communication, and so on. These broad comprehensive units may treat separately such areas as history, geography, and civics. Still other schools have made radical departures from the traditional approach and have developed social living programs centered entirely around school and community projects such as safety studies, beautification, gardening, clean-up, the school, and the store.

Present trends, however, tend to expand the social studies program of the primary grades toward places, events, and peoples in the broader world scene, contrasting cultures and major areas of human progress, such as transportation, communication, and production. For example:

GRADE 4:	Early California
	History of Records
GRADE 5:	The Period of Exploration
	The Westward Movement
	Pioneer Life
	Our State Today
GRADE 6:	Latin-American Neighbors
	Canada
	Alaska
	Islands of the Pacific
	Transportation
	Communication

The scope of the units expands from solving problems of community life and simple social functions to solving state, national, and cultural problems and the more complex social problems of governing, producing, transporting, and communicating. The realization that the social studies is a program of social process as well as informational content tends to favor this latest trend and pro-

vides considerable flexibility in selecting areas of major interest around which to center the learning activities.

The upper grades (7–9)

In the upper grades (junior high school), there is a general agreement on the social studies program because it has long been established. Grade seven traditionally includes a historical or geographical study of Europe, Asia, or Africa, or one or two of these. Grade eight traditionally includes U.S. history and government (civics). Grade nine traditionally introduces the pupil to senior high school through such courses as occupations, basic citizenship, social studies, or orientation.

Many schools, however, have gradually begun to move from the traditional program toward a continuation of the primary and intermediate grade unit approach. The adjustment is being made by adapting courses and units to the interests, maturity, and experiences of early adolescent youth.

It has been found that concepts are an important part of what the early adolescent pupil needs. These concepts must include those aspects which help work out constructively the feelings that stir within the pupil. Youth in early adolescence is constantly engaged in meeting the personality demands of maintaining self-respect, being respected as a person, developing a sense of achievement, and feeling emotionally accepted and secure. Hence, the pupil in the traditional program expresses his lack of interest and lack of acceptance of the program by stating he doesn't see how this "stuff" will do him any good. These expressions of disinterest tend to disappear when the social studies are oriented more toward the conception of learning how people can live together in satisfying and creative ways. In turn, the concepts which have a personal reference or those that deal with something immediate and personal tend to be more readily learned than concepts dealing with something more remote. Situations involving problem-solving should be so designed that, when the pupil arrives at decisions about the problems, he feels he has accomplished something worth while, with a gain in security and without frustration of other motivating forces.

The early adolescent is anxious to tackle and to understand adult behavior and problems. This anxiety is a normal manifesta-

tion. The normal social studies approach is to take major social problems of the day, and to seek out solutions by applying experiences both direct and vicarious—experiences gained through serving on a student council or school committee, or through observation over television of people solving problems. Thus at the *seventh grade* level conservation, strife in the Middle East, space travel, and other topics of current concern can readily become the areas of study. A major problem of interest such as a recent flood, the sailing of an aircraft carrier with brothers and fathers aboard headed for the Mediterranean, the announcement of a new guided missile or space ship, can become springboards for undertaking the unit of study. By such an approach it is almost certain that the traditional areas of knowledge will be covered as exemplary patterns of how other nations are involved in solving the problems. Arriving at real, applicable, and pertinent solutions to the problems should be the final objective.

At the *eighth grade* level a study of how democracy developed, and how it applies to the life of the pupils in school and where they live as citizens, is more promising of the development of desired concepts than the traditional chronological approach. Recent school or community problems in government or problems in the community as highlighted by television or news programs may offer a means for entering the unit. Discovering how others have solved the problem, and then checking these solutions against the pupil's experiences and concepts of democracy, will result in the same goals for which the traditional program has striven.

What is patriotism? How does economic freedom develop? How does the Constitution apply to desegregation? These and many other questions are of interest to the early adolescent.

At the *ninth grade* level the pupil realizes he will soon be entering his last major stage of education before he becomes a young adult. He wants to know how he will do, how well he can succeed, which direction he should aim, what specifically is expected of him, how soon can he learn to drive, how can he get a job, how do you meet and act in front of others. Thus Basic Citizenship appears to be a natural area of study. However, realistic problems and actual experiences in testing solutions to these problems of citizenship are important to the program.

Thus it seems the trend of the social studies program in the upper grades is toward covering many of the traditional concepts and areas of knowledge through an approach more closely oriented to the level of interests and experiences of the pupils, broadening their concepts through finding answers to problems of real and immediate concern to the pupils and citizens of the community. In the upper grades it is essential that pupils learn and experience firsthand the fact that good citizenship depends on the quality of the relationships among people.

Senior grades (10–12)

There is considerable agreement on the social studies program in grades eleven and twelve, but little agreement on the program at grade ten. Typically, U.S. history is required at the eleventh grade. American problems or senior problems courses are offered at the twelfth grade, but the course content varies considerably. Frequently world history, ancient history, economic geography, or some other history course is offered at the tenth grade level as an elective.

The overwhelming emphasis is on the teaching of history. When an effort is made to simplify the history for students of average and below average intelligence, the bright students become hopelessly bored. Many students, even very capable students, "take" U.S. history four, five, and six times during their school years and still know very little about it.

Several encouraging trends have been emerging in social studies programs at the high school level. Among these are such trends as:

1. A considerable number of schools have worked out integrated courses. A sequence of units centered around state and local social problems (tenth grade), national and international social problems (eleventh grade), and the role of the mature adult in solving citizenship and vocational problems (twelfth grade). The following is one such sequence of integrated units, two or three of which are to be selected for each year.

Grade 10: Conservation of Natural Resources
Planning a Home and Community
Influencing Public Opinion

Industrial and Cultural Development of Our Community

Grade 11: Problems of War and Peace
The United States as a World Power
Development of Democracy
The Role of Free Men
The Growth of Civilization

Grade 12: The Power of a Vote
Selecting an Occupation
Role of the Citizen in National and World Affairs
Development of Social Action
Contributions of the Culture of Nations to Our Life
Free Enterprise and American Democracy
Conflicting Goals of Groups and Nations

It is easy to see how many more areas of study could be developed. Thus other trends have developed to determine more clearly the selection of areas of study.

2. Other schools have spent considerable effort in studying adolescents in order to determine the problems they face in becoming citizens. Rapid social changes which directly affect the emotional and social life of youth, inability of youth to adjust to social change, as expressed most clearly in rising delinquency rates and "fad" rebellions, increasing loss of interest in traditional courses by adolescents, rapid changes in technological development, and increasing problems of vocational choice have all added to the need for such curriculum considerations.

Schools have analyzed the needs, questions, interests, abilities, and problems of adolescents and listed the types of learnings which should be provided in order to offer experience and understanding of these adolescent characteristics. Schools have then adjusted the social studies courses to provide these learnings.

3. More and more schools in recent years have been concerned with differing levels of ability among adolescents. As a result, most recent trends at this level provide a variety of courses at each grade level which will offer different sequences in the social studies program for pupils of differing interests and abilities. The term "tracks" has been coined by some schools to

designate the various sequences of courses. In track I, pupils of below average ability and interests are given one sequence of courses. In track II, pupils of average ability and interests are given another sequence of courses—frequently this is the traditional program. In track III, pupils of superior ability and mature interest are placed in a more rapidly progressing and concentrated sequence of courses—often leading to an "honors" course at the twelfth grade and sometimes leading to advanced placement upon college entrance. The titles of courses may be quite similar for the sequence in each track. However, the content of each course is carefully worked out and learning activities are geared by the teacher to fit each group of adolescents.

4. Many high schools have carefully worked out their guidance, counseling, and student government programs so that they closely parallel and supplement the social studies program. Personal guidance, vocational counseling, school behavior, and student government problems are closely related to problems of becoming a citizen. The student government program provides a ready laboratory for leadership development and problem-solving experiences. Personal and vocational problems are of deep concern to adolescents; they afford opportunities for developing interests, providing personal satisfaction, furthering critical thinking, and indicating meaningful direction for personal behavior. These are of vital concern to the counselor and teacher alike. They mutually strengthen each program as they are interrelated in the social studies program.

Such a program requires close cooperation and careful planning on the part of the school staff. It also broadens the responsibility of all staff members to provide a meaningful educational program. The result, however, is well worth the effort since it places the students directly in a citizenship role and gives each an opportunity to function as a citizen.

The implication of these trends is that considerable adjustment and revision can be expected during the years ahead in the high school social studies program. For over half our youth, high school provides the culmination of citizenship training. For all youth, it means that society expects maturity in social action and citizenship responsibility when these youth leave the secondary school. Revision in the social studies program of the high school is desirable and should be anticipated as new social needs, goals,

and problems arise which the school is expected to prepare youth to meet and to solve for society.

THE PROBLEM-SOLVING PROCESS

THERE IS A DEFINITE TREND throughout the social studies program, from primary grades through college, to organize a sequence of courses around major study units and to use the problem-solving process as the basic method of developing understanding. This trend has been implemented by the gradual development of the United States as a world power and the sudden awareness that the principles of democracy are being threatened by the spread of dictatorial and communistic ideologies. The trend has been implemented, therefore, by the realization that each citizen must become capable of demonstrating by his actions that democracy works, that we must solve before the eyes of the world our own social problems, and that we must develop through our educational program leaders of world stature and methods of meeting these challenges.

The problem-solving process implemented through carefully planned units of study offers the best method of meeting this educational challenge. Here are the basic procedures for carrying out this process:

1. Citizens, educators, and social scientists must work closely together to determine nationally and in each community the concepts, learnings, social skills, and types of problems that our youth must understand, acquire, and learn to solve.
2. Each school, working closely with all schools in the community, must outline the scope and sequence of its social studies program.
3. The sequence of courses must be centered around units or areas of study which will provide a developmental continuum of learning experiences leading to the fullest maturity possible for each pupil.
4. The scope of each course must provide for the youth of the school. The staff of each school must analyze the needs, interests, abilities, and goals of the pupils in the school and provide activities within each course which will help each pupil toward increasingly mature citizenship.
5. The teacher of each unit must provide an environment

which will encourage growth and must implement the problem-solving process.

6. The problem-solving process must provide experiences for each pupil which will develop the following characteristics:
   a. A sensitivity to social need.
   b. A sense of personal responsibility for doing whatever is possible to solve social problems.
   c. The realization and confidence that reasonable solutions to problems are possible if enough people desire, work for, and think critically about these solutions.
   d. The realization that a consideration of facts rather than prejudice, untested opinions, or mob action leads to solutions.
   e. The courage to act upon evidence and principle.
   f. The belief and confidence that in a democracy one person's actions, no matter how seemingly insignificant, are truly important.
   g. The ability to work as an individual and as a member of groups. This is essential in fulfilling the requirements of citizenship in a democracy.
   h. The realization that individual maturity and behavior are basic influences upon the satisfactory solution of social and individual problems.
   i. The realization that personal satisfaction and success come from playing the citizenship role to the best of one's ability and in an understandable, predictable manner.
7. The teacher should organize each unit of study to provide this sequence of experiences:
   a. Setting the stage (planning the classroom and learning environment) to introduce the unit so that the maximum of pupil interest and acceptance will be stimulated. This introduction must be timely and carefully prepared.
   b. The pupils must be led (by skillful questioning, permissive encouragement, and procedure of introduction) into listing and organizing the questions, special problems they would like to find answers to, and ideas they have about how the answers should be found. Pupil planning is essential for maximum interest and scope.
   c. The teacher and pupils should plan how to find the

answers. They should also determine who is to seek what answers.

d. Pupils and teacher should share their findings through various ways, such as reports, demonstrations, and discussions.

e. The various answers, information, and discoveries should be brought together into tentative decisions on the problems previously indicated for study.

f. Generalizations, based on facts gathered, should be developed into an organized answer to the major unit questions. A series of solutions to the problems should be discussed and organized into major "answers we have found."

g. The unit should be culminated by a presentation of the major conclusions in such a manner as to demonstrate the decisions made regarding the problems studied. The culmination should be followed by a testing and evaluation of the soundness of the conclusions, possibly by applying these decisions to immediate events or developments within the school or community.

h. The final action on the unit should be an analysis by the students of the process through which they have gone to find the answers and of the strengths and weaknesses of the process.

8. The method and process of the social studies is arriving at decisions concerning social problems. The method involves social action such as:

a. Making use of values and standards of judgment.

b. Purposeful and critical thinking to serve as a safe guide to action—including a conscious sorting of facts and opinions in order that they may be brought to bear on the solution of problems.

c. Communicating in order that the thoughts and findings of others may be shared.

d. Working with others. Few, if any, problems are solved in isolation. Group thinking is usually involved if the study is carried on with the group members sitting facing one another rather than reading or listening at a distance from each other.

e. Making relative judgments. Usually, the number of

alternatives is limited. The number may be limited by the properties of the situation, or by the intelligence and creativity of the people attempting to arrive at decisions.

f. Implementing decisions. Each decision or solution will have its implication for action, its consequences, and its resulting effect. Alternatives may frequently need to be considered before final decisions are implemented into results. The end product of problem-solving is action.

The methods used by the teacher are linked inseparably with content.

9. The teacher must evaluate the effectiveness of the program. Part of any successful teaching is evaluation. Evaluation in the social studies involves gathering evidence of how much effective practice and progress has been made in the utilization of values, thinking, communication, group relationships, relative judgments, understanding of concepts, usable, practical concepts, and growth in social skills. Evaluation provides insights into how clearly and usefully a subject is being taught and the way it is being taught. Pupils should also be involved in evaluation. Change in, or growth in, behavior is the end product sought—evaluation indicates the change and growth made. This should be determined for the benefit of both the teacher and the pupils.
10. All teachers must work together as carefully on the process as on the content. The role of the citizen in a democracy is not easy to learn. A teacher working alone on the process of teaching may become discouraged and many of his efforts may be wasted if he is not supported by the other teachers in the school who are also working on the process.

THE SOCIAL STUDIES DILEMMA

IN THE FIRST PART OF THIS CHAPTER, the specific purposes of teaching the social studies were clearly and concisely delineated:

1. Increase social literacy.
2. Develop socially desirable behavior.
3. Demonstrate social processes.

4. Promote understanding and skill in dealing with social problems.

The child must be assisted in his quest to reach these goals by providing him with access to as much sure knowledge as is available. He must learn to interpret this knowledge and to apply it. His interpretation and application will be wise to the extent that he makes use of sound generalization, the lesser principles being ever subsumed in his mind by principles of increasing complexity. But this is the cognitive side of his learning. If his behavior is to be socially desirable, there must be a conative side also, and the two developing aspects of his personality must be harmonious. The stirring up of undirected energy by the teacher probably does more harm than good. Love of country, for example, is virtuous only to the extent that the citizen knows and wants what is demonstrably best for his country. That love of country which only permits him to feel insulted by foreigners may lead both him and his country to utter destruction. On the other hand, knowledge possessed in scholarly detachment which permits him no action but the futile chanting of the countdown is just as dangerous.

The method to be used in the teaching of the social studies was set forth earlier with equal clarity and preciseness. Pupils and students in the primary and secondary schools are to spend their hours in the study of society by working individually and collectively, and with all the resources of the school at their command, on the solution of interesting and socially important problems. Details of the problem-solving process are to be worked out in accordance with the abilities and interests of the children. Very early, with some children, and sooner or later with nearly all children, the time-consuming projects and activities can be by-passed as the boys and girls show themselves able to glean meaning from, or use their experience to bring meaning to, oral and written language.

What the chapter has not made clear is the nature of the content of the problems. Are the problems chosen going to be so broadly stated that information from all the social sciences must be used in their solution, or will the wording of the problems be more restrictive with respect to content? This is the dilemma of the social studies.

REASONS FOR THE DIFFICULTY

TEACHERS IN ELEMENTARY SCHOOLS, and even in secondary schools, are not primarily responsible for creating new knowledge. They are literally dependent on university scholars for their learning and understanding. When they act as teachers, members of university faculties are also largely dependent on their fellow-scholars, but collectively, as researchers, they bear a large share of responsibility for the development of learning. Traditionally scholars have parceled man's understanding into specialties and subspecialties. Their work is both aided and hampered by this traditional organization. Organization helps by limiting both the definition of the problem and the extent of the applicable knowledge so that these become commensurate with man's ingenuity. Specialization hampers their work by these very limitations.

Scholarly disciplines can be roughly divided into those which deal with public experience and those which deal largely with private experience. Because only public experience is reproducible, this is the kind of knowledge that is being increasingly sought. The so-called arts faculties are becoming more and more scientific.

Reproducible information obtained by means of instruments is more readily obtained about things than about people. Further than this, things can more easily be divided into parts with less variation among them than can humans and so precise experimentation is easier. Experimentation with things is also easier because they are unable to direct the energy they possess. Because of these two advantages, and because of the orientation of the general public, theoretical development in the study of things has advanced much farther than it has in the study of humans.

History as a scholarly discipline has itself an ancient and glorious past. As a subject of study, it lies somewhere between the humanities and the sciences. Although history has a great and splendid literature, it has few widely accepted theories that jibe with all known facts, despite the recording of a vast number of opinions that certainly jibe with some of the facts.

Geography, a discipline with a long tradition also, has veered more than history in the direction of a study of things. Although the study of geography has established a large body of reproducible

information, it has shown less growth on the theoretical side.

Other studies of man and society have developed, such as psychology, anthropology, sociology, political science, and economics. They strive in a way that is somewhat less fettered by tradition to establish both reproducible information and acceptable theories.

Teachers of the social studies, especially in secondary schools, have usually gone rather deeply into the facts and theories available in one of the social sciences, and less deeply into a second. They seldom have more than a casual acquaintance with the others.

Hence no clear body of fact and theory is readily available in the social studies as such. Teachers, by the nature of their preparation as well as their duties, should scarcely be expected to create it, or even to mine for it.

THE SOCIAL STUDIES ALTERNATIVE

Because of the organization of the scholarly disciplines and because of the nature of the pre-service education of teachers, no lists of problems that range freely over the social sciences are available to which teachers and curriculum-makers can turn. Many of them, sensing too much freedom in the social studies approach, experience a kind of agoraphobia. Half in a panic, they turn for solace to a textbook, and make use of textbook methods that emphasize the acquisition of factual information almost exclusively. This is bad only to the extent that other worthy purposes of teaching are neglected.

Those teachers and curriculum-makers who try to prepare their own lists of problems soon find themselves in difficulties, though they may not always be able to put their fingers on the source of the difficulty. Not only are no lists of graded problems available, but also there are few lists of general principles or concepts. As a result, unsuitable questions such as the following—too broad and amorphous—may be posed in grade twelve social studies courses:

1. How can we establish ways of working with the communists that will be most advantageous to our security and welfare?
2. Can we accept a concept of world order that includes a powerful communist bloc?
3. Should Red China be admitted to the United Nations?

On the other hand, suitable questions are possible:

1. What general principle of foreign policy is implied in the suggestion that our arms appropriation be increased? Can you select historical incidents to support your view?
2. Trace the history of the international relationships between England, France, Germany, and Spain.
3. Describe the actions of Premier Khrushchev on the occasion of his visit to the United Nations in the fall of 1960.

There is, in addition, the need to group questions about manageable concepts. Either each teacher is to work out this order for himself—a formidable task, especially in the absence of needed empirical knowledge—or the student will be left alone with a jumble of facts. For example, there is a need to formulate problems that are not too remote from the formation of useful opinion concerning U.S.–Latin-American relationships, but not so difficult as to either defy the intelligence of both pupils and teacher, or make it necessary to deceive both with oversimplification.

BACK TO HISTORY AND GEOGRAPHY

ANOTHER ALTERNATIVE is to renounce present attempts to unify the study of society, at least in secondary schools, and to restrict the content to that of history and geography. The major reason for doing so would be that teachers and curriculum-makers might be protected, perhaps only temporarily, by the canopy of order that these traditional disciplines have erected.

If it be true that content is not all-important, those who seek a variety of goals in the social studies should have little objection to the use of content that is inherently orderly. This content is as good as that for teaching children to think and to be good citizens, so why not choose the content that is familiar to the teachers and that has been worked on and organized by many scholars over a period of many years?

With such orderly content, a solid base is available from which to experiment with teaching methods designed to reach all the important goals of education. Not only have general principles been worked out for history and geography, but there has also been ex-

tensive pedagogical investigation with the subject matter. As only one example, the Thirty-second Yearbook of the National Society for the Study of Education was titled "The Teaching of Geography."

This alternative is not favored by the present authors, although they fully recognize the chaotic conditions that presently exist in the theoretical consideration of the social studies curriculum. By and large, their dislike of the history-geography approach arises because this approach is too conservative. Decisions and judgments concerning new problems must be made with full knowledge of new information and new ways of acquiring that information.

THE SOCIAL SCIENCES

THROUGHOUT THIS TEXT, the emphasis has been on process, the method of inquiry. To a great extent, all forms of rational thought emphasize the phenomenological; man's environment, as seen by man. There are, however, subtle but distinctive differences in the method of inquiry emphasized in the various specialized subjects into which rational thought has been divided and subdivided through the ages.

Language, the commonest method of communication concerning phenomena, is used by scholars in all fields. But language itself becomes a subject of study. By calling attention, through its very grammar, first to one point of view, and then to another, it restricts phenomena at the same time that it makes creation and communication regarding these phenomena possible.

On the one hand, language can be used as a form of art whereby highly subjective emotions are aroused in the heart and mind of an individual reader. With calculated imprecision, with rhythm and sound of unmistakable beauty, the poet, novelist, and essayist permit private emotions and feelings to be sensed, caught, and recreated.

On the other hand, language can be used to author predicates that are logically supportable. Relevant relationships can be stated and substantiated by reason. Closely linked to this logical use of

language is the idea of special vocabularies for special, precise purposes.

Music and the graphic arts share with language the ability to transmit freshly created phenomena. These are the ideas of art. Music and the graphic arts are less able than verbal language to transmit thoughts that must be shown to be logical and precise to render them tenable.

Through all of this kind of communication, whether imprecise and emotional, or precise and logical, man as a highly complex, sensitive, human being is exercised as much as he wishes to be exercised. These are the humanities. Religion with its heavy demand on both mind and spirit is the oldest, as well as the most difficult of the humanities. Historical research, while performing Herodotus' laborious task of "consulting all possible evidence, and weighing conflicting accounts," must always be recorded as literature. Historical scholars have somehow to weave a manageable past for the rest of us. With their tenable yet striking accounts of sovereigns, wars, and social movements, they must give us both the will and the wisdom to manage the present and the future.

More recent subdivisions of the study of man and society have stressed reason rather than feeling. They have sought reproducible evidence and statements of increasing precision. In this they have moved away from art and toward science. To some extent, they have made use of the communicative precision of mathematics. This numerical, data-gathering approach to the study of man and society is particularly evident in survey research, which makes use of complicated machines to record, tabulate, and to work out numerical relationships among the data. In this, sociology, and especially social psychology, follow as closely as possible much of the methodology of physical science. But there is always, in these two social sciences, much thinking and writing about theories that are complex and interconnected and which embrace much more of the man who is doing the thinking and writing in them than such theories as the kinetic-molecular theory, magnificent though such theories be. Completely objective treatment of data that must be to a great extent subjective is of course a contradiction in terms. No matter how much highly reproducible data the social scientist may collect

and however much he may restrict his hypothesis-testing to relationships among the external data, his theorizing must get subjectively inside the person if there is to be much chance of its being ultimately useful.

Distinctions of process among the various social sciences have to do, then, with means of data collection and the way in which the theories are worked out and developed. These differences tend to be qualitative, rather than sharply quantitative. Distinctions of process are high-order abstractions and, as such, are part of the content (and method) of philosophy. The phenomena on which these abstractions are based must always be the actions of social scientists themselves. Hence the important literature of a discipline, especially that which is important and significant among the early literature, is the ultimate source as well as the pragmatic corrective for any philosophical distinctions of process.

History, for example, has a department known as historiography, which is chiefly an examination of history as a process of inquiry. The earliest raw materials of history are the inscriptions, the chronicles preserved in the temples, and the annals of the pontiffs. Among the earliest of the historians are Herodotus and Thucydides. The latter especially employed a combination of art and circumstance that typifies historical writing. It is said, for example, that he created the Peloponnesian War from its separate parts. It is interesting to note that as subtle a thinker as J. S. Mill spoke of the "historical method" as being indistinguishable from the inductive-deductive method of science.

The word "sociology" was introduced by Auguste Comte in 1837. He was attempting a unification under the rubric of Positive Philosophy of the vast increase in knowledge that had taken place in the century since Hume's "Treatise of Human Nature," published in 1739. For the new science of human history as developed especially by Vico, Montesquieu, Condorcet, Kant, Adam Smith, and others, he suggested the term "sociology." The idea of sociology was developed by Herbert Spencer and it was he who drew attention to the evolutionary nature of science as opposed to discursive and literary writing. To the extent that later writers in a field are able to expand upon the developments of earlier writers, is that field a science.

During the nineteenth century and under the impact of the new evolutionary concept, the study of history, of law, and of political economy took on new significance as an increasingly scientific approach was adopted. During the same century new disciplines such as anthropology and social psychology developed, using strictly screened evidence and building from acceptable hypotheses a useful structure of theory.

At the present time, differences in methodology among the various social sciences do not seem to have been clearly verbalized. The several disciplines seem to be distinguished by the possession of an appropriated literature. Stanley Hall's great work *Adolescence* is one of a number that seem to epitomize an increasingly strong branch of psychology known as human development. Durkheim, Weber, and Robert E. Merton have done much to lay out the boundaries of sociology. LePlay with his *Les Ouvriers Européens* demonstrated the use of an observational method capable of bringing the social sciences generally more close to the biological sciences, but again, the method seems generally to have been applied in a number of the social studies.

The present authors are of the opinion that the most useful of the social sciences for purposes of secondary education will be that one which is able to differentiate a clear and recognizable methodology.

CALIFORNIA CURRICULUM REPORT

IN THE MEANTIME, attention to a recent report from the California State Central Committee on Social Studies may prove interesting.

This report, written in 1959, culminates six years of activity involving many different kinds of people. The committee itself was, at the time of appointment, "made up of five classroom teachers, one at each level of education; five principals, one at each level of education; four supervisors and coordinators of instruction with responsibility extending through the junior college level; three directors of instruction with the status of assistant superintendents in large city and county systems; four superintendents of different kinds of school districts; and six members of the State Department of Ed-

ucation." When the study was completed, the committee included twenty-eight members instead of twenty-seven as just indicated.

The twenty-eight were made up as follows:

California State Department of Education	7
Assistant Superintendents, with title of director	6
Superintendents	4
Principals	3
Curriculum Consultants	2
Teachers	2
Junior College Officials	2
Assistant Principal	1
Supervisor	1

Examination of the foregoing list reveals that the actual make-up of the committee differed widely from the planned membership. Two comments are possible among many: first, teachers are not readily made available for important work of this kind, and second, members of the State Department of Education are readily available.

The committee made use of assistance from 45 organizations and 79 professors. The following classification of the professors is possible.

DEPARTMENT	COLLEGE	UNIVERSITY	TOTAL
Anthropology	4	0	4
Economics	5	4	9
Education	6	6	12
Geography	3	2	5
History	2	1	3
Philosophy	6	2	8
Political Science	6	4	10
Psychology	3	7	10
Social Science	1	6	7
Sociology	7	4	11
TOTALS	43	36	79

Acknowledgment is made to almost as many individuals who contributed to the study through leadership roles in co-sponsored summer workshops and conferences.

The main body of the report consists of a list of 120 generalizations or principles. These principles are worded with the utmost

care, and offered as a "fruitful approach to the identification of appropriate content in the social studies" (page 26). No generalizations are offered in philosophy. Instead, the role of philosophy, which once included all the social disciplines, is now said to be responsible largely for exploring "the methodology employed in investigations, the foundations of theorizing, and the criteria of judgments asserted about human affairs and the values which they embody" (page 71).

Not surprisingly, there is a good deal of overlapping among the generalizations submitted by the various disciplines. The committee reduced the list from 120 to 18.

The report includes a careful analysis of what is known concerning child development and learning with the view that information about children and the ways in which they learn will permit local curriculum committees to prepare appropriate courses of study.

We have, then, in this report much excellent raw material for the local development of courses of study in the social studies that can now take into account recent developments in the social sciences including the sciences of human behavior. This raw material includes a basis for content in the social studies, for understanding the social sciences as a method of inquiry, and for intelligent planning of teacher methods.

It must be emphasized that the report is not intended as a curriculum. Routine teaching of the generalizations listed would not affect the educational development of the child. The present authors are strongly of the opinion that best use of the report will be made when teachers plan, with pupils, problem-solving activities that will lead the pupils to make some of the generalizations themselves and that will infuse the others with meaning. Standing alone, the generalizations provide the essence of learning, but unless the child works over these ideas to the extent that he can incorporate them into his thinking, however profound the generalizations be, they remain, for him, inert and dead, to be sloughed off by the breeze encountered at the next bend of the road.

SOCIAL STUDIES AND LIBERAL EDUCATION

ALTHOUGH THE STERNER INFLUENCES now at work in the schools will probably push the orange crates and butcher paper back to the periphery where they belong, the social studies must remain the heart of the curriculum. For it is by the study of society, his own society as well as societies of others, that a student can acquire the common basis of understanding needed so desperately for humans to live at peace with each other and with themselves. The social studies play a central role in helping the child to develop an increasingly conscious and harmonious self. The distinguishing character of this self must always be the ability to make consistent and appropriate choices.

CONCLUSION

THE NEED AND THE PURPOSE for a sound, productive, and meaningful social studies program is readily apparent. What is not so clear is the content and the method of social studies. This chapter has attempted to develop broad insights into content and method. No attempt has been made to provide specific details to be blindly followed. The specific details must be worked out by each school staff and each teacher in order that the program will have meaning for the community, the staff, and the pupils.

It is evident that method (or process) is inseparable from content. Thus it is highly unlikely that a well-planned social studies program will be lacking in adequate, appropriate content. Content, however, can be provided without method or process. When content, devoid of method, is all the social studies program has to offer, the educational fare is meager indeed. Only when method and process are involved—even emphasized—can the schools be said to educate.

Inevitably, as always, the teacher must be concerned with subject matter. But when arriving at decisions to problems is uppermost in his mind he realizes that one selection of sequence of content is more effective than another in demonstrating the methods

used. He also realizes that one way of using content with his pupils is more effective than another if they are to master the more significant processes and use them in making their decisions. When method and process are stressed, the timeless qualities of subject matter are emphasized.

An emphasis upon training in the making of decisions—finding and acting on solutions to problems—is most important for youth growing up in a democratic society. Sophistication concerning the making of decisions will lead to questions as to who makes the decisions. When youth of a democracy learn to accept the consequences of their decisions and hence their actions, responsible citizenship develops rapidly. A people made tough-minded and experienced in their youth by long practice in the making of decisions will be prepared for the responsibilities of political action. They will also be well versed in the needed social skills and understanding. They will seek no political savior. They will praise no demagogue, for they will be citizens responsible and willing to face the future through their own individual and group decisions.

EXERCISES

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1. What are some of the basic purposes in teaching the social studies?
2. Write briefly on some aspect of American life that has undergone vast change during the past decade.
3. Formulate, and discuss briefly, one of the major social problems of our time.
4. Describe the daily life of a poor man in India.
5. Choose one of the countries of the Middle East where deposits of oil have been discovered, and discuss the effect of oil production on the people of the country.
6. Describe a typical assign-read-recite lesson in American history and contrast this with a problem-solving lesson where the pupils help choose their problem, locate information from a variety of sources, discuss the implications of this information, and reach certain conclusions.
7. Examine Hume's "Treatise of Human Nature," published in

1739. What large areas of modern knowledge are absent? What areas of knowledge have been modified but little since his time?

8. Why is the study of world history of value to all Americans?

9. Choose a single lesson in the social studies and show clearly how development of skills and abilities in communication, thinking, and working with others may be expected to take place.

10. As a result of the political system in use in the United States, the skills and abilities of defeated candidates are sometimes lost either wholly or in part by our federal government. Can you think of any possible remedy?

11. How can the teacher of social studies establish, in the classroom, "a market place for ideas?"

12. What values distinguish a patriotic American?

13. What are the economic factors involved in the struggle for school integration in the southern states?

14. How can the teacher determine what learning is of value to a particular child?

15. What classroom experiences in democratic behavior might be considered appropriate in a particular school class?

16. Sharp increases in the intellectual content of primary-school science experiences have been made recently. Specifically, illustrate ways in which content in the social studies might be similarly modified. Does your suggestion merely shift attention from one section of the student body to another, or does it take into account differences among pupils?

17. Why does a student need "concepts"?

18. Refer to the canons of curriculum development provided in one of the earlier chapters of this text and show how they may be modified so as to serve as guides to problem-solving activities conducted in the classroom.

19. How can a student court be developed as a supplement to the classroom program in the social studies?

20. What is the responsibility of the history teacher regarding the teaching of reading?

21. Is there any evidence available concerning the development of responsibility?

22. If a pupil in your class seemed to lack moral courage, what would you do to help him?

23. What evidence can you find that leaders in the social sciences are working positively toward world peace not only as private citizens but as professionals?

24. List various steps in the problem-solving process.

25. Suggest and illustrate a number of principles to be used in the determination of scope and sequence in the social studies.

26. Read the combined list of eighteen principles in the Report of the California State Central Committee on Social Studies. Are you familiar with these principles? Where did you learn about them?

27. What is meant by critical thinking?

28. Distinguish the method of inquiry of one branch of social science from that of another branch.

29. Is philosophy a social study?

30. What is meant by "reproducible evidence"? Can the study of history be made with evidence of this kind?

TOPICS FOR DISCUSSION

1. Extension of the American philosophy of the "common man" to people in underdeveloped countries.

2. The possibility of a population explosion which could be almost as disastrous as a nuclear war.

3. The contrasting requirements of research in the physical sciences and in the social sciences.

4. The role of the school in the development of socially desirable behavior.

5. Methods of determining scope and sequence in the study of American history.

6. The need for consensus as a prelude to democratic action and appropriate methods of reaching whatever consensus is necessary.

7. The less restricted the curriculum, the better prepared teachers must be.

8. The role of the social studies teacher in the development of character.

9. Should health and hygiene requirements be met in social studies classes?

10. How can we be certain there is such an entity as the "self"?

11. The role of the school in the development of a feeling of responsibility for citizenship on the part of the student.

12. Most people in America lead passive rather than autonomous lives.

13. How can one make use of group support toward the solution of social problems without losing his identity as an individual?

14. What values are indispensable for the performance of satisfactory American citizenship?

15. Learning to make choices in the social studies class.

16. The physical science versus the social science emphasis in the search for peace.

ADDITIONAL READING

Bateson, Gregory, "Experiments in Thinking about Observed Ethnological Material," PHILOSOPHY OF SCIENCE, 8 (Jan., 1941), 53–68. *An interesting emphasis on process or method in relation to material of the social sciences.*

Bellamy, Raymond F., Chase, Harrison V., Thursby, Vincent V. and Young, Sadie G., *A Preface to the Social Sciences* (New York: McGraw-Hill Book Co., Inc., 1956). *A text for a general education course in the social sciences written by a group of instructors at the Florida State University. The first chapter states the purposes of the course in a most compelling fashion. The substantive material seems well chosen and appropriately organized to reach the purposes stated.*

Everett, Samuel (ed.), TEACHING WORLD AFFAIRS IN AMERICAN SCHOOLS (New York: Harper & Brothers, 1956). *Short reports on various techniques that have been used.*

Firman, David. "Geography in Higher Education," JOURNAL OF HIGHER EDUCATION, 23 (Mar., 1952), 137–44. *Summarizes the geography course offerings in colleges throughout the country.*

Fraser, Dorothy M., "The Organization of the Elementary

School Social Studies Curriculum," SOCIAL STUDIES IN THE ELEMENTARY SCHOOL. Fifty-sixth Yearbook, Part II, National Society for the Study of Education (Chicago: University of Chicago Press, 1957). *The thesis is that fusion and integration are the predominant patterns of organization.*

Glaser, Edward M., AN EXPERIMENT IN THE DEVELOPMENT OF CRITICAL THINKING (New York: Bureau of Publications, Teachers College, Columbia University, 1941). *One of the first studies to emphasize method or process in the teaching of the social sciences. It is widely quoted.*

James, Linnie B., "A Mystery Country; A Lesson in the Readings of Graphs and Statistics," JOURNAL OF GEOGRAPHY, 51 (Sept., 1952), 231–35. *Describes how eighth grade pupils were guided in their use of maps, graphs, and statistics to discover outstanding characteristics of a country.*

Johnson, Earl S., THEORY AND PRACTICE OF THE SOCIAL STUDIES (New York: The Macmillan Company, 1956). *A textbook on the teaching of the social studies that is not afraid to deal with such difficult topics as the need for some indoctrination, the fixing of belief, and the nature of discussion.*

Michaelis, John U., SOCIAL STUDIES FOR CHILDREN IN A DEMOCRACY (New York: Prentice-Hall, Inc., 1950). *A popular text for the teaching of the social studies. Although the emphasis is on the elementary school, there is much of value for teachers of the social studies at other levels.*

Klee, Loretta E., SOCIAL STUDIES FOR OLDER CHILDREN: PROGRAMS FOR GRADES FOUR, FIVE, AND SIX (Washington: National Council for the Social Studies, 1953).

Lipset, Seymour Martin, POLITICAL MAN (New York: Doubleday & Company, 1960). *A leading political sociologist has gathered facts concerning citizens in political democracies and has delivered a number of provocative findings.*

National Council for the Social Studies, SOCIAL STUDIES FOR THE JUNIOR HIGH SCHOOL, Julian C. Aldrich (ed.) (Washington, D.C.: The Council, 1957).

National Council for the Social Studies, SOCIAL STUDIES IN THE SENIOR HIGH SCHOOL, Eunice Johns (ed.) (Washington, D.C.: The Council, 1953).

Strong, C. F., HISTORY IN THE SECONDARY SCHOOL (London: University of London Press, 1958). *An English book, but an interesting presentation by one who believes that history should be taught to each grade in the secondary school. The final chapter provides a design for a four-year course.*

Thralls, Zoe A., THE TEACHING OF GEOGRAPHY (New York: Appleton-Century-Crofts, 1958). *A textbook on the teaching of geography. Deals with the development of such skills as map-reading and the interpretation of graphs.*

United Nations Educational Scientific and Cultural Organization, HISTORY, GEOGRAPHY, AND SOCIAL STUDIES (Paris: The Organization, 1953). *A summary of school programs in fifty-three countries. Gives years of schooling, approximate age of pupils, and sometimes the number of lessons or hours per week. Written in English.*

CHAPTER 10

Mathematics

THERE IS A GENERAL PATTERN for the teaching of mathematics in American schools at the present time—a pattern that can be observed in most schools. From kindergarten through grade eight, nearly all children spend some time in the study of arithmetic. True, there is wide variation from school to school and even from class to class in the same school concerning what is taught as well as the way it is taught, but all children in these grades are taught some arithmetic.

In the ninth grade, those who show greater facility with abstract concepts are allowed to take algebra. Nearly two-thirds of the children in grade nine take this subject. The children who have trouble with abstract concepts are usually required to take a course known variously as basic math, general math, or shop math. These courses also vary, but in most instances they provide the student with an opportunity to review the arithmetic studied in the earlier grades. Generally speaking, the courses are unsuccessful. Discipline problems are frequently disruptive. There are two major reasons for the difficulty. The first is that the same content and methods are used

that did not succeed with the pupils during the preceding years. The second is that young and inexperienced teachers are usually assigned to these courses. Experienced mathematics teachers see little value in the courses, they do not like to teach arithmetic, and they miss the contact with more able students. At this point and in this sad fashion, the study of any branch of mathematics ends for more than fifty per cent of the high school students.

Those who are successful with algebra in the ninth grade study geometry in the tenth. With some exceptions, the study of geometry in the tenth grade goes on in nearly all the high schools of this country in a ritualistic and archaic fashion. Students who enjoy meeting a new intellectual discipline usually enjoy their brief encounter with geometry. Other students parrot back the proofs of the theorems and juggle patterns until they have hit upon a successful solution to one of the exercises. Still others fail to pass the course and are given an honest F or a gratuitous D.

Euclidean geometry has been taught to high school students for several hundred years. It has an honored place in the curriculum and generations of intelligent men and women devoted to the welfare of society have spent their productive years as teachers of the subject. With the children who fail the course, nothing useful has been accomplished. Instead, they have added one more failure to their steadily growing list and will soon drop out of the academic race. The timid, sensitive ones will withdraw, blaming themselves and thus compounding their present difficulties; the bold, aggressive ones will engage in practical affairs and their growing anti-intellectualism will be reinforced.

With the children for whom geometry has little or no meaning, transfer of the use of symbolic logic to the solution of their personal problems can scarcely be expected; their receptivity to propaganda has probably increased with the practice undergone.

Even those few high school students who have understood the abstractions of Euclid, marveled at his insights, and experienced the intellectual thrill of using these insights in the solution of unknown and difficult problems may not have escaped damage. When geometry is taught by a mathematician unaware of the fact that Euclidean geometry is a self-contained body of abstractions and that other geometries, depending on the axioms accepted as self-evident,

are possible, the developing child may be so impressed with the suitability of Euclidean space that he is later almost unable to free his mind of Euclidean concepts.

After a lapse of a year, a second course in algebra is taught to a rapidly dwindling group of students. As evidence that the first course has had almost no opportunity to function in the lives of the students, a lengthy and systematic review of Algebra 1 is nearly always needed.

Trigonometry and solid geometry are taught to the last survivors in grade twelve.

To substantiate these pessimistic comments on the preparation in mathematics in elementary and high school, the program of courses will be considered in greater detail.

ARITHMETIC

IN ELEMENTARY SCHOOLS arithmetic is taught incidentally in the social studies or science units, in a separate unit, and in periods of drill or practice. This need for a multiple approach has been grasped as insights into the teaching of arithmetic have developed through the years. At the turn of the century, children in elementary schools spent at least two periods a day on arithmetic, one on drill first thing in the morning when they were fresh, and one in the afternoon on word problems when the teacher was tired and needed a rest. Faculty psychology was then accepted and any subject educationally sound had to be abstruse and difficult. Children were beaten, thrashed, urged, and cajoled until a surprisingly large number of them were able to work out problems of fantastic complexity about tanks filling up, gears rotating, ages of uncles, cousins, and aunts, and the interest due on notes and mortages. The following is a typical fifth or sixth grade problem of fifty years ago.

A grocer buys 27 pounds of tea at 30 cents a pound, 15 pounds at 25 cents a pound, and 10 pounds at 40 cents a pound. If he blends the three qualities, at what price per pound must he retail the mixture to allow for a gross profit of 15 per cent?

This problem gives an approximate answer of 35 cents a pound if the grocer is willing to forget a little matter of 2¾ cents. Arith-

metic teachers of the era could be fairly sharply categorized into those who wanted the fraction of a cent accounted for and those who were willing to deal with the problem more realistically.

The problem listed helps to explain the revolt against this sort of thing which was first made in the name of social utility. The extent to which people make use of arithmetic is difficult to measure. The use of numbers to express abstract quantities is perhaps not as common as the use of words to express qualitative notions, but it is much more prevalent than the early utilitarians were willing to admit. To be forced to plan a busy day without the use of numbers would be hopelessly restricting. Further, social utility is a limited criterion for the selection of subject matter for educational purposes.

In 1915 or thereabouts, Thorndike brought out his theory of connectionism. This theory was remarkably successful in tying together a number of hitherto unrelated phenomena. Hence, school people considered themselves enlightened when they governed their practices according to the dictates of the manner in which S-R (Stimulus-Response) bonds were thought to be strengthened. Instead of being asked to learn a few hundred arithmetic facts in addition, subtraction, multiplication, and division, children were now expected to learn thousands. According to this highly specific theory of learning, children who knew 7 and 8 totaled 15 had to be asked to learn the total of 17 and 8 as a separate and unrelated fact.

From faculty psychology through social utility and connectionism, the educational theorists under the banner of progressive education went wholly over to the point of view of the child—not so much the child as he should be and might well be, but the child as he spontaneously was. The emphasis was all on the needs of children as children saw them. These needs included very little study of arithmetic, so that in progressive schools the teaching of arithmetic was entirely incidental unless the individual teacher showed concern.

In 1940, largely under stimulation from the researches of Brownell, Buswell, and other educational psychologists working with Judd at Chicago, the concept of meaning was introduced. This concept is brought easily into harmony with both the notion of social utility and developmental needs of children. According to Judd

and his fellow workers, the child can generalize from the facts he has learned only when he understands those facts and they have meaning for him.

The concept of meaning emphasizes the role of the individual in learning. Although general methods have been worked out so that meaning can be comprehended more rapidly by the learner, investment of a symbolic representation with meaning, which means to relate it to the experiences of the individual, is activity for which each separate learner must accept responsibility.

Recently, a theory of motivation has been worked out to demonstrate that the search for meaning by the child is its own reward. The study of arithmetic on this basis becomes self-generating as the child develops favorable attitudes toward a discipline that will assist him in forming a stable pattern of orientation to his environment. A revival of interest in mathematics for its own sake can be expected if this theory is able to survive empirical testing. There have always been a few children able to derive considerable pleasure from being able to solve a tough problem in mathematics. The new theory may indicate how children are able to develop an interest in this kind of activity. If it does so, the number of such children can conceivably be increased.

An estimate of the content of courses in arithmetic in the elementary schools of this country at the present time can be made with some intelligence through an analysis of the content of popular textbooks and of courses of study. Such an analysis leads to the approximate outline that is given below, but much variation in an individual school is to be expected, especially when one geographic unit of the country is compared in this respect with another that is several thousand miles distant. Further, there can be little assurance that a written course of study, or the content of a textbook, provides an accurate description of the daily activities in the classroom in which it is used, and no assurance at all that the course of study provides an accurate description of the arithmetical achievement of the pupils. Hence, the following lists a possible grade placement of topics that may be considerably wide of the mark with respect to the curriculum in arithmetic to be found in an individual school:

A. Kindergarten, grades 1–2

1. Saying the numbers. Perhaps the child in this age group may be expected to say the numbers up to 1,000, but there would be little point in asking the child to say all the numbers up to 1,000, one after the other, providing he is given sufficient opportunity to gain insight first into the relation between 21 and 31, etc., and between 199 and 299, etc.
2. Enumeration—certainly as far as being able to count the number of children in the room.
3. Identification—giving the correct answer to such a question as, "How many fingers am I holding up?"
4. Ordinal scale—first through tenth.
5. Comparison—five objects are more than four objects, and so on.
6. Grouping of numbers—by twos to 100, and by fives and tens.
7. Meaning of numbers—to 50 or more.
8. Combinations through ten. The number facts about nine would include: (a) five and four make nine, (b) four and five make nine, (c) nine take away four leaves five, (d) nine take away five leaves four, as well as four similar facts about the other possible combinations of numbers that together make nine, such as six and three.
9. Reading numbers to 500, words to 20, Roman numerals to XII.
10. Writing numbers: Arabic numbers, 100 or more, by ones, twos, fives, and tens.
11. Place value, at least the units and the tens.
12. The concept of zero as a place holder.
13. Fractions, ½, ¼, ⅓, ⅔, and ¾.
14. Decimals as related to money—1¢, 5¢, 10¢, 25¢, 50¢, and $1.00.
15. Simple units of measurement—the idea of the inch, foot, and yard, but not necessarily the relationships among them; the pound, probably known in connection with their own weight.
16. Geometric forms—line, cube, and cone.
17. The vocabulary lists for this grade should be checked for arithmetic words.

B. Grades 3–4

1. Reading and writing of Arabic numerals to 10,000 or more, Roman numerals to at least XX, ordinals to thirtieth, words for numbers to 100, by threes to 30, by fours to 40, and money to at least $9.99.
2. Meaning of numbers to 100 and the places for ones, tens, 100's, 1,000's, and 10,000's.
3. Addition—four- or five-figure columns to five or more addends. Adding dollars and cents. Estimating reasonable answers, and checking answers in adding.
4. Subtraction—four- and five-figure numbers including zero and borrowing. Subtracting dollars and cents. Estimating reasonable answers and checking answers.
5. Multiplication—understanding process of multiplication including the signs and the terms. Multiplication facts through nine. Multiplication of three- and four-figure numbers by two- and three-figure numbers with zeros and carrying. Multiplying involving dollars and cents. Estimating reasonable answers and checking answers.
6. Division—understanding process of division including the signs and the terms. Division facts through nine. Division by the long method only of three- and four-figure numbers including zeros and remainders. Dividing involving dollars and cents. Estimating reasonable answers and checking answers.
7. Fractions—easy addition and subtraction of like fractions. Equivalence of simple fractions. Finding simple and fractional parts. Meaning of fractions as part of a group and as a ratio or comparison.
8. Decimals—making change with money.
9. Measurement—second, mile, ton, terms, and abbreviations.
10. Form—rectangle.
11. Graphs—simple line and bar graphs. Graphs of individual spelling scores.
12. Tables—table of contents, and height and weight tables.

C. Grades 5–6

1. Reading and writing numbers—Arabic to 1,000,000 or more, decimals to four places, Roman to 1,000 (M) or more.
2. Meanings of numbers—to 1,000 or more.
3. Understanding of place value—to 1,000,000 or more.

4. Practice in addition and subtraction for speed and accuracy.
5. Similar practice in multiplication, including work with one- and two-place decimals.
6. Practice for speed and accuracy in division should include work with all zero difficulties, correction of estimated quotient, one- or two-place decimals, and short-cut division by 10, 100, and 1,000.
7. Fractions—vocabulary of fractions, changing fractions to higher and lower terms, addition and subtraction of common fractions, mixed numbers, and whole numbers, multiplication and division of fractions.
8. Decimals—vocabulary of decimals, interchanging common fractions and decimals. A, S, M, and D (Addition, Subtraction, Multiplication, and Division) with decimals up to at least two places.
9. Measurement—gross, peck, bushel, square inch, square foot, square yard, acre, time zones, area, perimeter (both the terms and abbreviations for all the foregoing). Include estimation of size according to the unit of measurement; for example, an estimate of the number of square feet to represent the area of the floor of the classroom.
10. Form—include the trapezoid and the parallelogram.
11. Graph—include circle graph, pictorial graph, and scale drawing.
12. Tables—an ability to read the common tables encountered in the study of science and the social studies as well as an ability to use these skills in situations and problems.

D. Grades 7–8

Much of the work of these two grades must be designed to increase, to the point of lifetime permanency, skill and accuracy in the basic processes of A, S, M, and D; with whole numbers, fractions, and decimals of any complexity that seems reasonable to the teacher, which accords with the ability on the part of an individual child to understand, and with the over-all policy established by the various educational authorities in the school system. In all this work, solution to word problems should be included, if not strongly emphasized. Probably a thorough understanding of ratio, both direct and inverse, is the most important concept that the teacher can develop in the child in these two grades. The child who knows in-

stantly when to multiply and when to divide in order to compute, say, the cost of an aggregate of objects, knowing the price per dozen, per nine, per ten, or per hundred, or the period of a journey, knowing the rate and the distance, will always have the advantage over the child who does not have this knowledge. In addition to practice of the kind suggested, a number of new topics are usually included in the work in arithmetic in these two grades. Because more and more textbooks and courses of study are including topics that introduce the learner to algebra and geometry, the work of these two grades is sometimes called mathematics. Use of the term "mathematics" is especially wide when grades seven and eight are included in either an intermediate school or a junior high school.

1. Meaning and applications of per cents.
2. Simple statistical measures such as majority, median, and mean.
3. The metric system.
4. Measurement of angles.
5. Use of simple formulas in problem-solving.
6. Construction of geometric figures of some complexity; similar figures, the rule of Pythagoras, congruent triangles, and square root.
7. Form: pyramid, cone, prism, and cylinder.
8. Business arithmetic: mortgages, taxes, stocks and bonds, banking, interest, and ways of borrowing money.
9. Systems of notation.

Grade placement of the various topics in arithmetic has resulted in part from the scientific study of the elementary school curriculum. In general, the methodology of such studies is to attempt to teach certain topics to children in successively lower grades until finally a point is reached where the children fail to learn the topic, that is, to understand the topic to the point where the topic has meaning for them and they are able to apply their knowledge; or else the teaching is so time-consuming as to be considered inefficient. Because of individual differences among children, no sharp cutoff of ability to learn can be expected at any given grade. Investigations of this type call, therefore, for value judgments on the part of the investigator. How many children must fail to learn a topic before the teaching of the topic can be considered inefficient? How

elaborate can the teaching method be permitted to become before a decision is reached that the teaching is too costly in time and effort on the part of the teacher? Have all possible methods been tried?

Hence, subjective evaluations by classroom teachers have been influential in the grade placement of arithmetic topics. Teachers have "experimented" with variations in courses of study; a number of them have collaborated in the writing of influential textbooks in arithmetic; tradition in the placement of arithmetic topics has steadily developed.

A third influence on the placement of arithmetic topics has been the logic that is inherent in the mathematics itself. When curriculum-makers accept the assumption that most of the subject matter of arithmetic is to be covered and practiced before the end of grade eight, considerable placement of the various topics is immediately prescribed.

Much of the number-work described can be incorporated in the science and social studies units. Detailed descriptions of all possible science and social studies units would be quite out of place at this point. However, one or two examples will be provided to illustrate the way in which content in the social studies and in science can be used to provide meaning for the various arithmetic concepts that have been listed.

Much quantitative thinking can be centered round the topic of a trip or voyage by sea. Arithmetical problems having to do with the loading of freight can be made interesting and varied; painting of sea vessels is never-ending, and problems having to do with the quantity and cost of paint and with the labor involved can be so worded as to capture the imagination of the child. Large-scale movement of crude oil across the surface of the earth is most timely, and calculations based on the size of the vessels used and the time taken for the vessels to complete a trip, including loading and unloading, provide answers that bear on the solution of problems in geography, politics, and science. Children easily become interested in the knot as a unit to measure the speed of a vessel. Sailing vessels used to be timed with an hourglass, and a log of wood with a cord attached. At the same moment that the glass was turned, the log was thrown overboard, and a cord attached to this log was played out over the stern of the ship. Knots were so placed in the

cord that by counting the number of them that ran over the side while the sand was running down in the hourglass, the navigator could estimate with a fair degree of accuracy the speed of his craft.

Latitude and longitude are both quantitative measures of position on the surface of the earth. The relationship between differences in latitude and miles on the surface of the earth is an important concept in both arithmetic and geography. The relationship between differences in longitude and time is equally important. Incidentally, the knot is a nautical mile per hour, and a nautical mile is the distance between two parallels of latitude that are one minute apart. Because there are 60 minutes in one degree of latitude and 360 degrees in all in a circle, starting at the equator, going north to the pole, south to cross the equator on the opposite side of the earth, south again to the pole and finally north again to the equatorial starting point, the circle just described is 21,600 nautical miles. But the earth is approximately 25,000 miles in circumference, hence a land mile is nearly six-sevenths of a nautical mile.

The navigator finds his way about the trackless oceans of the earth by means of celestial navigation. Times of the rising and setting of the sun and moon and times of the accompanying tides can be found in the appropriate tables, and this information can be used to devise problems of the appropriate difficulty by means of which children can increase their understanding of their environment and practice their arithmetic at the same time.

An imaginative teacher, by tying the concepts briefly listed to air travel, to voyages of exploration, to the stories of the stars, and to other topics in social studies and in science, can make the study of arithmetic meaningful and interesting to the child.

GEOMETRY

IT WOULD SEEM INAPPROPRIATE at this point to present an extensive outline of the content of the geometry course. Plane geometry is offered as a two-semester course to college preparatory students in grade ten. It is taught by a specialist, and nearly always, the teacher and his students work closely from the textbook.

Half a century ago, geometry students were expected to memorize the assumptions of Euclidean geometry—the definitions and

the axioms. A point has position but no magnitude; a line has length but no thickness; things that are equal to the same thing are equal to one another. On occasion, the teacher tried hard to help the students obtain meaning from these abstract ideas. A point was the smallest of dots made with the sharpest of pencils; a line was an unbroken succession of these mythical points. The best teachers were able to get across to the better students a reasonably sound conception of the thought processes involved; for here was theory, pure and unadulterated, which could be used to describe, in part, the world of experience.

Given the assumptions and the definitions, the student was then asked to follow many of the demonstrations of the master. Later he was asked to prove other relationships, sometimes in a stilted and formal manner, sometimes with a modicum of freedom. Some geometry teachers expected their students to memorize the particular enunciation of nearly a hundred theorems and to be able to prove them with flawless logic and with every reference cited. Occasionally there were brief excursions via compass, ruler, and protractor into the lowly world of induction. Frequently, the student found intellectual sanctuary in this tight little dream world, and "Q.E.D." was considered to give force to arguments over mundane affairs.

Today, geometry textbooks begin with much the same definitions and axioms, and demonstrations based on these assumptions are still either given or required of the student. Modern geometries place greater emphasis upon induction—by asking the student to perform constructions, the order of the demonstrations is changed markedly, and a number of ingenious proofs and clever exercises have been added.

It may well be true that the ultimate goal of the teaching of geometry, as is true of the teaching of all subjects, is to get students to improve their thinking and hence their decision-making. However, direct approaches to the teaching of thinking seem destined to failure—theorists in education have long urged this direct approach with little or no effect even on their own teaching—and there are, perhaps, a number of reasons for this failure. Thinking is abstract, and therefore difficult. Even more difficult for both teachers and pupils generally is thinking about thinking. Hence, it is difficult and rare for the teacher to become passionately and per-

sistently involved in a study of thought. Unless the teacher has this passion, emotional involvement of the pupil is most unlikely, and even where the teacher has the needed attitudes, there are so many chasms into which he may fall as he attempts to transmit his thoughts and feelings directly to the student that success is rare.

Taking teachers, pupils, and educational institutions as we find them, a much more realistic method of regarding the teaching of geometry would seem to be: Here is one of the great and noble intellectual systems that man has developed. I enjoy it; let me see how many of my pupils can develop favorable attitudes toward the study of it.

The foregoing statement can be wholly misinterpreted. It does not mean that children are to be left to themselves to discover the delights of geometry without assistance. It does not mean that the teacher is to set out to achieve the easy popularity of the ice-cream vendor. It does mean that development of a genuine intellectual interest is to be sought, and this means understanding and recognition of the validity of the thought processes involved.

In all probability, a number of steps which lead to a development of this interest, recognition of function or use, are brought about by the description of agricultural and industrial development, as well as by the possibility that the methods of thinking in geometry may be useful in the solution of problems already vital and real to the student.

At least one teacher of geometry, Fawcett,[1] has apparently been able to teach in this fashion and he has recorded his experience.

In the first place, he is fully aware and seems able to transmit this awareness to the students, that no demonstration proves any point or relationship that is not implied by the assumptions. The essential difference between the proofs of science and the proofs of geometry is thus established. In an abstract system, no exception may be permitted; otherwise, we say there is a flaw in the reasoning. Because the best of our theories is but an imperfect description of our experience, exceptions to empirically established rules are to be expected.

[1] Harold P. Fawcett, *The Nature of Proof*. Thirteenth Yearbook of the National Council of Teachers of Mathematics (New York: Bureau of Publications, Teachers College, Columbia University, 1938).

However, the more our theories conform to nature, the more accurately we can make our predictions. The ideas of plane geometry have assisted immeasurably in the control of the environment. Crippling calcification of man's future ability in this respect takes place when masses of children are taught that the world was created in conformity with Euclidean concepts. Children must be taught to master plane geometry instead of permitting this particular geometry to master them.

Further, Fawcett is reluctant to swallow whole the dictum that any study of geometry automatically produces people who are skilled in the art of deductive reasoning and passionately devoted to the use of formal logic in the conduct of their daily affairs. He accepts the development of skill in reasoning as a legitimate aim of geometry teaching, but insists that the teaching must be of a special kind if this aim is to succeed.

His method is to give the children plenty of practice in the use of formal logic; not only with the abstractions of geometry, but also with an analysis and criticism of newspaper and magazine editorials; a discussion of issues arising in the school and the community; and analyses of religious, legal, and political problems.

He then evaluates the achievement of his pupils not only in their ability to solve problems in plane geometry, but also in their ability to transfer both deductive and inductive reasoning to the kind of decisions that American citizens are asked to make.

A teacher who wishes to apply these methods to his own classes should study Fawcett's *The Nature of Proof* with great care. Especially important is the way in which he weaves the geometrical strands with the carefully carded materials from lectures, sermons, editorials, and advertising to produce accurate patterns which the pupil can use to think for himself.

ALGEBRA

LIKE GEOMETRY, algebra came into the secondary schools from the colleges and universities. High school teachers and many high school pupils found the subject congenial and a traditional body of content soon developed. Like any other branch of mathematics, algebra is a form of symbolism to be used in com-

municating ideas which relate to an understanding of the natural and social environment. Years of experience have shown clearly that many high school pupils are able to master most of the algebra content that is presented to them. Some students develop a high regard for the order and beauty of algebra, and this affection transfers fairly easily to higher mathematics. On the contrary, pupils may develop an equally strong disregard for the subject and either reject it entirely or study it to achieve aims that are totally irrelevant.

Whitehead, himself an eminent mathematician, has a number of things to say about the teaching of algebra. He says that, like any other mathematics, it is apt to become recondite and that consequently, if it is to be used for the purposes of general education, it must be subjected to a rigorous process of selection and adaptation.

To make this selection and adaptation more intelligent, he points to desirable goals for the teaching of mathematics. In the first place, pupils are to acquire familiarity with a system of abstract thought—with its economy of time and effort, and with its universal character. Further, they are to be led to see the usefulness of mathematics for an understanding of concrete circumstances. He has at least two extremely pungent remarks to make with respect to this understanding: that the art of reasoning consists of getting hold of the subject at the right end, seizing on the few general ideas that illuminate the whole and persistently marshaling all subsidiary facts round them, and of recognizing that precise law is never really verified by observation.

According to Whitehead, the most useful algebraic concepts for the purposes of general education are not always stressed in traditional algebra courses. He would list among the most important topics for general education: graphs, simple differentiation, examples of statistical laws as applied to social understanding, and some of the history of mathematical ideas.

Fagerstrom has studied the mathematical facts and processes prerequisite to the study of the calculus. The findings of such an analysis are pertinent to curriculum development if one assumes that the teaching of algebra is needed in the program of the college preparatory student—that the teaching of algebra in high school has a propaedeutic function.

ADVANCED MATHEMATICS COURSES

TENUOUS AND DIFFICULT OF ACHIEVEMENT as the goals of general education may appear with the content of algebra and plane geometry as the media of instruction, the possibility of using the more advanced mathematics courses for the purposes of general education is so slight that these courses must either be justified as ends in themselves or as preparation for further mathematical study.

Provided they have the necessary enthusiasm, high school students can improve their mathematical insight by suitable study of these advanced mathematics courses. For such students, and for this purpose, an entire semester devoted to solid geometry seems wasteful. With the necessary interest and background of experience, a boy or girl should be able to understand and grasp most of the new ideas from the usual text in solid geometry in a week or two. What has been said of solid geometry is less true of advanced algebra, trigonometry, and analytical geometry, but there is still a tendency to drag these courses out by the inclusion of "recondite" material so as to make them fit the requirements of a semester course.

Many students take advanced algebra, trigonometry, and analytical geometry as college preparatory requirements when they are unprepared emotionally or intellectually to deal with these abstractions. These unprepared students are accepted to make up a class, because of parental pressure, or for some other equally unacceptable reason. As a result, weeks are spent in advanced algebra courses on a systematic review of Algebra 1. At the end of this review, the students who belong in the course have lost interest, and those who do not are seldom any better off then they were before.

CRITICISM OF THE MATHEMATICS PROGRAM

IN THE OUTLINE of the mathematical program just presented, numerous criticisms have been stated or implied. Aspects of the program prompting these criticisms have developed through failure on the part of those responsible for the mathematics program

to keep the curriculum abreast of our understanding of the way pupils learn and of the requirements of society, and in accordance with acceptable educational goals. This failure may occur less through ignorance of the way pupils learn, of the requirements of society and of acceptable educational goals than through an inability to influence and modify classroom procedures. Those charged with responsibility for the mathematics program may be well aware of the characteristics of a good educational program, yet ignorant of effective methods of establishing the needed classroom procedure. Because the daily classroom procedure depends almost entirely on the educational understanding of the individual teacher, each teacher must achieve a firm grasp of sound curriculum principles. This grasp is possible only when all teachers, not just those in the elementary school, are able to obtain a view of the curriculum as a whole, not just a view of their special subject, important as such specialized insights may well be. Further, teachers at one level, primary, secondary, or tertiary, can no longer proceed intelligently and still remain ignorant of the curriculum at other educational levels.

A list of criticisms of the mathematical program may prove interesting. At least, such a list helps to explain the suggested modifications in the mathematics program that follows:

1. In spite of the emphasis on meaning made at various times by leaders in the teaching of arithmetic, many teachers still seem to assume that once the computational skill in arithmetic is developed, pupils will sooner or later add meaning to the processes on their own. The point of view taken here is that quantitative thinking is not possible until numbers are meaningful to pupils and that the ability to do quantitative thinking is so important that acquisitions of the skills needed cannot be left to chance.
2. No other broad or sweeping criticisms were made of the teaching of arithmetic through grade eight. However, teachers need constantly to examine their arithmetic program to make sure that it is reasonably close to the best possible practice—given our present understandings of how children learn, of the needs of society, and of suitable educational goals.

3. If algebra and geometry are to be used as media for general education, these two subjects require critical and continuous examination as to both content and method.
4. Few courses in college preparatory mathematics make sufficient provision for individual differences. The assumption generally accepted by teachers of these courses is that the students are much alike in their attitudes, abilities, and vocational interests. This assumption is false. Teachers of high school mathematics are urged to test their students in as many ways as possible. Reading age will probably be found to vary from twelve to twenty years old at the least. Intelligence quotients will probably show a similar range. If no provision is made for individual differences and a student with an I.Q. of 100 is able to keep up with the class, students with an I.Q. of 125 or over must be hopelessly bored with the proceedings. Further, these capable students are probably developing extremely poor study habits.
5. In high school mathematics courses, too much emphasis is placed on the preparatory nature of the course; the subject is studied in order that the student will later be able to study other mathematics.
6. When algebra and geometry are included in the curriculum of a high school student for purposes of general education, they sometimes fail to take because the teacher does not teach adequately in terms of these purposes. If the study of these subjects is to help people to acquire habits of logical, quantitative thinking, such thinking must be practiced outside of formal mathematics while the student is actually studying these subjects.
7. Courses in higher mathematics are probably important and needed by a few students. Such courses are usually much too pedestrian.

MODIFICATIONS OF THE MATHEMATICS PROGRAM

IN LIGHT OF THE CRITICISMS just summarized, certain modifications of the existing program of mathematics are suggested. These modifications should be worked out by committees of teachers provided with the needed time and consultative assistance. In-

dividual committee members can then be expected to put the suggested modifications into operation. Provided the known facts are established concerning the ways pupils learn, the legal requirements as well as requirements of society voiced by representatives of the local community and of all segments of the educational system, failure to reach consensus should not be a cause for concern. Little or no attempt should be made to reach a compromise. Establishment of a middle-of-the-road policy with respect to those aspects of teaching which are at present doubtful, and may even remain so, can only be expected to result in colorless and ineffective teaching. In general, legitimate and rational dissent should be vigorously supported by the committee.

1. Arithmetic

a. No formal arithmetic should be taught before pupils enter grade three. Pupils entering grade three will know many arithmetic facts and these facts should be thoroughly impregnated with meaning for the child, but they will have been acquired in the study of science and social studies units and in the informal life of the child both within and without the classroom. Indeed, many writers would postpone the teaching of formal arithmetic until the fourth or even the fifth grade. Local experiments as to the grade level at which pupils are introduced to formal arithmetic should be encouraged. Experiments whereby some pupils are introduced to formal arithmetic before others of their own grade would seem highly appropriate.

b. Experiments with the incorporation of concepts from various systems of symbolic logic into the arithmetic work of grades seven, eight, and nine are also to be encouraged.

c. Remedial arithmetic courses taught in grade nine and known variously as general math, basic math, and shop math need careful and possibly drastic revision. Only experienced and highly qualified teachers should be permitted to teach these courses, the classes should be kept as small as possible, and a wide variety of instructional materials should be provided.

2. Algebra and Geometry

a. Provision for individual differences in these courses is usually inadequate. Such provision might include:

(1) Use of more than one textbook.
(2) Use of a textbook that contains graded sets of problems.
(3) Reports by individual students and panels.
(4) Individual and committee student projects.
(5) Visits to business and government offices by individuals and by groups of students.
(6) Use of correspondence courses.
(7) Use of educational TV.
(8) Use of resource persons in the community to work with individual students.

b. Students in these courses should be provided with plenty of opportunity to generalize their mathematical thinking to the solution of problems that they consider to be real and important.

3. Advanced Mathematics Courses

a. Student requirements, especially in smaller high schools, are extremely varied with respect to the content of their courses. In order to meet these requirements, one or more courses in advanced mathematics, and so called, should be offered, these courses to be taught on an individual basis. Screening for such a course should be most careful. Only those who are truly advanced should be permitted to enter.
b. The pedestrian pace of most of these courses is in need of rapid acceleration. In part, this increase of pace will be accomplished by more careful screening and by individualization of the instruction. Those teachers accustomed to lingering an entire semester, sipping the delights of elementary principles of solid geometry, may need to be jolted. Mathematical rigor is possible without exhausting either the subject or the student.

REVISION OF JUNIOR AND SENIOR HIGH SCHOOL COURSES

AT THE TURN OF THE CENTURY less than five per cent of the youth went on to high school. These were generally the more able and profession-bound youth. Today, sixty to eighty per cent of all youth are completing high school. The transition from high school attendance by a selected few to secondary education for all

TRACK	GRADE 7	GRADE 8	GRADE 9	GRADE 10	GRADE 11	GRADE 12
I (MOST ABLE)	Consumer mathematics, introduction to algebra and geometry	Algebra	Advanced algebra	Plane and solid geometry	Honors math, including trigonometry, algebra, calculus, binomials, and higher math theory	
II (COLLEGE PREP)	General math	Consumer math	Algebra	Plane geometry	Intermediate algebra	Trigonometry
III (AVERAGE)	Seventh grade math	Eighth grade math	Algebra (fewer and practical concepts)	Plane geometry (fewer theorems, practical application)	.....	.....
IV (BELOW AVERAGE)	Seventh grade math	Eighth grade math	Consumer math, including practical algebra and geometry to a very limited degree		.....	Review math

youth has brought with it many problems and a wide spread of ability.

In recent years, many junior and senior high schools have made definite strides toward revising the mathematics program of the secondary school to meet the varying interests and abilities of the student population. These revisions have taken many paths. However, most common appears to be the development of "multitrack" math programs, providing for the most-able, the above-average, the average, and the below-average groups.

Notable among the changes has been an accelerated program for the most-able students, a revised program for the above-average college preparatory students, revised course content for the average students, and a limited program for the below-average students. One such example is shown in the accompanying table.

ILLINOIS PROGRAM

BEBERMAN[2] HAS PRESENTED a point of view for the teaching of mathematics not greatly at odds with that presented in this chapter. The major differences are first that Beberman displays greater mathematical sophistication. The second is that Beberman ignores the extremely difficult matter of how teachers are to be led to a proper use of the suggested content. The history of new curricular ideas largely follows a cycle of invention, enthusiastic reception, unenlightened use, routine teaching, and eventual neglect of everything that cannot be incorporated into a standardized approach. The only way that has succeeded to date in keeping the curriculum alive is to incorporate an on-going program of curriculum development, with revolving membership, into the regular system of the school.

Beberman's ideas have been taken up by a number of groups associating teachers of mathematics in high school and college and university. Among these groups are the College Entrance Examination Board Commission on Mathematics, and the School Mathematics Study Group at Yale University.

[2] See the list of "Additional Reading," at the end of the chapter, for references to these various programs.

THE COMMISSION ON MATHEMATICS

THE COMMISSION ON MATHEMATICS consists of fourteen members under the chairmanship of Albert W. Tucker, Professor of Mathematics at Princeton University. There are five teachers from secondary schools, all of them with primary interests in college preparation. The representatives from the colleges and universities are approximately evenly divided between those who profess the study of mathematics and those who profess scholarship in the teaching of mathematics.

THE SCHOOL MATHEMATICS STUDY GROUP

THE SCHOOL MATHEMATICS STUDY GROUP consists of representatives from the National Council of Teachers of Mathematics, the Mathematical Association of America, and the American Mathematical Society. Operating funds were supplied by the National Science Foundation. Dr. E. G. Begle, formerly of Yale University and now at Stanford, is the director, and there is an Advisory Committee consisting of twenty-seven persons including university, college, and high school teachers of mathematics, school administrators, and representatives of science and industry. This group has already produced textbooks and teachers' manuals which are being tried out in the schools. The data concerning the suitability of these materials consist largely of reactions of teachers and students to the materials. By and large, both groups seem to find the materials highly congenial. A brief outline of the materials follows.

Three volumes are available for use in the teaching of mathematics to youngsters in junior high school. There is one on number systems, one on geometry, and one on the applications of mathematics.

More than a dozen volumes are available at the time of writing for use with high school students. Several of these are volumes of commentaries and answers for the teacher so that a reasonably intelligent mathematics teacher could do a great deal with these materials without further instruction. For the use of the students, the

materials fall into four sections, presumably one section for each of the four years of high school. The four are: beginning algebra, geometry, intermediate mathematics, and elementary functions.

Titles of the nine chapters in beginning algebra are:

1. Number line and sets
2. Phrases and sentences
3. Properties of operations on numbers
4. Open sentences and English sentences
5. The real numbers
6. Addition and multiplication of real numbers
7. Subtraction and division of real numbers
8. Factors, exponents, radicals
9. Polynomials and rational expressions

Missing are the long lists of meaningless exercises. Throughout, there is a flavor of understanding in light of comparatively few basic concepts. New ideas in mathematics are used, as can be seen from the list of chapter headings. Relations to science and technology are introduced.

The third volume on intermediate algebra gets into the problems of vector notation. In high school there is time to develop skills such as are needed here, time which is not available to the science student in college. There wasn't time thirty years ago, and now there is even less. One wonders how many students dropped out of physics thirty years ago because of the unequal struggle with strange symbols. We may have been totally misled by the notion that a certain I.Q. is needed to achieve the needed skills.

In the section on elementary functions, we find the following chapter headings:

1. Sets, relations, functions
2. Polynomial functions
3. Exponential and logarithmic functions
4. Circular (trignometric) functions

To those who studied mathematics some time ago and have not been using it regularly since, this seems at first to be a strange new world. By and by, however, old landmarks are recognized. Beyond this a synthesis becomes apparent that is both enlightening and refreshing. These new materials of instruction bid fair to revolutionize the teaching of mathematics to the brighter students. One won-

ders whether or not, with increased understanding of both the materials and the way children learn, plus a willingness to wait longer for results, these materials might not be helpful in the teaching of all high school students. One thing seems certain. The materials by themselves will not be able to do it, and the mechanical, unenlightened use of the materials will probably produce disappointing results.

EXERCISES

1. What are the purposes of teaching arithmetic?
2. Why is mathematics taught in high school and college?
3. General mathematics courses in grade nine for noncollege preparatory students have in one or two instances been rescued by a new approach such as the use of set theory. Describe one such new approach.
4. What is meant by saying that any geometry is a self-contained body of knowledge?
5. What advantages may be derived by a child from learning to solve complicated word problems in arithmetic such as the following: "A cylindrical tank with flat, circular ends is 3 feet 7 inches long, and the radius of cross-section is 8 inches. If a pipe admits water to the tank at the rate of 5 gallons per minute, and a second pipe takes water from the tank at a rate of 3 gallons per minute, how long will it take to fill the tank?"
6. Psychologists who study learning still make extensive use of S-R bonds. Does this mean that their thinking is still being dominated by Thorndike's theory of connectionism?
7. To what learning theory does the concept of "meaning" largely relate?
8. A number of studies have been made purporting to show that children in the United States are not as good at arithmetic as children in certain other countries or even as good as they were in this country several years ago. Discuss this situation as fully as possible.
9. Consider the outline of the elementary curriculum in arithmetic that has been presented. How much of the plan is dic-

tated once the assumption is taken that arithmetic must be completed in six years of study?

10. Locate a study of the grade placement of certain topics in arithmetic. Criticize the study.

11. Select a social studies unit and show how certain learnings in arithmetic can be introduced.

12. Describe in some detail one of the newer geometries.

13. What psychological views of "transfer of training" support those of Fawcett?

14. Examine the new program of mathematics suggested by the College Entrance Board, the School Mathematics Study Group, or some similar committee. Show whether or not these proposals (a) are more likely to reach acceptable educational goals; (b) will make high school mathematics more consistent.

15. Examine a textbook of solid geometry. Do you think this course is valuable for the general student?

16. Can you think of any ways in which the fetters of a semester or year course in a special branch of mathematics can be avoided?

17. Describe ways in which a teacher with a given class can make provision for a wide variety of mathematical ability.

18. Check the quantitative part of an intelligence test to compare the mathematical knowledge possessed by a child of eleven with an I.Q. of 75, with that of a child of eleven with an I.Q. of 200.

19. Suppose an unintelligent child of twelve knows about as much arithmetic as an intelligent eight-year-old. Should the same teaching methods be used on these two children?

20. Why should an overemphasis on the preparatory function of a course be considered as a possibility that ought to be avoided?

21. Examine the proposed algebra course put out by the College Entrance Board. How does this course compare with any standard course in grade nine algebra?

TOPICS FOR DISCUSSION

1. The teaching of algebra and geometry in the middle grades of elementary school.
2. The use of mathematics in the social sciences.
3. The teacher who generates excitement about mathematics but leaves gaps in the mathematical preparation of his pupils is doing a better service than his colleague who exhausts both the subject and his students.
4. The study of political speeches is entirely out of place in the high school geometry class.
5. Should calculus be taught in high school?
6. How can the teacher of algebra try to ensure that his students learn so as to be able to transfer their knowledge and understanding?
7. If the taking of courses in advanced mathematics in high school is to be restricted to especially able students, what should be done with other college preparatory students who have succeeded in passing algebra?
8. How can algebra be made interesting to a child who is not interested in the subject?
9. A completely new approach to the teaching of high school mathematics that has not so far been presented.
10. Contribution to curriculum decision-making by scholars in the subject-matter fields.
11. The good teacher increases the range of competence in mastery of a subject by the students he is teaching.
12. Use of mathematics content to help bring about the moral development of high school students.

ADDITIONAL READING

Beberman, Max, AN EMERGING PROGRAM OF SECONDARY SCHOOL MATHEMATICS (Cambridge: Inglis Lectures in Secondary Edu-

cation, Harvard University Press, 1958). *An excellent introduction to modern methods of the teaching of mathematics.*

Brownell, William A., DEVELOPMENT OF CHILDREN'S NUMBER IDEAS IN THE PRIMARY GRADES, Supplementary Eduçational Monographs, No. 35 (Chicago: University of Chicago Press, 1928). *The first major study to insist that children must understand and bring meaning to the arithmetic they are learning.*

College Entrance Examination Board, Commission on Mathematics, SETS, RELATIONS, AND FUNCTIONS; A GUIDE FOR TEACHERS (New York: The Commission, 1958).

College Entrance Examination Board, Commission on Mathematics, INTRODUCTORY PROBABILITY AND STATISTICAL INFERENCE (New York: The Commission, 1959).

A number of committees of teachers and scholars have brought out materials for the teaching of mathematics in the secondary school. These two publications of the Commission on Mathematics are examples. They emphasize mathematical topics such as commutative groups not previously found in high school courses but which are most useful in tying a great many other topics together.

Fagerstrom, W. H., MATHEMATICAL FACTS AND PROCESSES PREREQUISITE TO THE STUDY OF THE CALCULUS, Teachers College Contributions to Education, No. 572 (New York: Bureau of Publications, Teachers College, Columbia University, 1933). *Little use has been made of this significant study in the development of high school mathematics courses.*

Hogben, Lancelot Thomas, MATHEMATICS FOR THE MILLION (New York: W. W. Norton & Co., Inc., 1937). *A classic in the field of lay representation of mathematics.*

Kamke, E., THEORY OF SETS (New York: Dover Publications, Inc., 1950.) *A topic we shall hear more about as time goes on. The book is based on a mathematical concept that is simple but most important.*

Langer, Susanne K., AN INTRODUCTION TO SYMBOLIC LOGIC, 2nd ed. (New York: Dover Publications, Inc., 1953). *A description of the Boole-Schroeder and Russell-Whitehead systems in language that most of us can understand.*

Polya, Gyorgy, HOW TO SOLVE IT (Garden City, N.Y.: Doubleday Anchor Books, 1957). *A useful little book on the subject of problem-solving.*

School Mathematics Study Group, MATHEMATICS FOR HIGH SCHOOL GEOMETRY, PART I (New Haven: Yale University, Photolithoprinted, 1959). *As indicated in the text, this group has produced a number of textbooks for use in junior high school and senior high school. The book provides a fresh approach through the use of modern mathematics.*

West, R. L., Green, Charles E., and Brownell, William A., "The Arithmetic Curriculum," REPORT OF THE SOCIETY'S COMMITTEE ON ARITHMETIC, Twenty-ninth Yearbook of the National Society for the Study of Education (Bloomington, Illinois: Public School Publishing Company, 1930). *On page 83 we have this interesting statement: "Perhaps the most outstanding single tendency has been the effort to break down the watertight compartments between arithmetic, algebra, and geometry, so as to include certain concepts from algebra and geometry in the arithmetic work of the upper grades."*

Young, J. W. A. (ed.), MONOGRAPHS ON TOPICS OF MODERN MATHEMATICS (New York: Dover Publications, Inc., 1954). *This collection was first published in 1911. Fifty years later there is still widespread interest in the topics presented.*

CHAPTER 11

The Fine Arts

IN THIS CHAPTER the discussion will center on the teaching of literature as well as music and the plastic and visual arts. Communication skills are usually taught by the teacher of English. In a previous chapter we set forth our belief that the teaching of reading, writing, speaking, and listening is the responsibility of all high school teachers. We believe all teachers should take home (for comment and criticism) a few essays written by students; all teachers should demonstrate and supervise the reading of books on their subject; all teachers should provide opportunity for formal and informal talking; and all teachers need to show their students how to listen. The teacher of English, like the teacher of French or Spanish, will continue to ask the students to write compositions. But the writing appropriate for a class in literature may be highly inappropriate for a class in science. Both kinds of writing, along with several others, need to be practiced and mastered. All teachers share the responsibility for teaching communication skills.

The point of the fine arts, as in all education, is to assist the individual to build for himself a rich, satisfying, and well-integrated

personality. But the fine arts, emphasizing as they do the emotional side of life, are outstanding for the development of the necessary human values. Essentially, they place the learner in communication with the geniuses of aesthetic experience. As he reads great literature, listens to or helps to perform great music, or enjoys and surrenders to the attraction of the pictorial and plastic arts, the learner is in a position to derive some of the insights that great men and women have had; although he may never hope to live as intensely as they, the whole plane of his existence can be elevated in the process.

His sights have been raised; his feelings sensitized; a fuller and richer life is his for the taking. Whether he does so or not is a measure, in part, of the effectiveness of the educational program.

An appreciation of the fine arts can generally be cultivated only through long effort. The serious error made by some of those who urge a more disciplined approach derives from an apparent belief that undifferentiated lash-produced effort will do: Any subject, or perhaps any medicine, will serve if it is difficult enough to take and if the mentor is strong enough to compel that it be swallowed. On the contrary, the subject must be such that the student can be led to establish an initial foothold of interest. The teacher can lead him on a tour of the valleys, pointing to the surrounding mountain peaks. But until the student has expressed at least a vague desire to climb, or better still has chosen his own particular mountain, any demonstration of equipment or mountaineering skill is premature. The discipline must arise out of the situation; it is unsatisfactory if imposed from without by means of another and stronger personality.

Music and literature, examples of the fine arts, are concerned with the communication of feelings. But to say so is not to deny the intellectual content of the fine arts. Mastery of the needed thought processes, as well as of the requisite bodily skills, calls for extended effort. Music, literature, and the other fine arts are also disciplines. But the intellectual aspects cannot be forced. Instead, they must be fused with emotional appreciation—even with love.

Probably, a great many children are capable of acquiring a taste for architecture, dancing, literature, painting, sculpture, photography, drama, and music. But a grave mistake is made if we assume that all children of eight or nine can curl up with *A Tale of Two Cities* and spend an enthralled evening. Later, the same chil-

dren, if properly nurtured, will delight in filling their storehouse of memory with passages from Shakespeare, the Bible, Milton, and Keats. But there are others who must test their powers on gentler slopes, foregoing, perhaps forever, the highest peaks. When some children leave our schools with a profound dislike for Shakespeare's plays; when tricks such as synopses of the stories of Dickens and Thackeray are employed in literature classes; when teachers insist on the extraction of the last ounce of meaning from every line of a difficult poem; when the only music the high school student hears at school is an indifferent rendition by the school band of "On Wisconsin"; and when art remains indistinguishable from sentimentality on the one hand, and pornography on the other: then attention to the teaching of the fine arts is long overdue. Let us consider in detail the curriculum in literature, in music, and in the graphic arts.

LITERATURE

PRE-PRIMARY AND PRIMARY GRADES

THE APPROACH TO THE FINE ARTS hinted at in the preceding paragraphs ought to be started in the pre-primary and primary grades. Probably many of the school experiences that have been devised for these young children meet a number of educational purposes. At the moment the significance of a few of these experiences will be estimated for the literary development of the child.

All teachers in the pre-primary and primary grades are aware that much perceptual experience must be associated with concept formation. They say that the children must be ready to learn before they can actually learn. Immediately, different provisions are needed for different children. Some have enjoyed hours of listening as father or grandfather, mother or grandmother, told them of The Three Bears, Old Mother Hubbard, and Little Jack Horner; read them of Snow White and Jack the Giantkiller; and, when they were very young, took them over and over through the stylized patterns of Pat-a-cake, Pat-a-cake, Baker's Man. Others, perhaps, have experienced rhythm not only devoid of fantasy but filled with pain as the

hand or strap beat steadily on bodies that toughened all too slowly. Worst of all, some children have been left, for much of their babyhood, alone. Just possibly, the advent of television has contributed to some of these activities by providing professional story-tellers that comfort the lonely, keep the naughty ones out of mischief, and to whose rivalry busy mothers are glad to surrender at least after repeating The Three Bears for the twentieth time in as many hours. But wide variations in the background experiences of children are still to be expected. Hence, the common activities and experiences devised for children should be rich with possibilities for learning, and a wide range of individual activities and experiences should be provided.

Large building-blocks, an aquarium, and a browsing table ought to be in every classroom so that a variety of activities is available to children who have a few spare minutes. Instruments for the rhythm band can vary widely in the skills required to play them.

When children come to the front of the room to recite during the sharing period, their tale can be long or short, simple or complex.

Not all children can be expected to derive the same benefit from the reading of a story any more than, as adults, they will all enjoy a play, a concert, or a symphony to the same extent. Certainly, the teacher would be ill-advised to choose such simple stories that all children can grasp everything in them. On the contrary, the best children's stories have an almost universal appeal because they contain so much at so many different levels. Story-telling should probably be continued after the child has begun to read for himself, although as they progress through the primary grades more children will be content with less listening.

In addition to being provided with an abundance of picture books, and picture books with few and simple words, children in the primary grades should have access to more difficult books.

These are the raw materials for group activity, for the enjoyment of books is heightened when one reads aloud to others, when two or three work at the reading together, when a superior reader can tell others the story, when there can be a discussion of characters and events, or when enthusiastic readers merely wish to bubble over and share their newly discovered thrill with their playmates.

INTERMEDIATE GRADES

As CHILDREN PROGRESS THROUGH SCHOOL, they will, if they are richly taught, increase their individuality at the same time that they increase the quantity of learning they acquire in common with their friends. Common learnings provide the pleasantly familiar grooves so necessary for social action; individual learnings meet the sterner requirements for a distinguished personality. By the time the children are through grade six, the last of the intermediate grades, a very few may be reading at the average achieved by those in grade ten; one or two others may be struggling to reach the average achieved by those in grade two. The remainder of the pupils may be expected to demonstrate a level of achievement that falls between these two extremes. For free individual reading, for shared reading, for listening, a wide variety of books should be ready right in the classroom itself. Still more books should be ready for their use in the library. Literally hundreds of titles are available; informative books like *Paddle-to-the-Sea, The First Book of Stones,* and *After Dinner Science;* tales of adventure such as a *Lassie Come Home, Smoky,* and *Flare Path;* and such perennial favorites as *Pinocchio, The Jungle Book, Heidi, Alice in Wonderland, Ivanhoe, A Tale of Two Cities, Robin Hood, King Arthur,* and *The Arabian Nights.* Some of the children are ready to read biographies, descriptions of travel, plays, and librettos.

JUNIOR HIGH SCHOOL

GRADUALLY, the work in literature will develop as to method as well as to content. In junior high school the teacher can be expected to read less and expound more. But there still should be plenty of free reading time for the pupils, for these are the years when the more romantic readers will assault the works of Kipling, Dickens, Thackeray, Scott, Stevenson, O. Henry, and Mark Twain with a voracious and all-consuming appetite. These are the years when others will want to satisfy a curiosity concerning the nature of the more formal of the natural sciences.

These are the years when Booth Tarkington and Captain

Marryat can be used effectively as bait to lure still others from an unrelieved allegiance to comic books and the TV screen.

More formally, a general exploration of American folklore or of Greek mythology is perhaps desirable. Certainly an exploration of a full range of literary types should be aimed for.

The National Council of Teachers of English recommend that units in literature classes be built around themes such as Heroes and Heroines of Today and Yesterday and Growing Up in America and Other Lands. This procedure seems highly satisfactory with classes in junior high school, but questions will be raised later concerning the suggested extension of the theme idea into classes in the senior high school.

GRADE 10

UNITS SUGGESTED for grade ten literature classes by the National Council of Teachers of English include:

Life Is What We Make It
Knowing Your Way Around—Custom and Countries
In and Out of Family Living
Friendships and My Relations with Others
Finding One's Way into the World of Work
What Is Fun?
Making the Most of Oneself

When literature is arranged on such themes as these, the class, teacher, and general learning situation are apt to slip into a highly formal and inflexible position. To some extent life is "What We Make It," but a teacher with a fixed and therefore narrow philosophy is perhaps aided, by a device such as this, in trying to push her pupils into the same tight little mold. It would seem much safer to let the men and women of literature speak directly to the children without so much intervention of the part of the teacher.

"What Is Fun?" seems rather hopeless as a unit. A considerable gulf will probably exist between the notions of fun entertained respectively by a woman teacher of literature and by some of her male students. A desire to increase the range of pleasurable experience is doubtless worthy, but since this should be the aim of such a large

part of the literature, teaching a unit on the theme, especially with such an ambiguous title, may or may not be either acceptable or necessary.

Instead of choosing literature according to themes, the teacher might well choose selections according to the interest and understanding of individual students. No doubt this substitution, which is frankly student-centered, permits less structure and therefore demands more continuous planning by the teacher and his class. With such a scheme much of the reading of the class is on an individual basis, the teacher indicating by book lists, by samples, and by short reviews the kind of reading that is available. Perhaps he will give some explanation when this is called for, but it is much better that he encourage his students to use the available dictionaries, encyclopedias, and books of criticism to develop their own taste and understanding. Students with a taste for reading already developed might be willing to help others.

In any event, opportunities ought to be provided for children to get together: to compare notes on an essay, biography, or poem; to listen to book reviews; to hear the cadence and rhythm of poetry; to see what someone else derives from an explanation; to build, imaginatively, the setting for a drama. To accommodate these activities, the room might well be divided (perhaps by a glass partition) into a laboratory for such activities and a library for reading. In the library—all should be quiet.

Reading what has been written in books and articles by teachers of English, the impression is received that a taste on the part of a twelfth grade student for such a book as *A Tale of Two Cities* is modest and that to more than half the class this will be a novel for the late evening rather than for daytime reading. This impression is false. It will be true for not more than two or three members of an average graduating class, and they, in all likelihood, will have developed their taste elsewhere than at school. Only once in each two or three classes will the boy or girl be found who chooses good books for himself and who reads them with avidity. This is too seldom. Teachers of literature must continue to nourish the interest of students, and toward this goal, must be willing to use highly individualistic procedures when necessary.

GRADE 11

IN THIS GRADE, American literature is taught almost exclusively. To a greater or less degree, the study of literature is associated with the study of United States history. Such units as The American Epic and What America Means lead the pupil to study among others the writings of Emerson, Whitman, Sandburg, and Wolfe, and to correlate their readings with such typical historical topics as the Westward Movement, Our Agricultural Basis, and the Industrial Expansion. The project varies from a dull and hackneyed exercise to the establishment of a fairly vivid realization of what it means to be an American in mid-twentieth century and escapes a limited parochialism when attention is directed to the role of Americans in a world setting. Partly because of the influence of the teachers of social studies, attention is redirected, in this grade, to the skill in logic and analytic reasoning power used by the students. This tendency seems highly commendable, for there would be little purpose in developing the moral sense of children through the study of great literature unless there were developed, along with this sense, some critical ability, some ability to judge whether the conclusions reached by other speakers and writers were sound, in the sense of following logically from premises and assumptions that could be recognized. Such integrity and consistency is of course characteristic of all good literature, but such writings can be read and enjoyed without the reader being conscious of the precise manner in which this integrity and consistency is achieved. Indeed, it is just such analysis, prematurely forced, that turns the student, with his modest intellectual attainments, away from the study of literature.

The needed practice in critical thinking can be performed on less sensitive material. One way that has been suggested to develop a store of such material is to acquire tape recordings of current political speeches. To these may be added current newspaper editorials. Dissection of contemporary speaking and writing runs far less the hazard of destroying student interest because the events discussed usually have meaning for him. Let us have Patrick Henry at the Virginia Convention just as he comes from the printed page.

Let his emotion stir us as it stirred the members of that convention. Aside from a brief statement to the effect that the speech was extemporaneous, knowledge that heightens our thrill, let us have no parts A, B, C, or D, and let us not go excising and prying after logic. On the other hand, speeches that have not been tested by time can be analyzed by the pupils. The teacher will not need to look far to find examples of poor logic, inconsistency, special pleading, and downright tampering with the truth. If the children become angry at the revelation because it shatters some of their political illusions, so much the better. At least they are not being bored with it all.

GRADE 12

MOST AMERICAN HIGH SCHOOLS offer a course in English literature to seniors. This course must usually be taken by those going on to college, but for others it is an elective. Teachers of English enjoy this course; the rebels and nonconformists have been weeded out, the subject matter is dear to the teacher, and the choice of content is extremely wide. Examples of drama, poetry, the novel, the short story, and the essay are usually chosen. There is nearly always one of Shakespeare's major plays. *Macbeth, Julius Caesar,* and *The Merchant of Venice* are considered among the most satisfactory, although a few daring teachers try *Richard III, Henry V,* or perhaps *King Lear. Hamlet,* for some reason or another, is not a popular choice. Occasionally, one of the comedies (appropriately edited) will be read by at least a part of the class.

For many years *Silas Marner* was the novel chosen by most teachers. This is one of the three novels which brought lasting fame to George Eliot. The first of these, *Adam Bede,* is another popular choice for grade twelve readers, though the third, *The Mill on the Floss,* is usually considered too harrowing for young people.

The shorter pieces, essays, short stories, and poems, are usually studied from an anthology which is a textbook. In recent years, the trend in these texts has been away from Addison and Steele toward Churchill, Chesterton, and Waugh. Because a single text must necessarily include material that appeals to a wide variety of taste, we find Saki and Eric Knight, and even P. G. Wodehouse.

In the poetry section, Kipling is strongly represented, but surrounded usually by many other poets: Donne, Lovelace, Dryden,

Pope, Gray, Burns, Wordsworth, Coleridge, Byron, Keats, Shelley, Tennyson, Browning, and others.

To place the literature of England in a proper setting, well-known classics from a number of other countries are often included. With but one or two selections from each poet and author, the single anthology is apt to be a long, long book. Most unfortunately, although the selections must have appealed strongly to the compilers, there is no guarantee that these particular selections will make an equally strong appeal to all high school seniors. Where others of the author's works are available, an appropriate meeting ground may be reached. Further, if a multitude of short selections helps a child to appreciate literature, to sample fewer writers more thoroughly would probably be more successful. Or is the purpose of the senior course in English literature simply to provide those at the end of their high school career with the tags and trappings of culture?

Seniors take English for fifty minutes each day and read perhaps twenty minutes daily on their own. School is in session fewer than 180 days a year. In addition to examining the mass of English literature just listed, the students are expected to write at least one essay per week, to make several speeches during the year, to study grammar and work laboriously through innumerable exercises, and to examine the outpourings of the mass media for examples of loose thinking.

For the past few years a number of excellent dramatic films have been available for use in English classes. Where the play lasts more than a single period, time can often be traded with the teacher of the succeeding class. A drama usually has its greatest impact when seen at a single sitting. Recordings by professionals are nearly indispensable. Who of us does not remember how a piece of writing that seemed but a poor dead thing as we read it or listened to a fellow student read it became alive and vibrant as it flowed from the lips of a master speaker?

COLLEGE AND UNIVERSITY

LITERATURE, like most of the disciplines, is taught in colleges and universities to both amateurs and professionals. It is part of the general education of those preparing to become writers

and publishers, and those preparing to become scholars of literature.

General students

To the general student, literature conveys insights into the range of man's experience, thereby helping self-understanding as well as the understanding of other men. But literature is not history. Yet one of the standard lower-division college courses has been a survey of literature with a strongly historical flavor. Again, as with the elementary college courses in most of the other fields, preparation for a life of scholarship is the dominating theme. But great literature is the expression of an emotional response to life and should be used, educationally, to enrich the power of response in the learner.

Literature is not ethics. But ends and means are constantly interchanging and life, especially to the lower-division college student, is often harassing in the extreme. He needs to read more than the echo of his own voice but without any tawdry moralizing. Without orating from the platform of a closed system, the teacher of literature can help his students to see what it is that they can share with other men, what it means to be a human being, how one can use the mind and heart to bring order and serenity to a world of strife and chaos.

Literature helps one to come to terms with life. To understand life we need to study the experiences of others, make these experiences our own by thinking about them, talking about them and trying them out. As we share experiences in common, we learn to live together. As we learn to choose for ourselves, we build our individual personalities. In literature, while the thought may be profound, it is seldom new. Or rather, the newness or oldness of it is not significant. What is significant is the manner in which the thought is expressed to us. It may be tragic, comic, tiring, cheerful, sad, gay, or morose, but if it is good literature it heightens our perceptions by its beauty, and so impresses us with its validity and truth that we are ready to accept the principle more or less permanently into our lives. Even pain acquires a sweetness and dignity when it is universalized.

Special students

A man or woman planning to become an author, journalist, playwright, or critic ought to be able to prepare professionally by majoring in literature at a college or university. For this group the emphasis should be on the development of critical judgment. Such judgment is more than taste. It is self-conscious to the extent that the critic not only knows a given piece of writing is good or bad, he knows why it is good or bad. Concerning contemporary writing, individual variation of opinion will be wide. As to older writing, the sieve of time will have eliminated much that has either lacked the needed body and integrity or that has been so bizarre as to exercise a limited appeal. Yet the literary heritage is well-nigh boundless. Nearly all serious critics of English literature would agree concerning the value of the King James version of the Bible and of the plays of Shakespeare. Below these obvious pinnacles, the differences of opinion would first be slight and later wide.

Hence, there seems to be a dilemma that cannot be resolved. Critical judgment of literature is to be both subjective and objective. It is to be a matter of individual opinion, yet there must be general agreement concerning the worth of the opinion. The resolution of the dilemma comes from a general acceptance of the validity of an individual opinion, provided the individual opinion demonstrates the use of principles of criticism that are generally accepted. In a very real sense, applications of general principles also constitute much of the subject matter of science. To a degree, the literary critic is scientific. But he also realizes that as the thought of the writer goes into the reader, so to speak, the reaction between the two of them is much more violent than the reaction that occurs when a phsyicist reads his spectrometer. The impact on a physicist of encountering a major scientific theory often has an emotional impact similar in many respects to the impact of a poem, or symphony, or picture, and to understand the theory, the physicist must make the theory his own. Because the theory can be analyzed and related step by step to the thinking of others, there cannot be the tolerance for individual opinion that is to be expected in the criticism of literature where the analysis is incapable of such great precision, where, indeed, such analysis is antithetical to the communication of the thought.

MUSIC

ADULTS WITH A CULTIVATED TASTE in music may have difficulty tracing their musical development to its source. They are conscious of increases in their fund of familiar themes, but they cannot remember learning much of the music they enjoy. Its acquisition seems to have taken place before they were able to think conscious thoughts. A notion is prevalent, therefore, that people are born with the predisposition to appreciate and to enjoy certain kinds of music.

Because a love of music of one variety or another is nearly universal among humans, and perhaps among animals too, the idea that people are born ready to enjoy variations of rhythm and tone is difficult to dismiss. But if they are, then there are probably individual differences in this inborn capacity. This line of speculation is interesting, but like all speculation concerning innate abilities it is of little use to the teacher whose control is limited at best to but a part of the postnatal environment.

Children are five years old or more before the teacher sees them. By the age of five, variations in experience have combined with whatever differences were present at birth to cause the musical ability of children to vary widely. At the age of four, Mozart was playing minuets and composing little pieces. At the age of six, he played before the various kings of Germany and two years later he was astonishing the English court with his skill and virtuosity. Mozart is a unique case, but Welsh children share in part singing long before they go to school, and there is reason to believe that most children could learn to carry a simple tune almost as soon as they can form a sentence. Parents often neglect this important part of nursery education. Where they are willing to spend hours before the child asking him to point first to his nose and then to his eyes, they do not seem, in our culture, to have got into the way of working with equal persistence to persuade the child to sing his first little tune. Some mothers, through fear of ridicule, or lack of confidence in themselves, fail even to croon to their children, and though the entry of canned music into the home is much more

prevalent than formerly, the radio, phonograph, or television cannot start the child unless the mother helps. It takes, "Come on, sing with Mother," over and over as she rocks the child to and fro, before there can be "Do you know 'Away in a Manger,' Grandpa?" And so some children will come to the kindergarten teacher without the key to this magical world of sound, and their mothers will apologize for the "tone deafness" of the little one. It should prove interesting to see what teachers do with this widespread range in ability and interest.

PRIMARY GRADES

IN THE FIRST THREE GRADES and kindergarten most of the children should develop a basic orientation to music. Exceptional children should be provided with special opportunities at the same time. Usually, the children can all enjoy music together, but there may be occasions when a few must be given the teacher's undivided attention. Class activities will be discussed first.

With the teacher accompanying, the children will want to sing together every day. After daily practice during the first grade, they should have an extensive repertoire of Christmas carols, spirituals, sea-shanties, nursery rhymes, hymns, patriotic songs, folk tunes, and popular songs. By the end of the primary grades, they should know both words and music of a seemingly endless number of songs and, what is far more important, they should have learned to enjoy singing them together.

Many of the songs can be acted out. In some of the songs the acts are more significant than the words. The point is that the acts are always rhythmical, and acting them out as he sings properly develops the child's rhythmic sense. Practice with these singing games provides one approach to a study of dancing. Running, jumping, hopping, and galloping can also be used to develop the sense of rhythm needed for dancing. Some children in kindergarten hold their bodies and control their limbs so as to provide a picture of flowing grace as they dash across the playground; others stumble over their feet, flail themselves with their arms, and either lean their head and shoulders so far forward as to topple on their faces or so far backward as to choke themselves. With these, the teacher

must work with utmost care and diligence, often going back to walking, clapping, or bending, or just showing the children how to stand.

All children in the primary grades should enjoy the thrill of producing at least rhythmic variations using simple homemade drums and other percussion instruments. Many of the children will be able to produce tonal variations at least one note at a time. With modern toylike instruments, sounds of amazingly good pitch and quality can be made by the beginner, and this mechanical excellence eases the child through the difficult initial stages.

Phonograph and tape recorder make possible teacher-directed listening. Children can soon distinguish fast, slow; high, low; loud and soft. When they are able to distinguish these three continua for the description of sound, especially the first two, they are ready for creative effort, and it must be emphasized that if perception of any kind, including that of music, is to be intelligent it must be, to some extent, creative.

The reason children must learn to distinguish rhythm and tone before they can be creative is because creativity in music, as in other art, connotes communication. It is far easier to teach very young children to communicate rhythm and tone symbolically than many people suppose.

The procedure that follows has been worked out in detail by Raymond McCall, a music teacher in the Vallejo, California, school system. No attempt will be made in these hints to present sufficient detail to enable a teacher to put the method into immediate operation. On the contrary, much thought and practice by the teacher will be needed to turn these abstract notions into a practical method. However, a lead of this rough kind, plus the knowledge that it has been done successfully by others, is sometimes all that is needed to stimulate an ambitious teacher into a superior performance.

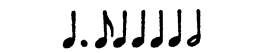
Let us suppose, for example, that children have learned, by rote, both words and music for "Twinkle, twinkle, little star."

Twinkle, twinkle, little star
How I wonder what you are.
Up above the world so high,
Like a diamond in the sky.

First, the children sing through the song. Then they clap to beat time as they sing. The teacher records, by means of scribbles of varying length, the length of time that elapses between the various notes. When he has done so, on chart or blackboard for all to see, the pupils have no difficulty in marking off the length, common to all four lines, as 1½, ½, 1, 1, 1, 1, 2; or, if fractions are to be avoided, as 3, 1, 2, 2, 2, 2, 4. The children may wish to represent these as solid lines of varying lengths.



In music, the basic note is the quarter note ♩. Hence the rhythm could be written



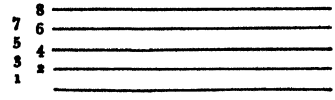
Because there are four quarters in a whole, this is a two-bar line
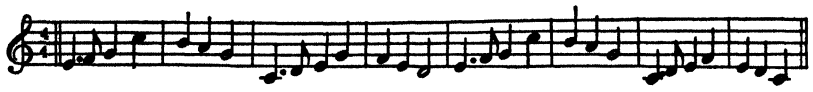


Next we must figure some way to show how the sound goes up and down. Again we will use numbers. Let the lowest note be the smallest number "1" and the highest note be the number "8." With appropriate guidance from the teacher, the children can work out numbers for this simple tune, as follows:

3,4,5,8,7,6,5,
1,2,3,5,4,3,2,
3,4,5,8,7,6,5,
1,2,3,4,3,2,1.

The teacher now introduces the gate and puts numbers on it, odd for lines, even for space.



When the notes previously worked out are placed on the proper lines and spaces, we have the music ready to be sung, the symbols before the opening bar being slipped in by the teacher so that a question will be asked on their meaning.



Undoubtedly, one or two of the children will see the identity between the first and third lines, and the strong similarity between the second and fourth lines. In this way an organic musical sense is born.

Before leaving the primary grades, we must say a word or two about individual and small group activities. Even with the help and encouragement of those near them, a very few of the children will still be unable to manage a tune. Fortunately, there are always one or two children in any class who manage quite well themselves and who seem anxious to assist the "lame ducks." Through considerable practice, they have developed the necessary patience and if coached occasionally by the teacher they will work away with a child who is falling behind until he gains at least a little confidence and skill, perhaps enough to make the class exercises interesting and meaningful. There will still be an occasional child with whom the teacher will have to work unless she can persuade one of the parents to come in and assist with the music lessons. Incidentally, a parent is often more than pleased to serve as accompanist, or one of the more able children in an upper grade can perform this task, or perhaps a student teacher is available as more and more emphasis is placed, in pre-service teacher education, upon practice activities within the classroom.

A few of the children, while they enjoy the class activities, may be ready for more difficult tasks. Individual performance, performance with a small group of good singers or players, or solo parts of the class exercises, make full demand of talent. Some teachers send their musically able students to sing and play with older children, private lessons are arranged for others, or they are simply permitted to practice alone. Probably no harm is done if the gifted child remains with his age-mates for a part of the music class.

INTERMEDIATE GRADES

EACH DAY, the children continue to sing and to play and technical controls and insights continue to increase. The delicate germ of a feeling for tonal relationships, for melodic movement, for phrase structure, and for rhythmic flow and beat will now be fostered, and rendered more precise.

At this age, many children will be affected by the music of the moment and the teacher may be at odds with the folkways whereas the primary teacher was advantageously allied with them. That teachers should fight "rock and roll" or "jazz" is probably to make a serious tactical error. The adroit teacher will use this material for serious analysis. There is a twofold advantage in doing so. In the first place, the children are already attracted to it; there is nothing for the teacher to sell. In the second place, if the vivisectional analysis either kills off the piece, or at least destroys its glamour, no great harm will have been done.

With the introduction of contrapuntal and part singing, the children will be delighted with their increased voice control and the way will be paved for the communication of harmony by means of symbols. Most teachers introduce the child to harmony by means of rounds: Three Blind Mice; Row, Row, Row, Your Boat; and London's Burning, to quote three popular examples. Contrapuntal singing can be introduced by asking part of the class to sing one well-known song, while the rest of the class sings another. Two that go together well are "Humoresque" and "Swanee River." It is much easier than many people suppose to persuade children to sing a kind of natural or primitive harmony. For the simple songs, a fair start can be made if the child who is learning to harmonize sings his notes either a third above or a third below the notes of the melody. When his ear is offended, he can slip into the melody or improvise a combination that pleases him. Analysis of such primitive harmonic combinations can become exceedingly complex and uniquely interesting.

JUNIOR HIGH SCHOOL

IN GRADES SEVEN, EIGHT, AND NINE, there should be a gathering of musical momentum and the beginnings of specialization. Score-reading should become easier for all the children. Sight-singing, including parts, is a reasonable goal. That the goal is reached so seldom is more of an indictment of music education methods than it is of the musical potentiality of children.

Junior bands, orchestras, and choruses as well as smaller instrumental and vocal ensembles will now be started. Eight male voices can be very pleasing at this age, uniquely so as there are still a few beautiful sopranos among them. The possibility of exploiting a strong impulse to form a closely knit gang or clique in this fashion is often overlooked. Nor should there, unless the school is very small, be just one of these groups. A man derives a deep satisfaction from joining a small group of his fellows in singing. There seems no logical reason why so many adult males are kept from this satisfaction by unwarranted inhibitions. Girls should be encouraged, too, to form small singing groups. Just a little training and encouragement enables them to produce effects of marked and tranquilizing beauty. It may be an unrecognized starvation of this need for music that sets our bobby-soxers shrieking in the galleries for the most vapid of musical fare.

SENIOR HIGH SCHOOL

MORE AND MORE of the students in these grades will be wishing to gratify independent musical impulses. The goal that every child should learn to sing and to play one instrument well enough to enjoy taking part in an ensemble seems reasonable. A few children can be expected to reach close to the peak of their musical performance during these years.

With an *a capella* choir, boys' glee clubs, girls' glee clubs, mixed glee clubs, quartets, and vocal ensembles; with band, symphony, instrumental quartets and trios, drum and bugle band, and dance orchestra, at least three-quarters of the children in these grades

should be active in music. In addition, nearly all should be learning to listen to music.

Classes where music listening is taught are usually called music appreciation classes. One example of a successful class in music appreciation will now be described. This is a class in a rural high school with a total enrollment of approximately five hundred students. The thirty members of the class demonstrate a wide variety of musical taste, but there is a solid core of at least two-thirds of the class to whom music has a direct, sensual appeal only. Four or five students show some understanding and about the same number get little or nothing from any kind of musical performance.

To begin, the instructor asked the pupils to keep track of the music they listened to from radio, television, or phonograph. This method was calculated to bring the majority of the students into the heart of the discussion immediately. Further, most of the children were listening to the same kind of thing and so a community of interest was established easily in the classroom. Likes and dislikes soon became evident. When students were asked the reasons for their preferences, most of the answers given were vague.

At this point, the members of the class with a greater understanding of music were gradually and skillfully brought into the discussion. Tunes were whistled or sung and referred to as themes. Choruses were distinguished from verses; and hackneyed or novel devices to vary the sound sequence were brought out. In other words, music that students listened to of their own free will and in their leisure time was used as a basis for discussion. Most importantly, the teacher was careful to show neither admiration nor disdain for the type of music chosen, and the pupils were soon bringing favorite records to class in attempts to persuade others of the wisdom of their choices.

A degree of musical literacy soon developed. Questions over beat and harmony soon meant that scores and orchestrations could be referred to. The confines of the four-four tempo, as well as the extreme regularity of such devices as the "blues" sequence, brought nearly all the class to the point where they could see why some musical numbers could stay popular for only a limited period.

At this point, depending on class interest, attention could be directed either to the origins of jazz, and hence of music itself, or

to the possibility of more complicated variations in meter, theme, harmony, and rhythm. Going in the second direction, the interests of the more knowledgeable members of the class were brought out and the students themselves were asked to bring records of their choice and to try to say what it was about the music that gave them pleasure and satisfaction.

Checks on musical listening at the end of the class showed that, almost invariably, students were spending more time listening to music. At least a few demonstrated the awakening of a musical taste by choosing to listen to different music, and the majority of the students reported that they heard things in the music they listened to that they had not attended to previously.

There can be no rigid placement of problems or instructional materials in music. Children in grade three enjoy the Nutcracker Suite, so do high school seniors, and so do many adults. They probably are not all listening in the same way. Problems chosen depend entirely on the development already achieved by the individuals that confront the teachers, and the same individuals can take appropriate part in the choice of instructional materials.

Those attending the 1953 Music Educators conference recommended a specialized course in theory, harmony, and composition as an elective in all except very small high schools. In addition, they recommended that all high schools offer a broad course called general music. Because the theoretical course will be taught by a specialist in music, it will not be described. The general course will be discussed briefly.

GENERAL MUSIC

THIS COURSE SHOULD BE OPEN to all pupils whether or not they have had previous musical experience. A variety of musical activities should be presented, including actual singing and musical performance as well as listening. Not all the listening should be to records or to tapes. A variety of teaching techniques might include discussions, visits to musical events and sources, demonstrations by local artists, and performances by class members. Such a course provides a splendid opportunity to integrate music with English, social studies, science, mathematics, and other subjects in the

curriculum. The music educators recommend that the general music course be required in grades seven through ten.

COLLEGE

IN COLLEGE AND UNIVERSITY, the dual problem of general and special music education is encountered, especially in the lower division courses. One group of students may be preparing for a musical career, or at least for a heavy avocational emphasis on music; another group may be interested only in general personality development. A number of institutions offer separate courses for the two groups. Those preparing to be composers, conductors, performers, critics, teachers, editors and publishers of music will probably need and be ready for a theoretical course that goes seriously into the various musical forms, problems of harmony, and musical history. Those less professionally concerned will still need, and be ready, to probe deeply, but they will be less interested in technical details and more interested in the philosophy of music especially as it relates to the philosophy of art generally, to the psychology and sociology of music, and to a general increase of musical knowledge and understanding.

Upper-division and graduate courses in music will be specialized and to be worth while should be frankly intellectual.

In this brief section on music education a broad outline of a desirable program has been sketched. Most schools place much greater emphasis on performance, with all musical activities supporting the twin peaks of the high school marching band and the *a capella* choir. There is much to be said in favor of these two activities, but when they take too much of the time and attention of the music teacher and of his talented scholars, the music education curriculum demonstrates a serious lack of balance. A wide variety of musical activities in which the great majority of students are able to take part seems a more desirable and fitting goal.

ART

IN APRIL, 1956, at a UNESCO conference in San Francisco between a group of outstanding Asian cultural leaders and

leaders of American thought, Dr. V. D. R. V. Rao, Director of the School of Economics of Delhi, India, charged the United States generally as having an unjustified inferiority complex about its culture.

> No one coming here can escape being impressed by your cultural development—the music libraries in your universities, your art and architecture, your dance, which enjoy larger and more discriminating audiences than anything in Europe. But few people in India know it since all we see are your films. Yes, Martha Graham and Leontyne Price recently came to Delhi and made a big hit. We ought to have more of such things. The Communists are cleverer than you in these matters—they deluge us with cultural missions. Ballet, painting, music are nonpolitical and make for popular understanding. More exchanges between nonpolitical groups, especially of educators, is important. Such exchanges have an added value. We are embarrassed about repaying your material gifts in India because we lack dollars. But in art, ideas, discussion, we can give as good as we get.

This statement is typical of a number made by the visitors to this UNESCO conference and it emphasizes the role of the arts in a troubled world.

Dewey has pointed out, in *Art as Experience,* that in a world of mere flux there is no order, hence, no possibility of aesthetic experience. In a world that is static, and finished, everything is known; fresh aesthetic experience is again impossible. Hence, the moments of passage from disturbance into harmony are life's most intense moments.

In all likelihood, Western civilization is now experiencing such a moment so that despite the heavy emphasis that is being placed on scientific development at the present time, a strong aesthetic development is much more natural and increasing attention to the arts can probably be expected.

"Ah you Americans! Please go on making your beautiful refrigerators and automobiles, but leave painting to us." This remark, attributed in a recent issue of the *New Yorker Magazine* to a Paris art dealer, is typical of an attitude toward American art that is widely held both in this country and abroad. Such scorn is undeserved. While it is true that American society has but recently emerged, first, from its frontier days when there seemed little time

or energy for embellishment and even less for contemplation; and second, from an industrial revolution with its emphasis on material production, the importance of American art is fairly easy to document. Prior to 1776, several world-famous portrait painters were at work in this country, notably including the remarkable Peale family, and a number of these studied in London with a former colonial, Benjamin West. Gilbert Stuart, at about this time, was doing portraits with a freshness and individuality that captured the attention of the critics. Thomas Sully was another well-known portrait painter of the period.

After the winning of American Independence, the landscapes of George Innes, though effective, failed to bring him lasting fame, but the work of James A. McNeill Whistler continues to receive admiration and respect. Probably the most robust expression of American life at the turn of the century was by Winslow Homer. His paintings of the sea display a vigor that no other painter has been able to match. Arthur B. Davies, Rockwell Kent, George Bellows, Grant Wood, Edward Hopper, and Thomas Hart Benton are examples of world-famous American artists who are either still living or who have died fairly recently.

The implied dilemma is also susceptible to direct attack. No apology need be made for American leadership in industrial design. American automobiles, refrigerators, kitchens, freeways, and power stations are often distinctively beautiful. Despite the fact that some of our industrial and public buildings have been designed with too much deference to well-established canons of the past, American architects can be justly proud of many of the newer buildings designed for industry, education, and the government and making full use of the potentialities of steel, concrete, glass, and aluminum. We are justly proud of our many fine bridges, and Frank Lloyd Wright and his interpreters have changed the modest home from an ugly, awkward box, to an effective instrument for family living.

All of this is not to imply that art education in American schools should be confined to a study of American products only, but rather to lend support to the suggestion that art education is important not just for the talented few but to enrich the experience of everyone.

PRIMARY GRADES

As soon as they begin to talk, and sometimes even earlier, children begin to express themselves with form and color. In an earlier day, parents and teachers imposed tight restrictions on the nature of these childish attempts; coloring must always be done between certain lines, a house or tree must resemble a house or tree as an adult sees it. With the development of greater understanding of children and their ways, these restrictions have eased and we find the little ones in nursery school and kindergarten using butcher paper for canvas and their fingers for brushes.

In the primary grades, with plenty of free practice and experimentation behind them, the children are ready for suggestions which will help them to structure and organize the details of line, color, texture, and spatial relations into art products. At the same time, the teacher should be sure that the child is expressing aesthetic concepts that he has made his own and not just performing tricks with pencil and crayon as a dog might for the chance of a biscuit. Suppose, for example, the child insists on drawing two ears and a nose outside the circumference of a circle to represent a head. This is nonsense to the teacher, but before he tells the child so, he should question gently to find out whether the observation has been careless or whether the child is trying to represent an effect as it appears to him. Worse than censuring a childish representation before finding out the meaning from the child, is to tell the child to draw a bird in flight by means of two curved lines meeting at a point, or a tree in leaf by means of a single vertical line with a cloud of fluff on top. These are tricks, and to hand them ready-made to the child is rote instruction which kills initiative and inhibits later growth of aesthetic sensibility. At the end of the primary grades most children have mastered the problem of line relationships. They can draw vertical and horizontal lines, and, in representing a tree, they can draw the branches at almost any angle with the trunk; they can draw curved branches and they can show smaller twigs growing from the branches.

In the primary grades the children use tempera, crayon, and water color for pictorial expression and they draw, often from mem-

ory, scenes that include houses, people, and animals. They also model in clay and plasticine; they cut, paste, and fold paper; they make posters with cut-out letters and pictures and with fold-over block letters. In these early grades come the beginnings of art appreciation when the attention of the children is drawn to form and beauty in their pleasant and attractive environment. Toward the conclusion of the primary grades the children are made aware of a few of the elements of pictorial design.

INTERMEDIATE GRADES

TEACHERS OF INTERMEDIATE GRADES continue to be faced with the problem of how much direction to give the children. The capable teacher will realize the need to respect differences among pupils. All children need to be provided with opportunities for self-expression, and all children are entitled to learn from others. Some children with understanding families have sent down fairly stable roots by the time they reach the fifth and sixth grades. They can withstand the winds of circumstance. Others are still groping and perhaps need telling that a window is a square and a cross. To some extent, they need to be shown how. They cannot stand the responsibility of doing everything for themselves. This is the great mistake that was made by the early progressivists—they put too much responsibility for choice on the young child. While a rigid, uniform system of values is by no means desirable for all children, a few children will find a strait-jacket a pleasant thing to lean back on—they will be able to relax without falling apart.

At the end of grade six, children will have run the gamut of attempts at pictorial expression. They will have tried to distinguish hills and valleys, rough surfaces and smooth ones; they will have used action to make their pictures real; they will have "done" still life; and they will have referred to models and to photographs as sources of information. They will have a growing command of the principles of perspective. The principle of overlapping surfaces is typically introduced in grade five, and shading by means of pencil or charcoal to depict form in grade six.

In their project work for social studies and science units, the children will have made use of developing skills in paper sculpture,

plastic modeling, woodwork, and lettering to construct dioramas, make puppets, put up murals, make time charts, do relief maps, and fashion historical and contemporary models of artifacts, buildings, villages, and towns.

In their study of design, children of the middle grades will become increasingly conscious of repetition, rhythm, symmetry, and grace; they will not only learn to sense order, they will become more and more conscious of how they themselves can create order. It is most important to help children to use their growing power of creativity to enjoy the work of adult artists. A bowl of orange marigolds or a field of yellow mustard can be fleetingly enjoyed by the casual passer-by, but it took the coarse, jabbing brush strokes of Van Gogh to show us how, with the necessary creative effort, we can thrill to the yellow blaze of supplication reaching, reaching for the sky.

JUNIOR HIGH SCHOOL

TO THE END OF GRADE SIX, art was the visual approach to all learning; it was an illustration of a reading lesson, a map in social studies, or a well-arranged written page. To some extent, it stood alone as a set of skills, a body of principles, and a growing cluster of attitudes. In the junior high school, art continues to be the doing and making of projects in other studies, but it is treated separately in a single course—general art. In developing a program for this course, many teachers include units on art in industry, the theater, religion, the home occupations, the city, and the representative art of certain historical periods. A favorite is a unit on architecture which, although given a distinctly separate treatment, can at times be associated with the social studies, and permits the intellectual and manual demands to be suitably balanced according to the interests and abilities of the different children. Some will pride themselves on being able to remember which is the Parthenon and which the Pantheon; others, if mistakenly driven too far in this direction, will struggle and struggle until the inequality of the contest finally kills their interest.

Many junior high schools make use of a collection of up to 250 reproductions of fine paintings. Perhaps the aesthetic appreciation of a few of the children is enhanced if these pictures are merely

left hanging on the walls of corridors and classrooms, but they should be taken down and discussed in the art classes if more than a very few of the children are expected to develop a taste for them. Such discussions should provide a pleasant variation on the printing-with-cork-stopper routine.

SENIOR HIGH SCHOOL

THE MOST POPULAR ART COURSES in high school are general art, poster design, and art appreciation—in approximately the order given. In certain schools, especially those in urban areas, a wide variety of art courses is sometimes offered, including sculpture, painting, architecture, crafts, commercial art, art appreciation, and the art of the theater. Nearly every high school offers the general art course and thus this course will be outlined briefly.

GENERAL ART

AT THE START, students are introduced to elements of composition, and the theoretical discussion usually goes along with practice by the students. From then on, the programs in different schools vary widely, depending on the background and training of the teacher and students. In many of the classes, the students share in the selection of the units of study, and in most art classes all the students spend much of their class time at work on individual projects. In all art courses the general aims are fairly clearly established: development of the creative powers of students as producers and consumers of art products; emotional and intellectual development as shown by a growing sensitivity and the acquisition of taste and good judgment; and ever-increasing manipulative skill.

Evaluation of progress by the students toward these goals is perhaps easily made definite, providing that the goals themselves are made definite and specific. Defining and specifying the goals of art education must inevitably be highly subjective even to the point where the leaders of art education show a large area of disagreement. This disagreement is reduced, to some extent, by the mold of fashion, yet the creative artist is constantly freeing himself and his work from this mold. The question as to the limits of freedom that

are to be set for the student must therefore be constantly on the mind of the high school teacher of art.

Art education, emphasizing as it does creativity and individuality, seems to fit well with the philosophy of education supported in this book, and with current findings of psychologists and sociologists. The major criticism of art education applies to the curriculum generally in that too few students are able to avail themselves of the excellent offerings.

EXERCISES

1. Who are some of the important philosophers in the field of aesthetics?
2. What are the major purposes to be achieved by the study of literature?
3. Why must the appreciation of a fine work of art always be a highly creative process?
4. How can a teacher tell whether a particular work of art is an appropriate subject of study with a particular child?
5. Choose one of the fine arts and provide detailed information, at a given educational level, for appeals to a wide variety of tastes and understandings.
6. What do we mean when we speak of the intellectual quality of art? Can art ever be wholly intellectual?
7. What is the relation of art to industry?
8. What are some of the "common learnings" provided by literature and necessary for social cohesion?
9. Should every child in grade nine be expected to study one of Shakespeare's plays?
10. What are the advantages, if any, of arranging the literary studies of children according to themes?
11. Does the school share any responsibility for the development of an acceptable literary style of writing on the part of any of its pupils?
12. The teaching of U.S. history and U.S. literature in grade eleven is well-nigh universal in this country. What are the advantages? Are there any drawbacks to the scheme?

13. What principles should govern the teacher of literature as he seeks to demonstrate to the pupil the way in which a good writer is able to achieve logic, consistency, and integrity?

14. Discuss the advantages of using an anthology against those of making use of a small number of discrete literary masterpieces.

15. Why is excessive analysis sometimes destructive of the thought that is being communicated in a literary masterpiece?

16. Provide an example from your own experience of wide variation in musical ability among adolescents. Describe the abilities being compared in the necessary detail.

17. Choose a familiar child's song and work out a system of notation.

18. How can the seeds of musical interest be properly cultivated in the junior high school?

19. What can teachers of other subjects do to support the activities of the music teacher?

20. Criticize the music appreciation course that is described in the text.

21. Show how a general music course in high school could be related to a course in your special subject of instruction.

22. List one or two modern American painters whose work is world-famous. Describe their work briefly.

23. Choose a pictorial work of art with which you are familiar and which you like. First, tell why you like the picture, and second, how you think you might persuade others to like it.

24. How can the study of art be expected to contribute to a liberal education?

TOPICS FOR DISCUSSION

1. Exercise of adult will power to persuade the child to practice with sufficient diligence to master performance skills.

2. To what extent can suitable works of art for educational purposes be preselected?

3. Teaching of art in high school.

4. The selection of literature for high school proposed by the San Francisco Curriculum Survey Committee.

5. Use of books of criticism in the development of literary taste.

6. Literature appeals to the imagination, yet the teacher of composition must stress the appeal of reason.

7. Use of contemporary speaking and writing to practice criticism.

8. Communication in the arts.

9. Use of fast learners to teach slow learners.

10. Deliberate fostering of individual talent in the schools is undemocratic.

11. The musical potentialities of most children is not being reached.

12. A specialized music course in theory, harmony, and composition is appropriate in all except the very small high schools.

13. How might young children be helped to develop an interest in abstract art?

14. To what extent is the study of art history appropriate in the junior high school?

15. Ways in which more students may be permitted to study art in high school.

ADDITIONAL READING

Cole, Natalie Robinson, THE ARTS IN THE CLASSROOM (New York: The John Day Company, 1940). *Mrs. Cole believes in releasing the creative spirit. In this book she describes how she did it with one group of nine-, ten-, and eleven-year-olds. They were by no means a clever group, nor a privileged group, but they did some amazing things, painting, working with clay, doing block printing, dancing, and writing.*

De Francesco, Italo L., ART EDUCATION: ITS MEANS AND ENDS (New York: Harper & Brothers, 1958). *A complete summary of the development and literature in this field.*

Loban, Walter, Margaret Ryan, and James R. Squire, TEACHING LANGUAGE AND LITERATURE (New York: Harcourt, Brace, and

World, Inc., 1961). *This book, by a professor and a supervisor of the teaching of English at the University of California and a professor of the teaching of English at the University of Illinois, is designed to clarify the relations among the three aspects of teaching English, purpose, content, and method. Because of the emphasis on thinking and problem-solving, the point of view is close to that of the authors of the present volume.*

Lowenfeld, Viktor, CREATIVE AND MENTAL GROWTH, third edition (New York: The Macmillan Company, 1957). *A general discussion of the creative act is followed by lengthy descriptions of art work at various stages of child development. There are interesting and informative chapters on the gifted and on the therapeutic value of art.*

Richards, I. A., PRINCIPLES OF LITERARY CRITICISM (New York: Philosophical Library, 1925). *This work by one of our most eminent critics is generally recognized as definitive.*

Thompson, Carl O., and Nordholm, Harriett, KEYS TO TEACHING SCHOOL MUSIC (Minneapolis: Schmitt, Hall, & McCreary 1949). *The fact of a tenth printing in 1958 is one indication of the value of this work. It is unashamedly a book of content with songs and activities listed and illustrated for every grade.*

Wickiser, Ralph L., AN INTRODUCTION TO ART EDUCATION (Yonkers: World Book Company, 1957). *After a broad overview of purposes and potentialities, current ideas about art education are explored. Papier-mâché figures, dioramas, painting, drawing, are all dealt with from kindergarten through high school. Profusely illustrated.*

Wilson, Harry Robert, MUSIC IN THE HIGH SCHOOL (New York: Silver Burdett Company, 1941). *A complete discussion of the subject based on the concept that music has an important place in democratic living.*

Ziegfeld, Ernest, ART IN THE COLLEGE PROGRAM OF GENERAL EDUCATION (New York: Bureau of Publications, Teachers College, Columbia University, 1953). *In Part Three, the author synthesizes what has been said about general education in the first part with what has been said about art in relation to the individual and society in the second part. The role of art in general education is thus clarified.*

CHAPTER 12

Health and Physical Education

INTRODUCTION

APART FROM WHAT THEY SEE as two major errors, people who study education generally like the health and physical education program. A number of them would admit to this liking reluctantly because the climate of current opinion has veered strongly to a position influenced more by thoughts of safety for the state than by a consideration of the welfare of the individual. The two errors seen in the P.E. program are, first, an overemphasis on boys' interscholastic athletics and second, a rigid scheduling that provides more time for health and physical education than for any other subject in the curriculum.

On the credit side, the P.E. program emphasizes educational possibilities that the psychologically literate have learned to admire if not revere: emphasis on the learner and his need and interests, provision for individual differences, pupil-teacher planning, all-

round personality development (there is nothing like a grueling game of handball to work off those nasty aggressions), and above all plenty of activity. Instead of denying the accusation that such a position can be described, at least in part, as anti-intellectual, these educators might well set out to prove that national survival depends not only upon intellectual superiority but also upon good physical and mental well-being. A state carrying a large share of its members on either the physical or mental sick-list can scarcely be said to be in fighting trim.

One of the clearest trends in P.E. is the increase in coeducational activities. Whether or not this presaged or followed cultural development, we now find men and women not only dancing together, but fishing, swimming, sailing, bowling, skiing, hiking, and even golfing together. Only vestigial and anachronistic preferences for muscular males and soft females prevents the association from being completely successful.

Those concerned with human health realize more completely than the rest of us that during the millions of years man was evolving to his present mental state, he had, much like any other animal, to fight for his food, his cave, and his mate. But social and biological evolutionary processes run on different time scales. Biological evolution can be recorded effectively with a moving-picture projector that shifts a frame every two or three thousand years, but social evolution, especially in its more highly developed phase, finds a frame a year much too slow. Civilization, therefore, traps mankind with his twentieth-century intelligence and his Stone-Age body. It is essentially the difficulty of reconciling these two selves that produces so much costly physical and mental distress. Unfortunately, the difficulty is often compounded by those who are unable or even unwilling to test the remedies they propose.

SOURCES OF P.E. IN THE CURRICULUM

ACROSS THE MAIN DOOR of the men's gymnasium of the University of California at Berkeley is the motto *Mens sana in corpore sano.* (Oddly enough, *mens* in Latin is feminine!) Here, with its epigrammatic plea for a sound mind in a sound body, is clear evidence for the influence of Greek and Roman thought on

Western civilization. In addition, we find the word *gymnasium* in Latin with the meaning of both "public gymnasium," and "school"; and the word *gymnasion* in Greek meaning "a place for exercise." This odd word is presumed to have been derived from *gymnos,* "naked," because of the need to obtain greater freedom of the body by removing much or even all of the clothing before taking vigorous physical exercise.

Although the leaders of the Renaissance found it necessary to bring much of the learning of the Greeks and Romans into line with the teachings of the medieval church, they found the Greek and Roman acceptance of the body completely at odds with the ascetic's glorification of his soul. Scholastics then and since have displayed an almost pathological interest in mental gymnastics.

Leaders of the Reformation went so far as to soften certain of the ascetic taboos of the church, permitting priests to marry for example, and Robert E. Merton [1] has shown clearly the compatibility between Puritan thought, British empiricism, and the interest in scientific discovery that developed in the seventeenth and eighteenth centuries. At any rate, an interest in games, always so important to the British, was permitted by the Puritan leaders in this country to find a certain degree of expression.

Additional sources of a strong program of physical education in American schools were the Swedish and German interests in body-building exercise: rope-climbing, tumbling, tricks with bars and rings, and calisthenics without benefit of apparatus.

P.E. IN THE ELEMENTARY PROGRAM

PHYSICAL EDUCATION EVERY DAY is prescribed for elementary-school children in certain states. Because P.E. is usually taught by the regular teacher, who teaches everything else, the directive is susceptible to wide variation in its application. There are other visible and effective barriers to a satisfactory P.E. program in the elementary schools.

Many recreational activities call for bodily contact. The danger of injury is much greater than when children sit quietly in a

[1] Robert K. Merton, *Social Theory and Social Structure,* The Free Press, Glencoe, Illinois, 1957, p. 574 ff.

disciplined classroom. In the event of injury the school authority is always liable to punitive damages if the play is unsupervised, and there have been a number of successful pleas where clear evidence was available to show that the play was being supervised.

Many elementary schools, especially in the larger cities, do not have adequate play areas. When large numbers of active youngsters are crowded into an area much too small for their accommodation, healthy swings and kicks at the ball cannot be permitted, and in some very unfortunate situations, ball games must be almost entirely prohibited.

Equipment is sometimes totally inadequate. On the other hand, visitors from foreign countries often marvel at the playing materials provided for American children. More importantly, especially for children in the intermediate grades, many teachers do not themselves possess the rhythmical and athletic skills they are supposed to teach the children. Attempts by a woman of fairly pronounced sedentary habits, charming and motherly though she be, to improve the pitching and batting average of a well-coordinated boy of twelve is something like asking a tiger to take instruction in stalking its prey from an animal accustomed only to tiptoeing across the carpet to sip cream daintily from a clean white dish.

The importance for a boy of the development of bodily skills can scarcely be denied. Even the shy, timid little fellow, picked on by his peers, should be protected by neither the bulk nor the status of an adult. Rather, he has the right to be shown how to improve physically so that he can win a few battles for himself.

The following outline gives a rough idea of the progression of physical activities that can be expected in grades one through six.

Grade 1

a. Singing games such as "Did You Ever See a Lassie?" and "Farmer in the Dell."
b. Supervised use of some of the playground equipment such as slides, rings, ladders, swings, teeter-totters, jungle gyms, large pipes, balancing rails.
c. "It" games such as tag and hide-and-seek.
d. Relay races.
e. The beginning of ball games, moving whenever possible from

individual games like tetherball, jacks, and catch, to team games.

f. Simple stunts such as forward and backward roll.

g. Mimetics such as animal imitations, and simple story plays such as an Indian hunt or a night fire.

h. Rhythm activities based on children's own experiences—tapping like a woodpecker, flapping like a duck, whirling like a top, hopping like a robin, or throbbing like a motor. Later, the children can do rhythms to the accompaniment of piano or drum.

Grade 2

a. Singing games: A wide variety of these is now available and children can enjoy both the novelty of new games and the friendliness of the old ones. Games like "Jolly Is the Miller," calling for general activity, can be interspersed with games like "Drop the Handkerchief," where only one or two are active.

b. Continued use of playground equipment. Traditional use of certain equipment by certain grades can easily be established, and customs acceptable to the children will help the teacher maintain whatever order is needed.

c. Running and hiding games. A rich variety is available in various reference books. When the children are ready, team games like Fox and Geese and Prisoner's Release can be introduced.

d. Relay races. Using beanbags, balls, erasers, and sticks, a growing repertoire can be established.

e. Ball games. Levels of skill attained by each child should be recorded, both to provide motivation and to let the teacher know where help and additional instruction is needed.

f. More stunts. A few children in this grade can do beautiful cart wheels.

g. Mimetics and story plays, e.g., cowboy throwing lasso, helicopter and airplane taking off and landing.

h. Marches, one-steps, and gallops.

Grade 3

a. A gradual reduction in the amount of time spent in singing games during the P.E. period.

b. Continued use of playground equipment.
c. Less time on running and hiding games.
d. Relay races—these are still useful.
e. Ball games—third-graders are ready for distance throws and throw at a target. Simple games like boundary ball, dodge ball, kickball, and hand polo can be used to develop throwing, catching, running, dodging, and kicking skills.
f. More and increasingly complex stunts.
g. Less time on mimetics.
h. Rhythms can now be combined into the simple folk dances.

Grade 4

a. By the time children reach grade four, songs enjoyed will be pretty clearly music rather than P.E. Although singing will continue throughout the elementary grades, it will be classed as a musical activity rather than a P.E. activity.
b. Use of playground equipment and the playing of running and hiding games will no longer be organized by the teacher, though the children must be supervised as they play at noon and at recess.
c. Relay races continue—the children should have a repertoire of nearly twenty varieties.
d. Children of this grade will enjoy a wide variety of simple ball games: one-eyed cat (scrub), pin soccer, and playground baseball will provide an easy transition to baseball and soccer, and dodge ball, triangle ball, and the like can be used to continue the development of skill.
e. Stunts will now include push-ups, chinning on the bar, hanging by backs of knees, hanging by toes, as well as many other individual stunts. The simpler stunts using two or more pupils can sometimes be introduced in this grade.
f. Mimetics have merged now with the dance.
g. Rhythms have become folk dancing.

Grade 5

Activities can now be classed as athletic events, athletic games, and rhythms, with increasing emphasis on personal fitness and achievement.

a. Races, stunts, and other demonstrations of skill and ability should be included in each day's activities and records kept of individual performances.
b. Oddly enough, the children will want to spend more time on fewer games, and in a few of these the girls and the boys will separate.
c. Many folk dances will be pleasantly familiar. A few new ones can be taught for the needed variety.

Grade 6

a. In this grade, jumping one-hand shots at the basket should be common. Many boys and girls will be able to do the handstand, each will know his time for the dash of 50, 60, or 70 yards, his distance for the broad jump, and his height for the high jump.
b. Group games will include baseball, soccer, and volleyball. Intramural leagues will be operating. Some of the children will be playing tennis and others, when facilities are available, will be swimming.

P.E. IN JUNIOR HIGH SCHOOL

BY THE TIME BOYS AND GIRLS reach grades seven and eight they will probably move to a high school where they will be separated during the physical education period except for some coeducational games and rhythms. These will now include both social and folk dancing. Most junior high schools are provided with a gymnasium, many have swimming pools, and the athletic fields are increasingly spacious. Physical education will be taught by specialists, a man for the boys and a woman for the girls. Except for lower emphasis on interscholastic competition, the program will be nearly the same as that for the senior high school.

There is a steadily growing need, in the junior high school, for team-type games where group loyalties can be fostered and where the hunger for group support can be, to some extent, assuaged. It is in the junior high school that the girls especially, and to some extent the boys, begin to demand instruction in good grooming, social poise, and acceptable manners. These needs will grow more, rather

than less. Hence, discussion of the P.E. program in secondary school will include that in the junior high school.

BOYS' P.E. IN SECONDARY SCHOOLS

WITH A GYMNASIUM, locker room, showers, field house, and large outdoor play area, including both hard and grass-covered surfaces; with tennis courts, and in many instances a swimming pool, the director of the Boys' Physical Education Department in a large city high school has the facilities needed for a varied and complex program of activities. He himself is likely to be the coach of the varsity football team and he will have a number of assistants to help him with instruction in physical education. In turn, each of these men will be responsible for coaching one or more teams engaged in interscholastic competition. Where possible, the team players will be scheduled for P.E. the last period of the day so that the time can be merged, as needed, with the after-school practices for competition. Interschool games will be played usually in the afternoon or at night if an illuminated field is available. Varsity games, especially of football, will be followed with enthusiastic interest not only by fellow students, but by adults as well, many but by no means all of whom can be expected to be graduates or at least alumni of the school. These adults, a number of whom may have achieved high status in the community, like to see the local team win, so that the head coach can easily come to feel that the scoreboard is the measuring instrument by which his work is evaluated. Production of winning teams, when the competition is stiff, calls for much planning and effort on the part of the coach as well as on the part of the players. When too much of the energy of the P.E. instructors is bled off in this direction, only desultory planning of activities for the rest of the boys can be expected.

Most classes for P.E. are nearly twice the size of academic classes. Schedule-makers seem to feel that wholesale dumping of scores of boys into the P.E. class is a justifiable way of simplifying their annual acrostic. Principals and superintendents regard the existence of large P.E. classes as a necessary balance to extra thin classes in physics and advanced languages and mathematics. Justifiable or not,

the large groups for P.E. make planning, instruction, and supervision increasingly difficult.

When to these two points a third is added, to the effect that P.E. activities are essentially play activities, the offhand nature of at least part of the lesson planning is understandable although it may not be desirable. By and large, programs in smaller schools appear to be reasonable facsimiles of those found in the large urban centers.

Most schools are able to provide sufficient space to accommodate all those in the P.E. class either inside or outside. Both the gymnasium and one or more classrooms can be used.

Schools with separate gymnasiums for boys and girls, and with the necessary free classroom space, are able to house the children properly during inclement weather. However, in parts of the country where the winter climate is mild, enrollment pressures sometimes make it difficult for the schedule-makers to hold enough space, and the instructors are forced to make shift with corridors and covered walks if they want to keep the children dry. Flexible plans must be prepared to keep the program from deteriorating badly at such times.

With a wide variety of plans there must be access to a variety of equipment. Some schools engage the services of a property clerk to keep track of it. In other schools the role of property custodian is rotated among certain responsible students. Where facilities permit students to shower and to change clothes, distribution of towels is a similar concern and adult supervision must be provided in locker rooms. In secondary schools a fresh problem is introduced that often affects boys as well as girls. Certain religious sects prohibit exposure of the body, so that students belonging to these sects must be afforded privacy while changing and bathing, or they may even need to be excused entirely from the more vigorous games and activities. Other groups oppose rhythms and first aid. The beliefs of these sects must be accepted.

Numerous factors govern the selection of activities for the P.E. class, including the following:

1. Inherent interest and level of skill of students.
2. Teacher load.

3. Facilities of space and equipment.
4. Time allotment.
5. Climatic conditions.
6. Community mores.
7. School traditions and customs.
8. Skills and interests of teachers.
9. Desires of students to achieve personal fitness.

Because the factors vary from place to place, selection and grade placement of activities must continue as a local concern. In general, the program will include a wide variety of individual as well as group athletics, and rhythms. In general, instructors must try to make use of all facilities on a year-round basis, a principle which means that the majority of students will be playing games that are out of season. The basketball court, baseball diamond, football field, and swimming tank must all be occupied whenever the weather permits. Incidentally, modern youth, though learning to enjoy outdoor activities in the snow, is brought up to believe that exposure to the rain is invariably harmful and unpleasant; this superstition seems to be most prevalent where the annual rainfall is comparatively small.

Aside from his important role as planner and organizer, the P.E. instructor is called upon to teach physical and social skills. Instruction in the former should include demonstration of form by the instructor, by advanced students, and by motion pictures; actual physical assistance to the student, guiding the placement of fingers and the like; the use of inanimate objects such as tackling dummies and plastic golf balls; the use of mechanical devices to restrict the action of the learner; and plenty of verbal interaction between teacher and pupil while the particular activity is under way. With a large class, and with much on his mind, the instructor fails most often in this important aspect of his work. He usually succeeds in helping but a few of his students and these may be the best performers only.

More and more instructors of boys are cooperating with women instructors and combining classes for teaching modern and folk dancing. Coeducational activities in P.E. seldom extend to volleyball and swimming. Where skiing is part of the curriculum boys and girls are sometimes found together, but instruction and prac-

tice in the art of skiing usually takes place out of regular school hours and so is more properly considered to be an extracurricular activity.

GIRLS' P.E. IN SECONDARY SCHOOLS

WOMEN TEACHERS OF PHYSICAL EDUCATION have experienced a high degree of success with the use of teaching assistants from among the senior girls. In addition, intramural competition is such that it develops naturally from the regular instruction in P.E. and demonstrates few of the evils that have developed from an overemphasis on interscholastic athletics among the boys. Yet the play days, sports days, aquatic days, and dance festivals enjoyed by the girls provide plenty of opportunity for top-flight performance and at the same time there is little danger that these appendages will rock the rest of the educational enterprise.

The program can be divided into two parts. The first part contains those electives in which many students can be expected to participate; the second part lists the less common electives. In some schools the intramural program is sufficiently well developed to constitute a third part.

A. COMMON ELECTIVES

1. *Ball Games*
   - Basketball
   - Hockey
   - Soccer
   - Speedball
   - Softball
   - Volleyball
2. *Dance*
   - Modern Dance
   - Coeducational Dancing
   - Folk Dancing
   - Ballroom Dancing
3. *Swimming*
4. *Court Games*
   - Tennis

Badminton
Table Tennis
Paddle Tennis
Aerial Tennis Dart

5. *Recreational Games*

B. Less Usual Choices

1. Archery
   Bowling
   Golf
   Horseshoes
   Croquet
   Deck Tennis
2. Ice-Skating
   Rollerskating
   Skiing
   Tumbling
3. Lifesaving
   Recreational leadership, and P.E. leadership, officiating at team sports
   Drill teams
   Baton-twirling

As in boys' P.E., the plans should be made locally and in consideration of much the same factors that were listed for the boys. Generally, skills needed to play games should be tougher in grade nine (if they have not already been learned) and the emphasis in the upper grades should be on skill improvement. Cards to record progress in skill acquisition should be maintained for all individuals. Inevitably, certain girls will be inactive from time to time in the P.E. class and these girls can be used to keep the skill cards of other girls up to date.

Evaluation of a girl in the subject of physical education should be broadly based. The base might well include improvement in specific skill, demonstrated knowledge of rules of play, participation growth in self-direction, and social skills.

Rainy-day activities might include social recreation, game construction for home use, the learning of officiating and scoring tech-

niques, and the construction of visual aids, as well as films, discussion, and written work.

Rhythms and the dance make up more than a third of the activities for secondary-school girls. Sports and games come second in frequency of use, third aquatics, and fourth gymnastics.

HEALTH EDUCATION

HEALTH EDUCATION is admittedly important but it is seldom offered as a separate subject even in highly departmentalized secondary schools. Certainly, in elementary schools, health education is taught by the regular teacher and fully incorporated into the ordinary classroom and playground procedures. Each elementary-school teacher has the responsibility of checking carefully to ensure the inclusion of health topics in the daily lesson plans. For example, the need of a supply of potable water is naturally included in a unit on the western movement; studies of local, state, and federal government almost invariably call attention to departments of health and of sanitation. Units on the care of animals provide numerous opportunities for the alert teacher to call attention to problems of human health; studies of plant and animal physiology lead naturally to lessons concerning human physiology.

In the secondary school, attention to health topics is given by so many departments and officers that some form of coordination is highly desirable. General science and biology courses include numerous references to human health. Classes in homemaking can be expected to pay a great deal of attention to health problems. Specific attention to first aid is often given in classes in physical education. Social studies in grade twelve, usually called Senior Problems or Problems of Democracy, includes problems that may be regarded almost exclusively as health problems, and many other problems selected for study involve decisions concerning human health. The school nurse, the doctor, and the dentist will teach health to the students, at least informally, and the schools should be cognizant of the great amount of health education taking place as the result of activities by persons and agencies outside the formal program of the school.

There is a need to correlate these numerous activities. To do

so, each school should appoint a member of the faculty as health coordinator. Because the major emphasis on health instruction will be in either the physical education, homemaking, science, or social studies departments, the health coordinator will probably be a teacher from one of these. Appointment of the nurse as health coordinator is probably undesirable. She is already deeply committed. The opportunity should be taken to choose one of the regular faculty members.

This coordinator will work closely with the health educator, who is usually appointed on a district, or county-wide basis. The salary of this person is paid either from public funds or from those at the disposal of voluntary health agencies.

Both the coordinator and the health educator will probably find an advisory School Health Council helpful in many ways. A membership list for such a council is not difficult to imagine and would probably include:

Superintendent	*Teachers of:*	Psychologist
Local Health Officer	Health	Counselor
Health Coordinator	P.E.	Custodians
Principal	Biology	Students
School Doctor	Homemaking	Parents
School Nurse	Special Education	Community
School Dentist		Representatives
Chief of Police		

The duties of this council would be to advise the school and other agencies on health matters, especially those involving children; to provide the necessary liaison among the many public agencies directly or indirectly concerned with health problems; to assure the necessary status to any program that is launched; and generally to promote health and safety in the local community. One of the most promising methods of leading a heterogeneous group of this kind toward constructive discussion is to carry out a survey of the health and safety needs and interests of the students and to provide the members of the council with a summary of the findings.

AIMS OF P.E. AND HEALTH

THE AIMS OF HEALTH and physical education, while not entirely distinct from those of education generally, have at least a distinct emphasis. To an extent, instructors in health and physical education are concerned, for example, with teaching pupils to think critically, and to make use of values to determine choices of behavior; but essentially, the concern is with the body. Two aims have been mentioned repeatedly:

1. To develop and maintain each individual to his highest level of physical efficiency and fitness—an aim which must include mental as well as physical health.
2. To lead each to accept and understand his body.

In the pursuit of these two inclusive goals, goals such as the two already mentioned, critical thinking and the use of values, may be kept in view. Others would be:

1. The development of interest in satisfying recreational activities.
2. The development of social skills.

In health and physical education, perhaps more than in other areas, the purpose of the high school program must be to get students to take control of the physical side of their lives in an intelligent manner and in such a way as to promote full integration of their personalities. Perhaps one of the great evils of an age in which there is an overspecialization of activities, not only vocationally but avocationally as well, is an inability on the part of many to come to terms with their own bodies. The office worker who sits in his office chair all day comes home and instead of engaging in some sort of vigorous activity that will stimulate and exercise his various organs, he sits all evening before the television. Is it remarkable that he grows paler and pastier by the day, that his digestion troubles him, and that he early develops circulatory difficulties? Boredom drives others to unhealthy excesses of one form or another, and their plight compares most unfavorably with the satisfaction of those whose work and play activities are harmoniously arranged. Not only is the

stress on the people themselves reduced by such harmony, but also the lives of those around them, families, friends, and fellow workers, are made easier.

CRITICISMS OF THE P.E. PROGRAM

ASIDE FROM THE TWO MAJOR CRITICISMS made earlier in the chapter, namely, an overemphasis on interscholastic athletics and a too-rigid time schedule, the failure of health and physical education activities to become completely integrated, first with the rest of the high school program, and second with the life of the community, must be recorded. In all probability, blame for this aloofness must be attached to the entire administration and faculty as well as to the departments under discussion. Unfortunately, spreading the blame does not dilute the harmful effects on the children.

SUGGESTED MODIFICATIONS

LOCATION OF THE BLAME for difficulties observed does provide cues for the removal of these difficulties. A most important suggestion for a school is therefore the establishment of an advisory council to deal with policies concerning health, safety, and physical education. This council should include among its list of members those able to link school activities with community activities. The spectacle is a sad one of adult public health agencies conducting an operation completely apart from school health agencies; of adult recreation facilities standing idle all day and crowded all night, while the school playgrounds are equally packed during a part of the day; of the school nurse giving children advice while their parents insist they do just the opposite; and of the school physician insisting that children with colds stay home while the teachers force children who have missed work to "make it up." Fortunately, it has been proved conclusively that an active council provided with the necessary administrative support, is able to alleviate many, and sometimes all, of these problems.

A second major suggestion is that a more flexible scheduling of health and physical education activities be adopted. The modi-

fication and ignorance of the physical side of life still prompted by the asceticism of the scholastics is by no means advocated, yet the equally ridiculous point of view that a nation of healthy and vigorous citizens can be guaranteed, or even encouraged, by legislation requiring daily periods of physical education in the schools, is likewise repudiated. If schedule-makers were willing to vary the daily timetable, such legislation might be less harmful. What the schools must do is to develop within each child a feeling of responsibility for the care of his own body.

Hence, a third suggestion is that program and activities be worked out in cooperation with student leaders and with the community recreation department. Only thus can any extensive carry-over into adult life be expected. Boys and girls must be consulted together. These are several reasons for this: a part of the activities should be coeducational so that future husbands and wives shall be ready to play together; respect must be developed for skill in golf and swimming as well as big-time football; and the girls must learn that there are times when men need to separate themselves as a group, and perhaps learn the reasons behind these needs. Another important reason for cooperating with students is that all of them are entitled to instruction in various skills. The busy instructor can never find time to give personal help to each student by himself. Like the music teacher, he must adopt the slogan of the educational frontier, "Let each one teach one." None must be condemmed to a life of awkward struggles in the water, wild swinging on the golf course, or tip-tap on the tennis court. Participation in these activities is so much more thrilling when one has mastered the dive and the six-beat crawl, has broken ninety, and can deliver a smashing nonreturnable serve at least occasionally.

A final suggestion is that all recreational activities be carried on outside of regular school hours. When the recreational aspects of games and sports is emphasized, many of the criticisms made are voided. Class time in health and physical education can then be devoted to the serious pursuit of a most important aim of education—the development of a fit, healthy body for every child, and a deep concern on the part of all for the maintenance of a physically healthy and well-coordinated person.

EXERCISES

1. Detail a program of exercise suitable for you. Do you carry this out?

2. To what extent do people vary in their need for exercise?

3. How can the work of physical education and health be related to the decision-making theme of this book?

4. Contrast the modern view of accepting the body as an integral part of the personality with the ascetic view of the Middle Ages.

5. What games were played in this country in the seventeenth and eighteenth centuries?

6. Trace, briefly, the historical development of one of our major sports.

7. Discuss the conflict of masculine and feminine attitudes that may arise in some aspect of the physical education program.

8. Outline a course in home and family living. At which grade level would such a course be most appropriate?

9. What are the liability laws in various states regarding injury incurred by children during exercises conducted under the guidance of the teacher?

10. What is the law in your state regarding the amount of play area that must be provided at a given school? Is this law ever disregarded?

11. Bullying is still a problem in most schools. How could the teacher deal with this problem?

12. Work out what you consider to be a good program of physical education for the grade level you expect to be teaching.

13. List the arguments in favor of teaching everybody to swim before they leave high school.

14. What are a few ways in which the study of health problems can be made interesting?

15. How can the study of health be related to another discipline, the teaching of literature, for example?

16. What can the teacher do to help the children develop useful and appropriate health attitudes?

17. What community groups should be represented on the school health committee?

18. How can the physical education instructor make effective use of student assistants?

19. What are some useful physical education activities for inclement weather?

20. Should there be a health committee for each school in a large district?

21. What devices are available for collecting health data from students?

TOPICS FOR DISCUSSION

1. Boys' interscholastic sports.

2. Compulsory daily periods of physical education.

3. Separate health courses as opposed to a discussion of health problems in science and social studies courses.

4. Ways to increase the mutual enjoyment by men and women of leisure-time activities.

5. Human bodies are out of date.

6. Problems likely to be encountered through the need to "dress" for gym.

7. How to deal with the problem of fighting in a school that is essentially composed of children from lower-class families.

8. Sex education in the junior and senior high school.

9. Teaching children and young people to play should not be the function of the school in America.

10. Variations with which good health is held in estimation by various groups in our society.

11. Night football games bring too many discipline problems and should be discontinued.

12. Intramural, as opposed to interscholastic sports.

ADDITIONAL READING

Bernard, Harold W., MENTAL HYGIENE FOR CLASSROOM TEACHERS (New York: McGraw-Hill Book Company, Inc., 1952). *The book grew out of questions asked of the author as he gave instruction in mental hygiene. Hence some of the sections seem, at first glance, to be irrelevant. For example, an entire section is devoted to the mental health of the teacher. Another section deals with questionable school practices, among which is the "fragmentation of knowledge." On the whole, however, the author is successful in tying it all together by relating these topics to the mental health of students.*

Bucher, Charles A., and Reade, Evelyn M., PHYSICAL EDUCATION IN THE MODERN ELEMENTARY SCHOOL (New York: The Macmillan Company, 1958). *A useful general overview for the teacher in the elementary school.*

Cowell, Charles C., and Schwehn, Hilda M., MODERN PRINCIPLES AND METHODS IN HIGH SCHOOL PHYSICAL EDUCATION (Boston: Allyn & Bacon, 1958). *Written for teachers, this book develops a plan based on known facts concerning skill development.*

Grout, Ruth E., HEALTH TEACHING IN SCHOOLS; FOR TEACHERS IN ELEMENTARY AND SECONDARY SCHOOLS, third edition (Philadelphia: W. B. Saunders Company, 1958). *For teachers in training as well as for those in service. Contains many practical suggestions.*

Haag, Jessie H., SCHOOL HEALTH PROGRAM (New York: Henry Holt & Co., Inc., 1958). *Stresses the need for a related health program in the schools, including instruction, health services, and community resources. Recognizes the importance of, and gives due consideration to, the health of teachers and students, especially as affected by organization and operation of the school itself.*

Kaplan, Louis, and Baron, Denis, MENTAL HYGIENE AND LIFE (New York: Harper & Brothers, 1952). *Aimed at the notion that there can be no rational, moral society until there are rational, moral individuals, and second, that the development of such*

individuals is a process which every person must make his own responsibility. Although the book is soundly based, the writing is generally nontechnical.

Layman, Emma McCloy, MENTAL HEALTH THROUGH PHYSICAL EDUCATION AND RECREATION (Minneapolis: Burgess Publishing Company, 1955). *Covers the research on a wide range of topics such as personality development, and from this deduces the role of the physical education director as counselor. Numerous case studies make for ease of reading.*

National Commission on Safety Education, HOW EXPERIENCED TEACHERS DEVELOP GOOD TRAFFIC CITIZENS (Washington, D.C.: National Education Association, 1958). *A compilation of anecdotes illustrating the subject matter.*

National Safety Council, ACCIDENT FACTS, 1958 (Chicago: The Council 425 North Michigan Ave., 1961). *Statistical information is published annually.*

Patty, Willard Walter, TEACHING HEALTH AND SAFETY IN THE ELEMENTARY GRADES (New York: Prentice-Hall, Inc., 1940). *The fact that this book was reprinted in 1951 is an indication of its usefulness over more than a decade. All of the devices for driving home the lessons of health and safety in the elementary school are carefully explored.*

Voltmer, Edward F., and Esslinger, Arthur A., THE ORGANIZATION AND ADMINISTRATION OF PHYSICAL EDUCATION, third edition (New York: Appleton-Century-Crofts, 1958). *A fairly exhaustive treatment at both the elementary and secondary level. Special attention is given to extracurricular activities.*

CHAPTER 13

Business, Vocational Education, and Industrial Arts

BUSINESS EDUCATION

BUSINESS EDUCATION in the secondary school is that part of the total program of education which develops understanding, attitudes, and skills used in conducting business affairs, improving business relationships, and working effectively in the business world. Everyone needs some knowledge of the fundamental skills of business. He purchases merchandise, insurance, and services. He contributes to social security. He pays taxes. And he votes on issues that have to do with his economic life. A worker in industry, business, or the professions needs an understanding of our economic system and its relationship to the American standard of living. Basic business introduces pupils to the services and functions

of business and the occupational opportunities in the business world.

Seventeen thousand occupations have been definitely listed by the U.S. Employment Service. Fifteen hundred of these are in the area of business. In 1900, 8 per cent of our gainfully employed persons were in commercial pursuits. By 1950, 29 per cent were in commercial pursuits. Three to four times as large a percentage of the population today is engaged in commercial jobs as in 1900. This indicates a considerable growth in demand for business, commercial, and distributive trades employees. That the basic training for these pursuits should be provided by the public schools is a belief held and put forth by many.

Some business and vocational training is important to all persons, men and women, regardless of their interests in pursuing business training in the schools. For example, the development of the income tax has made it necessary for every individual to know the rudiments of simple bookkeeping and simple statistics. The skill of typing, which has the largest enrollment of all business subjects in the secondary schools, has become an interesting and useful skill for nearly all persons. In order to be able to live on an income, a person should be familiar with simple budgeting procedures, should be concerned with relative costs, profit and loss, distribution of income, expenditures of income for products, for taxes, and so on.

Whether the person is to be a consumer, an employee, a small-business owner, a producer, or a specialist in science or in social sciences, it is essential that he obtain some business orientation, vocational orientation, and basic knowledge required in business communication, purchasing, selling, and business economics. Related to this is the need to know about stocks and bonds and other forms of investing, about saving and borrowing.

The business curriculum, although important to some degree in the early academy, came into the modern secondary school program during the 1920's. Typical subjects in the business education program are typing, shorthand, bookkeeping, business arithmetic, and business English. In many ways business arithmetic has become an important supplement for many youngsters to the regular arithmetic program in the grades. Business arithmetic is concerned with denominate numbers, percentages, purchasing, and business termi-

nology generally, and has expanded the breadth of the regular arithmetic program.

For those working toward a career in commercial occupations, important areas of study in the business education program in the schools will develop clerical and managerial skills, and a knowledge of merchandising and buying.

The typical business education program includes orientation training through teaching ordinary business skills, provides specific information for occupational guidance, develops skills for those who seek employment in the areas of business and distributive trades, provides occupational rehabilitation for many persons seeking a change in their occupational future, and provides consumer education.

The *Biennial Survey of Education* has revealed that, at the present time, approximately 27 per cent of the students in U.S. high schools are taking trade and vocational courses, and 58 per cent are taking business courses of one type or another. The demand for this training can readily be sensed by these statistics. For example, as many pupils are enrolled in business courses at the present time in the secondary schools as are enrolled in science courses; as many pupils are enrolled in trade and vocational courses as are enrolled in algebra courses in the secondary schools.

Typing, as mentioned before, has the largest enrollment of all business education courses. Bookkeeping is taken by approximately 8 per cent and shorthand is taken by approximately 8 per cent of our students in any one year. The rise of the junior college in America has had as one of its major functions the development of further necessary skills in specialized trades, vocations, and business. The terminal education program of the junior college is specifically designed to aid in the development of employable skills and trades in vocations and business. Business colleges, per se, have become well-established schools, although generally operated on a private basis.

Many of our state colleges are providing trade, vocational, and business courses for further specialized training. Thus, trade, vocational, and business education have become respected parts of the American school curriculum.

THE JUNIOR HIGH SCHOOL COURSE

THE SPECIFIC COURSE titled Business Education is customarily a ninth grade course. It is a combination of typewriting and business information which is designed for those students who do not plan to major in a field of business in high school or who wish to explore the vocational opportunities in business. The course is usually taught on a personal-use basis in order to provide each student with enough typewriting skill to make possible personal use of this means of communication, and to give him a knowledge of business situations, the services they provide, and the advantages of the profit and loss system.

The basic business education course is a general education course. When a pupil has participated successfully in the learning experiences of the basic business course, he should be able to type letters, themes, and so forth, with sufficient speed and accuracy to satisfy personal needs. He should understand some of the different systems of filing and indexing. He should be able to use business services, such as transportation, communication, and banking. He should understand the general principles of insurance and the importance of insurance in personal and business life. He should appreciate more fully the importance of careful and accurate spelling and arithmetic in the business world. He should recognize the numerous employment opportunities in business, and should know the educational requirements for beginning jobs. He should recognize more fully his own aptitudes, abilities, skills, and interests, especially in terms of the occupational opportunities in the field of business. He should appreciate the importance of business in a free enterprise system. Most important, he should understand that, in business, one must be able to get along with people. He should know that personal attributes are important to success in business. He should cultivate dependability and courtesy. He should understand business standards and ethics. He should understand that budgeting and thrift are essential to a satisfactory home and family life, as well as to business.

Although a basic business course is generally offered at the ninth grade to any student who wishes to enroll, and, as one can

readily see, the purposes of the course would be applicable to all students and the needs of most of us in our working lives, too few students actually take this general education course. Many schools, realizing that the needs of more students should be served in these essentials, have attempted to infuse elements of this course into the social studies program or other orientation programs in the school, which traditionally are taken by a larger group of students.

Whether a student takes a basic business course in the junior high or senior high school, it is essential that, at some time in his preparatory years, the modern youth should have some type of exploratory program which includes an investigation into the nature of free enterprise, business economics, the nature of business, its purpose, its scope, its organization, its opportunities, its requirements, and its place in our total lives. Students should be helped to recognize more clearly their own interests, aptitudes, and abilities so that they will be able to make a more intelligent selection of achievable occupational goals. Those interested in pursuing sales, clerical, distributive, or other business careers should be given information concerning further opportunities available for business training in the senior high school.

HIGH SCHOOL COURSES

VOCATIONAL TRAINING AND BUSINESS EDUCATION are offered as a major program in senior high schools and are being taken by a considerable number of the students. However, some of these skills are essential and some of these understandings important to the daily life of all of us.

As mentioned earlier in the chapter, typewriting has become an important tool of communication in modern society. The standards required are those which enable the student to use a typewriter effectively and to use it as a tool in the transcribing and communication of his thoughts and information. When a pupil has participated successfully in typewriting, he should be able to type by touch with sufficient accuracy and speed to satisfy personal needs. He should be able to arrange his material so that there is an orderly, steady flow of work through his machine. He should apply the rules for spacing, for punctuation marks, and for typewritten copy. More

important than this, he should be able to type letters, manuscripts, post cards, themes, and other materials. Of course, a person entering the business world as a profession should develop typewriting skills to as high a perfection as his reaction time will permit.

In general, the senior high school program provides for students who are definitely interested in pursuing business careers a choice of four vocational curriculums which will prepare them for entry into jobs in business offices upon graduation and which will provide a foundation for advanced training in their chosen fields of business. These curriculums are in the fields of bookkeeping, general clerical, stenography, and merchandising. Important new fields which are developing for career business people are business law, taxation, and industrial engineering.

A business education provides students with an understanding of the requirements and opportunities in various business occupations. It aids in the selection of an occupational goal with due regard to the individual's aptitudes, abilities, and interests. Business education helps students to understand the place of business in the international economic structure. It helps them to realize the interdependence of many factors of production and distribution. Courses dealing with business laws and customs, business forms and procedures, and the code of business ethics are becoming increasingly significant. They provide an opportunity for the practice of desirable habits and attitudes for effective group relationships. Many of the activities should provide youth about to enter the business world with an understanding of business problems and the ability to develop the necessary skills for contributing to the solution of economic and business problems.

Business education should also promote the concept that effective citizenship requires the acceptance of civic responsibility and participation in the general affairs of the community. Thus, it supports and strengthens the social studies program of the school.

Aside from the mechanics and routines necessary in the various four curricular areas of business education, there are many other elements which contribute to the general over-all development of the individual as an active, thoughtful, and participating member of society. For example, in bookkeeping, the student should:

1. Develop a better understanding of how a business enterprise functions and how the various departments work together and depend on each other.
2. Understand the steps in the bookkeeping cycle.
3. Be able to analyze and record business transactions systematically.
4. Be able to understand the relationship between the cash account in his book and his bank account.
5. Recognize the purpose and use of more common business papers or vouchers, sales tickets, sales invoices, purchase invoices, and credit memorandums.
6. Recognize the importance of systematic and precise work habits.
7. Be able to prepare profit and loss statements for small-business enterprises and for himself as an individual.

It is especially essential that he understand withholding taxes and social security taxes as encountered in business and in private life. He should understand the importance of the use of machines including electronic devices and their application to recording processes, and the way they can serve to expand the record-keeping processes of our society to meet the needs of a rapidly expanding economy. He should learn self-confidence and respect for his own efforts and should realize that nothing is accomplished without work.

INDUSTRIAL ARTS

JUST AS THERE ARE general education courses in high school departments of commerce, so there are general education courses in shop departments. These courses are usually called Industrial Arts, to distinguish them from other shop courses designed more specifically for the purpose of vocational preparation. In business education departments, the distinction between courses for the general student and for the student about to embark on a business career is not always clearly distinct, and so it is with shop courses. Discussion of the shop courses will perhaps be easier if a description of the "industrial arts" courses provided for the general student,

including many of those in the college preparatory program, is separated from a description of the more specifically vocational courses. It should be kept in mind that many pre-vocational students take courses in industrial arts.

Courses in woodshop, machine-shop, auto-shop, printing, and vocational agriculture are available in many American high schools, but the educational possibilities of these courses are far from being realized. Perhaps the generic names industrial arts and vocational arts have much to do with the difficulties that have appeared. Blue-collar jobs are sensed as being not quite as good as white-collar jobs; hence education for a blue-collar job is considered, by some people, to be less worthy than other forms of education.

History works severely with industrial courses despite their introduction by the famous Benjamin Franklin. The word seems definitely to be that if you cannot quite manage the academic courses, you take manual arts. If you cannot display the intellectual vigor needed for algebra, German, and chemistry, you had best play around making things in the shop.

It might well be that the reason for this is that some students prefer shop to sitting. Or they may be unwilling to spend hours memorizing symbols they don't understand. Whatever the cause, the result is that the educational potential of industrial arts courses is sadly overlooked. For it seems clear that in industry, especially American industry, art and science have long been happily united and that a similar synthesis is possible in education.

Perhaps these courses should be referred to as engineering arts. They certainly should not be regarded as a dumping ground for poor students; and they certainly should not be regarded more as preparation for a trade than a profession. Even as they are at present, a course or two in shop seems highly suitable for the college preparatory boy or girl. For in a course where they create objects with their own two hands they distinguish clearly and sharply between success and failure, good and bad, and theory and practice.

There is no reason why shop courses cannot be upgraded sharply in the sense of making them more demanding on the intellect of the student. All projects should be started as original designs. The student should be made to face up to his problems and to think them through. Problems chosen should be such that mathe-

matical ingenuity is required to solve them. Much searching through books should precede the actual production.

Shop teachers with the needed education, skill, and enthusiasm are rare indeed. Until more of these men and women are found and given the opportunity for imaginative leadership, some of our most expensive classrooms will continue to serve a second-rate clientele in a routine fashion.

ELEMENTARY GRADES

INCREASINGLY, IN RECENT YEARS, hammers, saws, pliers, screwdrivers, and even wrenches have found their way into the regular elementary classrooms, these erstwhile strongholds of femininity. Projects and enterprises have meant the reincarnation of the orange crate and the girls soon found they couldn't do it all with a hairpin and scotch tape. The spectacle of a silk-clad knee holding down a board for sawing is reasonably common and there is a growing army of both sexes that wields a hammer with two hands firmly clutching the handle.

Seldom is woodshop taught as a separate subject to any children in the first six grades. Few of the classes are taught by men teachers and not all of the few men are skilled in the manipulation of hand tools. Hence, except for some attention to what is probably best referred to as arts and crafts, there is almost no teaching of industrial arts prior to the seventh grade.

JUNIOR HIGH SCHOOL

MOST JUNIOR HIGH SCHOOLS have at least a woodshop and a metal-shop. Many of the older schools have a printshop as well, and a number of schools, both old and new, have a shop for teaching leather-work, copper-beating, plastic-cutting and -shaping, pottery-making, and other arts and crafts.

The woodshop is nearly always equipped with power tools; table saw, band saw, jointer, drill press, shaper, and one or more turning lathes. There are six or eight woodworking benches equipped with vises, one on each side, and jack planes, squares, braces and bits, hammers, chisels, and other hand tools are available

from the locked toolroom or wall cabinet. In many schools, a hydra-headed system of exhaust pipes sucks the sawdust away from the tool as rapidly as it is made.

In these rooms certain of the boys, and on rare occasions, a girl or two, elect to spend one period daily for a semester. Plans vary with different instructors. In very few junior high school classes are all students expected to work systematically through the same set of models. Nearly as rare is the junior high school shop in which all students work independently on models and projects freely selected. Instead, the most common practice is to insist that all students make one or two standard objects like a built-up breadboard before continuing with individual projects. Partial routinization in this way helps to make sure that all students practice certain techniques and provides the instructor with opportunities for class instruction. When the students begin to plan their separate jobs, emphasis is placed on instruction regarding elements of design.

HIGH SCHOOL

A GENERAL SHOP, that is to say a shop in which woodwork, metal-work, arts and crafts, and even auto-work may be taught, is seldom found in high schools. When there is such a general shop, it usually is part of the program in vocational agriculture.

VOCATIONAL EDUCATION

AGRICULTURE

IN RURAL HIGH SCHOOLS, instruction in agriculture is sometimes administered by the state and partly financed by the federal government under a law known as the Smith-Hughes Act. Teachers of vocational agriculture receive additional training, they are paid slightly more than other teachers in the school, their classes must be kept below a prescribed maximum, and they are provided with a daily conference period and a daily period to visit pupil projects. In addition, they are supervised by special supervisors organized directly under a branch of the State Department of Educa-

tion. Additional federal funds may be provided for building, so that the vocational agriculture program sometimes turns out to be the one well-fed horse in a lean stable. When it is, the effect on the unity of a school is not always positive.

The purpose of the vocational agriculture program is to provide vocational education to farmers and farm workers. Many of the high school graduates who have gone through the program go on to take a degree at a four-year agricultural college, others go to work as farmers or farm workers immediately, and still others take the series of courses as part of their general education with little or no thought of engaging in farming as a vocation.

Vocational agriculture courses in high school are closely linked with the Future Farmers of America and to a lesser extent with the 4-H clubs. Future Farmers is a nationwide organization that carries much of the appeal of a national fraternity. Members feel they belong to a movement and the leaders get to attend national conventions. This joining of a national group is a well-known facet of American life. Among the advantages are the opportunities provided for motivation to work hard and study hard, for educational travel, and for the development of socially desirable skills.

The name 4-H reminds the members that head, heart, hand, and health are symbolic of four dimensions that, when properly cultivated, help in achieving a well-rounded personality. The club is open to both boys and girls and was founded during the First World War partly to increase the food supply as each member pledged himself to carry out a project of crop-growing, livestock-raising, or canning. During World War II the contribution to food production made by these boys and girls was enormous. The nearly two million that were enrolled in 75,000 clubs cared for nearly half a million acres in garden; in three years they canned 47 million quarts of food, raised 33 million chickens, nearly two million meat animals, and 300,000 dairy cows.

There is little doubt that the ease with which farmers cooperate with such government agencies as the Soil Conservation Service and the County Advisers of the Agricultural Extension Service derives in part from their useful experience while in high school.

SHOP DEPARTMENTS

Shop management

THERE IS MUCH CONCERNING MANAGEMENT and control that is common to the various high school shops. To a certain extent, some of the generalizations that will be made can be applied to the courses in homemaking.

One of the reasons boys and girls enjoy the shops is because they can move around and engage in activities. To carry on these activities, equipment and supplies are needed, as they are in other laboratory courses. Maintenance is much more significant than in the English, social studies, or mathematics classroom. Unless the shop teacher is to wear himself out keeping up his store of material possessions, he will need to get help from his students. Because children should learn to take care of things, shop maintenance can be just as important a part of the educative process as project-making and model-building. These clean-up and maintenance jobs ought to rotate among the students, so some form of chart with a list of names that can be rotated will have to be devised if the assignments are to be fair and regular. Exploitation of a particular student is a temptation the shop teacher should work hard to resist. When a boy turns out to have a talent as "Mr. Fixit" it is difficult to keep him away from a dead machine that the others boys just can't seem to get going. Another child may revel in the symmetry and repetitive order of the toolroom. To him, a gap in a row of gleaming jack planes is like the loss of a front tooth to the smile of a pretty girl. Perhaps he should be allowed to stay in the toolroom long enough to work out a system of tags or checks, but he must not be left there indefinitely, no matter how much he says he likes it.

Like the laboratory instructor, the shop teacher will save himself from spending hours and days in the supply-room if he works out a set of cards, one for each item in supply. These cards are filed alphabetically and carry the name of the material, the basic quantity to be ordered at any one time, and a series of blanks for checking off the quantity on hand. Because quantities vary from item to item, many shop teachers prefer to show four-row columns on their cards. When an order is checked in, the date of receipt is

written at the top of the column. When a quarter of the material is gone, either a check or a record of the date is made in the second square; when half is gone, in the third square; and when three-quarters is gone, in the fourth square. Cards so marked should be transferred to a separate file for reordering. Periodically, the instructor can assign a student to make up a requisition from the order file. When the order arrives, a fresh column of squares is marked and the card is returned to the standard file. Over a period of years, a card can thus record the experience with a given item and maintenance of the item can be much more intelligent than it can when orders are made on guesswork only. Prices can easily be recorded on the same card.

Other students can be asked to look after attendance, safety, ventilation, cleanup, and relations with other departments in the school.

A part of the shop that is often neglected is the planning and reference section. Ideally, this should be almost a library and should be in a separate room away from the dust and dirt. At least, there should be a closed cupboard with a clear table available in a corner of the shop and someone will be needed to keep the books and leaflets in order, to loan them temporarily to the other students, and to see they are all back in place when the period ends.

Production work

More and more shop teachers are influenced by industry to the extent of planning at least a part of the semester in production work. That is to say, the shop is turned temporarily into an assembly line and dozens of identical products are turned out by the class as a whole or by a group of students working as a unit. To be successful, this activity must be preceded by extensive planning. Much of the educational value of the proceeding is to be expected from planning the project, as the students try to foresee their difficulties, to work out the most efficient sequence of jobs, to figure costs and material needs, and to conduct time and motion studies. Such production work can be undertaken to help the school or the community, or it can be a business venture for the students themselves.

Educational advantages of production work are that such work

provides insight into the method of industry, the assembly line keeps the laggards up to scratch, managerial ability is developed, and there is an opportunity somewhere for an inferior workman or two. The great disadvantage is that the individual becomes submerged in the group to a greater or lesser extent. All must go along and conform. There is little opportunity for the really superior workman to demonstrate his skill. Repeated performance of an increasingly simple act can anesthetize the creative impulse. But perhaps these disadvantages can be exploited if the teacher stops the work occasionally and gets the participants to examine the process and its effects on themselves as individuals.

Mixed classes

Marriage counselors keep telling us that happy couples share one or more interests in common. Yet we seem deliberately to bring up boys and girls with separate and even isolated interests. Boys learn to like working in a shop. When they grow up and get married they like to relax in the basement or garage as they tinker with the car or build a boat or a piece of furniture. During the construction stage, the wife is usually separated from her husband as she sews, reads, or watches television. Only at the climax, when the job is finished, do they share a fleeting joy. How much closer they would grow if they could work together, and with the growing use of power tools, a man's physical advantage nearly disappears. Most importantly, women would be forced to practice a problem-solving logic that would facilitate communication between the sexes. So much of the trouble seems to start because the man and the woman just don't seem to understand each other. Where shop classes for both boys and girls have been tried, the new problems have not proved insurmountable.

Integration with other subjects

There are still a few shop teachers who are convinced that there is only one way to learn: their way. Hence, they sternly drive each pupil through a highly regimented set of activities. Those who survive the treatment turn out to be skillful workers and surprisingly, perhaps, a few are able to demonstrate creative skill of a high order.

But more and more shop teachers, with little or no objective evidence to guide them, adopt a less structured approach. They get

the students going as soon as possible on individual projects, they plan with the pupils, and they keep their own personalities resilient, perhaps, but flexible.

Teachers in the first group strongly resist any crossing of departmental boundaries. They regard maintenance work for the school or community as exploitation of the child. For them, order, of a fairly simple sort, is paramount. Teachers in the second group are much more willing to experiment. They are likely to assign at least one student each period to do maintenance jobs for the school, and they are usually willing to cooperate in the making of something that demands a variety of skills. Suppose, for example, that a boy wanted to make a boat. He could do most of the work in the woodshop, but the metal fasteners had best be made in the metal-shop, and matters relating to the motor would seem more appropriate to the auto-shop. The flexible teacher is willing to assist a stage crew and to permit the use of power tools for the construction of scenery just as he is ready to help make the booths for the carnival.

Educational potential

But shop courses can never reach their maximum educational potential if they fritter away all the energies of the teacher and his class in the performance of odd jobs. There must be a hard core of educational procedure that justifies and gives meaning to all the rest. The highly regimented shop teacher, with his rows of lathes and strict sequence of models, thinks he has this hard core, but he is quite likely to be wrong. His procedure is hard, right enough, but is it educational? Possibly, the rigor of his approach can be maintained, while the obvious advantages of greater flexibility are included. Undoubtedly a good machinist can accept only exceedingly small tolerances. A few thousandths of an inch can mean the difference between a useful, long-wearing part, and a piece of junk. The boy, or girl, who studies the use of a lathe should somehow get a passion for accuracy of this order, even though he has no thought whatever of becoming a machinist by trade. The joy of a fine performance is exquisite and well worth the drudgery of its seeking. But this joy is heightened, rather than diminished, if the fine performance is associated with something the pupil can use rather than with something whose value lies solely in its accuracy.

Accuracy and precision, like other acknowledged virtues, must be considered by the teacher as they relate to the individual child and to other educational consequences. To a large extent, accuracy and precision are personal and depend upon the perceptual capabilities of the individual. To be always pointing out inaccuracies to the striving youngster is cruel and heartless. It would seem equally cruel and heartless to leave him overlong in a fool's paradise. For though absolute perfection is not for mortals, there are acceptable adult standards, which a man should know how to reach, and what is more satisfying, how to determine when he has reached them.

The shop teacher must keep in mind that most mechanical firsts are crude affairs; Newcomen's steam pump, Stephenson's locomotive, and Fulton's auxiliary. The student who has begun with a plain piece of white paper and solved problem after problem as he worked through to the finished product surely deserves more than a minute criticism of each joint, though such criticism may be quite acceptable to another boy who did as he was told throughout.

So far as possible the discipline should come from the project itself: if the drawers are the wrong size, they just won't slide in and out properly; if the corners are not square, the piece will not fit; if the pieces don't fit, the job creaks and groans and the fear that it will collapse is not always groundless. But over and above such functional accuracy there is a precision which has inherent aesthetic value.

Scope

At the present time, depending in part on the size of the school, a number of shops can be found in the industrial arts department of a high school. Nearly every school, from the smallest to the largest, has a woodshop. Almost as common is the auto-shop with which the metal-shop can be combined, or it can be housed separately. Printing shops used to be fairly common but they are either giving way to a graphic arts shop which includes photography, or they are disappearing entirely. A single shop for electricity and communication is often found in a larger high school and it nearly always is quite separate from all academic departments, even including physics, with which it has so much in common. The distinction between the two can be emphasized by considering the way in which a well-

trained physicist and a well-trained shopman would go about repairing a piece of electronic equipment. Before the physicist could begin he would have to trace through and clearly understand the entire circuit. He would use meters and bridges just as the other man would. Having located the source of the difficulty, he would probably fix it in a rather crude fashion, either by substituting a part that necessitated the use of one or two trailing wires, or by doing a soldering job that, though permanent, tended to overemphasize the use of solder. If he were very lucky, he might hit on a simplification of the circuit that would do away with the part altogether. The shopman, on the other hand, would use a handbook to guide him almost immediately to the trouble spot, a factory part would be located in the same manner, and melting the old part out and the new part in would be neatly and efficiently performed in a matter of seconds.

In the research department of universities, trained technicians are employed and their superior, if limited, skills are recognized. It seems a pity in some ways that such strict separation should be necessary in high school. If the shopman and the physics man could work together more closely, their activities would fuse most beneficially within the understanding of the growing child.

Selection of students

The chief reason such a desirable integration does not take place is that the academic instructor and the shop instructor seldom work with the same child. And this is wholly deplorable. So often the distinction is falsely made that academic subjects train the mind, whereas shop subjects train the hands. Both areas can be used for full personality development. The notion that shopwork calls for a lower order of intelligence may be quite erroneous. We have no idea what abstractions people are capable of when they are sufficiently motivated. In any event, the student in physics seldom makes use of more than a minute fraction of his intellectual resources. If he is sufficiently motivated he does whatever is needed in the way of abstract thinking and seldom any more. He can imagine only what he has experienced in the past. If he had never seen or heard of a furry, four-legged animal witth whiskers and a tail, the abstraction CAT would be impossible for him. He certainly would find it

nearly out of the question to develop an interest in felines. However, the horror the teacher experiences at this discovery need scarcely compel him to doom the boy to any association with cats for the rest of his life.

By and large, we teachers do just this when we separate children into allegedly homogeneous groupings. For motivations and attitudes favorable to the performance of abstract thinking about a subject do not come along with our genes, they are learned from others. It should be possible for an adult to choose the extent to which he will work with things or with ideas. That his early experience has been restricted seems no justification for continuing the restrictions. If work with one child prevents our working with another, we had best do something about our own technique and do it fast.

Sequence of courses

If there were not this separation of technical and academic subjects, a year course in each of the various shops would seem ample. Because there is this separation, it is necessary for some of the boys and girls to major in shop if they are to graduate. Hence, there must be a sequence of courses about which logic of a sort can be demonstrated.

In general, the shop teacher develops a file of projects which are more or less graded as to difficulty of performance. He and the individual pupil choose from the file a project of such difficulty that he will be able to accomplish it providing he develops new skills along the way.

A beginning teacher has no such file and he must start one immediately. Sources are available: state departments of education, the Office of Education in Washington, national and state teachers associations, professional journals, curricular books, textbooks and manuals, manufacturers of equipment, visits to other shop teachers, visits to industry, meetings and conventions, libraries, trade magazines, and family magazines.

HOMEMAKING

THE FOREGOING HAS SEEMED PERHAPS to emphasize shop for boys: woodshop, metal-shop, auto-shop, printshop, and electrical

shop. A section specially devoted to homemaking will have a characteristically feminine slant although more and more boys are being included in the program. A number of the problems to be encountered are the same. So far as possible, obvious repetitions will be avoided.

In most schools, at the present time, courses in homemaking are still built around the central themes of food and clothing. These are two of man's fundamental needs and they seem most appropriate as foci of the educational process. Another basic need of man is for wife and child and it is fitting that courses in home and family living are more and more being included in the homemaking program.

When the emphasis in the homemaking program is placed on a recognition of principles and a seeing of relationships, problems having to do with financial distinctions are less obvious. For it is most important that as she tries to raise the sights of some of her charges the homemaking teacher avoid the twin evils of making girls dissatisfied with their own homes and at the same time leading them to see little or no benefit in the course offered.

For example, the use of flowers in the ornamentation of a home is almost universally possible. Even where there is no home garden, surely some form of vegetation can be acquired if it is sought with sufficient diligence. The teacher has no need to use American Beauty roses at several dollars a dozen, nor yet orchids at five dollars each. Most of the principles of flower arrangement can be taught with a handful of calendula, or if even these are not available, then with a few wild flowers or even some weeds or twigs.

The principles of dressmaking apply almost equally well to an inexpensive cotton as to the use of imported silk. Girls can learn how to hang and dispose pictures on a wall just as well with a picture cut from a magazine as with an original Goya—or almost as well.

The same considerations hold true when the girls are being taught to make a purchase. In fact, more ingenuity and resourcefulness is needed to stretch a modest budget than to spend a fairly large sum. Hence, with the make-believe buying, it is probably best to establish limits that correlate roughly with each girl's present experience, although in view of the degree of social mobility that is encountered in present-day American society, the girls should probably have as broad an experience as they are able to appreciate.

If, as seems appropriate, the homemaking activities are to be built around suitable problems, one of the strongest guides to the curriculum will be the maturation characteristics of the girls. Once again, the younger girls and the slower girls will be more happy with a routine, fairly highly structured program. Older and more intelligent girls will tolerate routine only as they are able to see progress toward more distant goals. Other signs of development are a growing appreciation and tolerance of abstract thinking, and greater respect for peer approval than for that of the teacher.

Physically, well-known principles of maturation apply. The use of the sewing machine, requiring large muscle operation will probably precede fine hand sewing. When little girls are encouraged to make doll's clothes, care should be taken to see that the materials and the sewing are within the child's capabilities.

Pre-testing is just as important in a homemaking class as in any other. If the child is to progress in the acquisition of skill and understanding, the teacher must be ready with an extensive repertoire of graded activities. When the child's interests are considered, care must be taken not to pay too much attention to ephemeral interests such as cooking a meal because of hunger or making a dress for a party.

There is a trend in homemaking education toward the idea of instruction built around the complete notion of the home: eating, drinking, clothing, looking after children, furnishing the home, making a budget, making purchases, entertaining, gardening, arranging flowers, doing accounts, painting, care of health, and personal and family relationships. No doubt such a program is most ambitious and it is difficult to draw lines round a subject-matter area that is at once so diffuse and so amorphous. Where the program is federally supported, as it often is in a rural school, the program is almost a school within a school. In urban areas the tendency is for principals to restrict the program pretty much to sewing and cooking.

ARTS AND CRAFTS

MOST HIGH SCHOOLS offer a course in arts and crafts. In this class, pupils learn leather-working, ceramics, jewelry-making,

copper-beating, the molding and shaping of plastics, the making of mobiles, and other crafts.

The educational possibilities of these courses are similar to those of the more formal and more popular shop courses. In them, pupils can increase their perception of beauty. When the activities in these classes are appropriately guided, pupils can learn to improve the quality of their thinking; they can practice creativity, and they can learn to work with others. Innumerable choices precede the turning out of a finished project. Most of these choices should be the pupil's own. As he examines the quality of his finished project, he has a ready and highly objective means of evaluating the quality of the choices that he has made.

TRADE AND INDUSTRIAL EDUCATION

IN ADDITION TO THE AGRICULTURE and homemaking programs, there are other vocational training programs that receive federal support and state supervision. These programs of direct vocational preparation are called Trade and Industrial programs or more commonly T and I. There is a growing tendency to move these programs almost exclusively into the junior college. At one time, vocational preparation for carpentry, plumbing, the numerous trades associated with automobile maintenance, power sewing, beauty culture, and many other trades and semiprofessions was most extensive in high schools. Teachers in these divisions worked closely with local chambers of commerce, with union representatives, and with other representatives of industry. In many instances boys left high school directly to become journeymen apprentices.

Again, with little objective evidence to show the way, these programs have settled more and more into the junior colleges. There are numerous reasons for this: the equipment is often costly, the classes must remain small, certain trades are comparatively rare so that a large population must be combed for the number of candidates needed to make up the class, a higher cost per pupil is tolerated in colleges than in high schools, a college has an advantage over a high school when seeking faculty, and the semiautonomous nature of the various departments fits in better with the college organization. Much of the terminal program of the junior colleges is com-

prised of T and I courses. Generally speaking, the content of these courses is highly technical and therefore of limited interest to the general reader. Complete courses of study in these subjects are readily available in schools and in college libraries, for such courses are usually far more highly structured and more strictly supervised than the courses in general education. In part, this sharpness is achieved because the chief aim of the courses, preparation for a trade, is capable of such clear definition.

INDUSTRIAL ARTS IN TEACHER-TRAINING COLLEGES

BECAUSE OF THE NEED to prepare teachers of industrial arts, we often find that students attending teacher-training colleges are able to major in one or more of the industrial arts: woodworking, metal-working, automobile repair, or printing. The student cannot complete such a major solely by making extensive projects, no matter how elaborate.

To a greater or less extent he must succeed in the study of theory of design, strength of materials, transformation of energy, and other courses dealing with abstractions susceptible to industrial application. Hence, this program gets close to being a program of engineering and in more and more teacher-training institutions with swelling enrollments, industrial arts departments have combined with their neighbors in the physics and mathematics departments to follow this new trail to academic respectability. Most unfortunately, the emphasis then shifts abruptly from a consideration of the needs of the future teacher of industrial arts in high school to a consideration of the needs of students not quite able enough to enroll in a standard school of engineering.

ENGINEERING EDUCATION

YET A FRANKER USE of the development of manual and practical skill to produce favorable attitudes toward a study of the abstractions of mathematics and physics is psychologically and sociologically sound. Engineering education should thus be the capstone for all those seeking a bridge between the natural and essen-

tially simple delights to be found in the manipulation of objects to the enthusiasm that sustains exploration in the limitless regions of the natural sciences. Instead, except for rare programs in which a job in the field alternates regularly with the abstract content found in books, and in laboratories for the most part too, the student of engineering is apparently expected to come to his professor with the attitudes and capabilities necessary to relate fancy into fact or he is expected to catch these learnings miraculously as he goes along. Many, of course, do not. The number who might develop a lasting interest in science is unknown. Many of these do not even get into a school of engineering. We do know that approximately half those who enter fail, for one reason or another, to finish. And the half-baked notions retained by the student in the bottom quarter of his class are a menace to society and a source of constant dissatisfaction to himself. A small group of dedicated people are doing wonders in the development of techniques of teaching very slow learners. It is high time these techniques were modified to perform similar educational miracles with the so-called average students, and even more importantly for society, with the ones we are pleased to call gifted.

THE BRIDGE TO ART

MANY STUDENTS OF INDUSTRIAL ARTS who find the cracks in the road to a study of engineering too wide to cross turn to a study of the fine arts in their search for a continuing challenge. Unfortunately, even here they find their past something that often has to be lived down. It seems most unfortunate that class distinctions should persist to dog our educational efforts in this way.

Perhaps the most promising attack on this deplorable educational snobbishness is being brilliantly staged at the Lick-Wilmerding school for boys in San Francisco. At this school, whose roll of alumni is growing ever more distinguished, boys who do well in school are accepted by and taught in shops as well as classrooms throughout the four-year high school course. The result is tremendous—a genuine development in the educational use of industrial arts.

VOCATIONAL GUIDANCE

OCCUPATIONAL INFORMATION

AN IMPORTANT ASPECT of business, trade, and vocational education is occupational orientation. Occupational or vocational orientation is thus an important part of the public school curriculum.

The importance of the elementary school program in the development of business and vocational skills lies chiefly in developing the basic tools of reading, writing, and arithmetic, and the allied skills of thinking and communication. The elementary school has a further responsibility which it has not generally realized as such. Vocational guidance, in its basic informational and orientation components, should begin early in the school. For example, when the first-grade class is studying the postman, one of the most important things that can be done is to learn what the postman does. At the present time, if one asks an elementary school pupil, a junior high school pupil, or even a high school pupil, what his father does, he very often says, "Oh, he works down at Convair," or, "He works for the Shell Oil Company." However, if you press him further as to what his father does on the job, very seldom does the pupil know specifically. For a sound foundation of occupational information, it is essential that youth, in its early years, be encouraged to see, analyze, and make decisions about the various kinds of occupations in which people work.

In the fifth grade, for example, studying the westward movement, knowledge of the kinds of work the people did in the early pioneer days is essential to understanding. When studying communication, for example, at the sixth-grade level, it is important to compare skills required in former days with skills required today. What does the airline hostess actually do? What does the pilot actually do? What does the dispatcher do? These are all important understandings in the transportation unit. And so it is with all other units in the elementary school. What do the people do? Can we see pictures of them actually working? Can we visit the firehouse and

see what the fireman does? In this way, we begin to build basic understandings and basic interests in vocational employment.

The determination to become a doctor is one example of a youth's decision on a career that is frequently a mistaken one. It used to be that the determination to become a doctor depended more upon the mother's appreciation of bedside manner of the physician at the time of birth, and her imparting this attitude to the child, than any other knowledge gained prior to actually entering the premedical curriculum at college. The parent, through encouragement and even through dictating, indicated this youngster should become a doctor. Basically interested in science and successful in mathematics, the youth decided maybe he should. And so he entered the premedical program at the university.

However, very unusual interest and ability is required to become a doctor. The drop-out of premed students is therefore considerable because of lack of ability and interest to follow the specialized curriculum provided. The realization that the youngster is really not interested in, nor capable of, doing the work required is an important one that youth too often makes only too late.

It used to be that, in seeking a specific job, especially among young people and, to a certain extent, in all job applications, personal contact played the most important role. In fact, a great deal of vocational education and vocational guidance has been informal on the supposition that, regardless of the training, "I'll get a job at such and such a plant because I know so and so or my Dad knows the foreman." To a certain extent, especially during periods when there are more applicants for jobs, personal contact plays a very important part in obtaining a job. Not only do students need to know the rudiments of selecting and applying for a job, but they should also become acquainted with their own interests, their own abilities, and possible directions in which they may use these for gainful employment. Vocational guidance and vocational education have become even more important in the last few years with the great explosion of new and specialized jobs arising out of atomic energy, electronics, and many related fields.

Gradually, in this country, the need for unskilled trades has given way to a need for semiskilled and skilled employees, and there are very few demands for unskilled labor. One of the greatest sources

of difficulty for people who are about to enter an occupation is their lack of knowledge and even imagination concerning occupations. Too often a person has such an extremely limited knowledge about jobs that he bases his liking or disliking for them on superficial or even incorrect judgments. Furthermore, a vast number of occupations exist of which he is not even aware. Stimulation is needed to persuade the pupil to seek the less well known occupations. From the point of view of vocational guidance, to encourage a person to seek a career in promising, but less well known, fields is often rewarding, since it may make the difference between a half-hearted approach and an enthusiastic one on the part of the youth.

The importance of the need for occupational information is well illustrated. Occupational information holds the key to the mastery of one of the two or three weightiest personal problems confronting mankind. Uncounted thousands of men and women live lives of drudgery, unhappiness, frustration, and disillusionment due to faulty, inadequate occupational information and to the absence of occupational guidance. This is not the only problem confronting these unhappy folk, but it is a weighty one. Free choice of vocation, in this situation, is a mockery.

Shartle's book on occupational information, first published in 1946, provides a most extensive and reliable coverage of occupational information. It contains accurate and usable information about jobs and occupations.

The Dictionary of Occupational Titles[1] is also a most useful tool in the hands of a vocational guidance counselor or a teacher concerned with exploring the fields of vocational opportunities with youth. The dictionary can be considered as a central reference in any library of occupational information. Part I of the 1939 edition contains definitions of 17,452 separate jobs. It also includes 12,292 alternate titles so that 29,744 titles are defined. These definitions are based upon 54,189 job analyses. All job analyses resulted from the observation of actual operations of specific jobs. Each definition is composed of four parts: (1) main job title followed by

[1] Division of Occupational Analysis, United States Employment Service, *Dictionary of Occupational Titles,* United States Department of Labor, Bureau of Employment Security, Washington, D.C., 1949.

alternate job title; (2) the industrial designation identifying the industry or type of work; (3) the occupational code number used to symbolize the job and classification structure; and (4) the definition of duties performed on the job.

The dictionary also contains a standardized occupational code structure and an alphabetical list of common commodities sold in retail and wholesale trades, together with the titles under which their vendors are classified. The use of this dictionary in vocational guidance aids in making local occupational surveys, assists in learning the variety of jobs for which the same job title is applied in various industries, assists in learning what work is performed in any given job, provides the student an opportunity to get acquainted with the vast number of ways to earn a living, and assists in preparing pupils for field trips to industrial establishments. The dictionary has been consistently revised. The 1949 edition, which is the most recent, contained slightly more than 40,000 job titles and 22,000 job definitions. It was also an improvement over its predecessor since it is easier to use and yields more up-to-date information. No secondary school library should be without the *Dictionary of Occupational Titles*. The teacher should refer often to this, indicating where the youngsters may go to obtain information about their interests.

High school youth are people who have very limited job experiences or none at all. Occupational information, employment, and job opportunities unfortunately are never steady. The total number of people gainfully employed varies with economic conditions. Fluctuations in occupations in new industrial fields which may be independent of the total trend are developing. Of course, in periods of prosperity, jobs are more easily obtained and during recessions jobs are more scarce. However, in both prosperity and recession, there are more jobs in some fields than there are in others. Trends should be spotted by counselors and teachers and highlighted. Here it is important that the vocational counselor and teacher meet face to face with each youth. The average student does not know how to obtain this information or how to interpret it even when he has it.

It is very important to see the changes in relation to the growth

of the country, its standard of living, its style of living, and its ability actively to absorb its people and grow rather than decline. The counselor must have a broad view if he is to be truly effective.

The economic and social welfare of any community depends, to a large extent, upon its ability to employ people. The hit-and-miss systems of the past have led to severe problems. Consequently, leading citizens have recognized that vocational guidance in the schools is important. It should be clear that occupational information must not only be accurate, but must also continually be kept up to date. Otherwise, more harm than good may result.

There are organizations devoting their time to the publication and dissemination of sound occupational information. Among such organizations, Science Research Associates of Chicago does a rather comprehensive job. It publishes a series known as *Occupational Briefs* on America's major job fields. Each brief is four pages in length and includes job descriptions, present demand for workers, training needed, working conditions, probable future trends, and a bibliography of selected references. This series includes 250 job fields and, as might be expected, covers almost everything from citrus fruit and nut farmers to teachers. Science Research Associates also publishes a series of occupational monographs and life adjustment booklets. Among the occupational monographs are included twenty titles such as careers in labor relations, highway development, the rubber industry, horticulture, public health, and so on. For example, *Life Adjustment Booklet No. 18* includes such titles as *Getting Job Experience, Choosing Your Career, How to Live With Parents,* and *Growing Up Socially.*

The Institute for Research publishes a series known as *Careers.* These are monographs discussing the national survey made with the cooperation of leading authorities in each field. There are well over two hundred monographs and many of these have been revised in recent years. Among the various titles included in the series are *Career as a Food Chemist, Botany as a Career, Career as a Tax Attorney, Service Station Operation as a Career, Careers in Geography, Mineral Economics as a Career, Careers for Women with the Airlines, Recreation Leadership as a Career,* and *Cartooning as a Career.*

There are additional organizations doing similar work. For ex-

ample, Personnel Services, Inc., publishes a series called *Occupational Abstracts.* Each abstract is approximately two thousand words in length, and summarizes available literature regarding specific occupational areas.

Vocational Guidance Monographs vary in length, but are more lengthy than the previously described series. Very roughly, they are about six thousand words in length and have been issued in more than seventy-five occupational areas. The Commonwealth Book Company of Chicago, publishers of these monographs, has released occupational information in such diversified fields as watch repairing, welding, forestry, beekeeping, tailoring, air conditioning, and restaurant management.

Not to be overlooked is the efficient job the United States Government performs in disseminating occupational information through its Office of Education. Publications for sale through the Superintendent of Documents, Washington, D.C., are very valuable. They have the additional advantage of selling at a low price. For example, there is a series of guidance leaflets which usually sell for 5¢ and 10¢ in such fields as nursing, librarianship, veterinary medicine, optometry, and osteopathy. These pamphlets cover such material as income opportunities, colleges specializing in preparation, and lists of approximate costs of achieving the goals. The government has also published a series of job descriptions in nontechnical language. These are organized according to industry and include such items as duties, equipment used, job relationships, and qualifications for employment. Materials have been published on many industries. From time to time, the government prints a special pamphlet on current need. For example, a pamphlet, *Teachers Are Needed,* printed in 1944, was written for the vocational counselor so that he might have the information indicating the shortage of qualified teachers.

Other useful government sources of publications related to occupational information are the *Occupational Outlook,* Division of the United States Bureau of Labor Statistics, Women's Bureau, United States Department of Labor.

Each year sees the publication of a number of helpful books written on a wide variety of occupations. Here are a few examples: *Photographic Occupations, Traffic Management, How to Be a Suc-*

cessful Advertising Woman, The Book of Opportunities, Twenty Careers of Tomorrow, Career Opportunities.

An additional source of occupational information is the large-circulation magazine. From time to time such magazines as *Life, Look, Pic,* and *Glamour* publish accurate and readable information directly concerned with occupations.

A relatively new source of occupational information is visual aids. Coronet Instructional Film Company of Chicago has produced some 16mm sound films in color, such as *Finding the Right Job* and *Chosing Your Occupation.* A serious attempt is made to present the material accurately and yet interestingly enough to stimulate high school students. A teacher's guide is usually provided with these films. *Aptitudes and Occupations* and *I Want to Be a Secretary* have been prepared with the collaboration of the University of Minnesota and the University of California. Occupational information is a very necessary core in the development of a vocational guidance and vocational education program. A number of people would rather see pictures than read, and therefore such attempts are promising.

The program that emphasizes only the knowledge of individual characteristics and abilities is incomplete. Acquiring knowledge and facts about jobs begins with the technique known as job analysis. The procedure leads to job classification. It is here that information takes on significance for vocational guidance. Teachers are cautioned that sources of occupational information should be carefully checked for accuracy and recency; otherwise vocational information may lead the youth in the wrong direction. The evaluation of such material is aided by reference to such an outline as the *Content of a Good Occupation,* a monograph put out by Science Research Associates.

VOCATIONAL COUNSELING

A VOCATIONAL GUIDANCE and vocational education program should not stop just at occupational information. It is important also that the individual study himself in relationship to jobs. Each youth should have an understanding of the way he as an individual reacts to unpleasant situations. He should understand the

facility with which he adjusts himself to other persons. He should understand his relative status in the social and economic group with which he identifies himself. He should understand the nature of the work in relationship to the abilities, interests, and preparation for the job he has in mind. He should understand and look into such things as job security and job loyalty. A job or future occupational lifework must meet the needs of the individual as to interest, and demands on the intelligence. To be sure, it must be related to economic needs as well, but this relationship alone cannot be considered enough for job satisfaction.

A good program of vocational guidance in the secondary school can salvage many lives in terms of future job satisfaction and happiness, since it proceeds by matching the individual and a job in accordance with both the person's and the job's requirements. For example, the interrelation between a man's scores on intelligence tests and his gainful employment in a specific occupational classification has implications for vocational guidance. It can allow the assumption that certain levels of intelligence are required in certain occupations. The recommendations can then be made accordingly.

If all individuals received vocational counseling prior to entering industry, the number of industrial misfits would be greatly reduced. However, it is important to realize that it would be unrealistic to believe that all misfits would be eliminated by a vocational guidance program in the schools. On the adult level, vocational maladjustment and emotional maladjustment are likely to be found together. These two forms of maladjustment can be present in individuals in different proportions. Interestingly enough, the original presence of one may react upon the other and increase its intensity. Thus, job maladjustment may develop in adult life because of emotional maladjustment that has no relation to occupational information or job counseling.

Vocational guidance programs should not overlook the possibility of *psychological tests.* Psychological tests are standardized instruments designed to measure samples of personal characteristics in a scientific manner. There are many tests and it is frequently difficult to determine which test to use in a particular situation. However, psychological testing is a complex matter and must be planned very carefully. Otherwise, much time and money can be wasted. In

order to test properly and obtain results which are most meaningful, it is necessary to have knowledge of psychological principles and certain background information in ways of administering tests, the attributes of tests, and varieties of tests.

It is important to remember that all testing is based upon the principle of individual differences. Not only do people differ from one another, but differences in ability occur within the same individual. The test environment influences these test performances in many ways. It is necessary to know about the difference in test administration because these differences necessitate varying interpretations.

The three attributes of psychological tests are validity, reliability, and norms. Validity is the measure of how well the test measures and what it purports to do. Reliability indicates consistency of measure. Norms are the standards against which individual scores are compared. The vocational guidance counselor should become well acquainted with tests, their uses, and what they tell.

Individual *intelligence tests* are important. Most of us are familiar with intelligence tests. These are used widely in classroom planning. They are estimates of aptitude for the performance of academic tasks.

Aptitude tests are related to intelligence tests. They measure intellectual components, such as verbal, spatial, and perceptual abilities. However, they measure other abilities like motor manual or manipulative skills which are not intellectual measures except for children under eleven. They are also more subject to the influence of the environment than the intelligence tests because they take for granted the equality of experiences among people which do not exist. The usual aptitude test norms are also derived from more specific and homogeneous populations and, therefore, interpretations are limited. Aptitude tests were developed as aids for the selection of possibly successful workers in different kinds of work. In vocational guidance, they are employed to determine the abilities of the individuals so as to predict success in particular areas of work.

There are mechanical aptitude tests, clerical aptitude tests, and aptitude tests developed more specifically for various occupations. They may measure potential ability for engineering, selling, law, music, or art. Usually they consist of several kinds of sub-tests. Some

law schools, medical schools, and engineering colleges use scores on a battery of tests as part of their entrance requirements.

Achievement tests measure acquired skill or knowledge in a trade or school subject. Although they measure the present status, they may yield implications for future potentialities. In this sense, they are also measures of aptitude.

Trade tests are not as widely used in vocational guidance as are the other kinds, since people who have reached a high level of skill in a trade generally have long since been a student in school or college. Trade tests are used more widely in personnel selection by industry.

Educational achievement tests are used in vocational guidance. These estimate the level of knowledge attained in subject matter. The most widely used subject-matter tests are those in English and mathematics. There are achievement tests in algebra, arithmetic, calculus, geometry, agriculture, business education, education, engineering, science, social studies, foreign languages, and so forth. They all have implications for school success. Together with tests of intelligence, aptitudes, interests, and personalities, they help round out the picture of the individual's potentialities.

Interest tests. In vocational guidance, the measurement of interest is generally considered to be as important as the measurement of abilities. These tests are needed to account for part of the variance in job success that ability does not measure. Without interest, ability may be wasted. The interest tests are valuable to measure and predict the strength of motivation that may be expected in relation to fields or types of work. A knowledge of the interest patterns obtained from the tests becomes a convenient frame of reference during an interview. An individual is usually not fully aware of his interests and their relative strength, and, in some instances, he is unfamiliar with the variety of occupations that fit his vocational preferences and interests.

The interest tests measure attitude toward various occupations, school, social, and recreational activities. The *Kuder Preference Record* and the *Strong Interest Inventory* are two well-known interest tests.

Personality tests are used in vocational guidance to help complete the picture of the individual. Tests of ability and interests do

not measure such personality traits as confidence, dominance, and social ability, which account for a significant part of vocational adjustment. Paper and pencil personality tests of the questionnaire variety are used predominantly in guidance, mainly because they are easily scored and given to groups. Personality tests differ in terms of several categories they purport to measure. There is the *Bell Adjustment Inventory* which measures four areas of adjustment: home, health, social, and emotional. The *Bernreuter Personality Inventory* purports to measure six traits: neurotic tendencies, self-sufficiency, introversion, social dominance, self-consciousness, and sociability. Since such tests, and especially the interpretation of such tests, are not readily understood by teachers, personality tests are used mostly by experienced counselors. The teacher, however, through study and expert advice, may soon add the use of personality tests to his "kit of counseling tools."

WORK EXPERIENCE

WORK EXPERIENCE has also become important in many secondary schools, and is the final transition of the youth into the business world. Work experience is supervised learning on the job, requiring adult standards of performance. This is an integral part of the educational program for youth. It provides, through employment, educational experiences which are not furnished by other subjects in the secondary curriculum. Students in a work-experience program should be enrolled in school full time and should be supervised in part-time employment; this to be considered as an elective subject which takes the place of one or two class periods. Credit allowed for work experience permits a student to engage in this program, while at the same time he meets his requirements for high school graduation. Work experience makes use of the resources of the community that may be available to broaden the educational opportunities of the student. It also offers an outside activity to eleventh- and twelfth-graders who are over sixteen years of age. Theoretically, the opportunity for work experience should be available to every student who has expressed interest and has reached the maturity level which will allow him to profit from it.

The student who participates successfully in a work-experience

program should acquire the fundamentals of a vocational skill, should gain experience in an occupational area, should explore his work interests and capacities, and should evaluate his vocational goals in relationship to his abilities. He should develop appreciation for, and understanding of, work and working people. He should develop work habits and work standards required for success in employment. He should realize the value of education in relation to success on the job and he should acquire self-confidence as a result of working with adults.

SUMMARY

SINCE WELL OVER HALF of our high school graduates enter the job market and seek full-time employment at the end of their high school careers, it is important that vocational education and vocational guidance be given these youth before they leave the secondary school. It is also important for those going on to college to be given vocational guidance in order that they may make the necessary selections with the minimum of change and confusion. Also, well over half of those students going on to college will be seeking part-time employment in order to support themselves. Much time in job-seeking is wasted because individuals do not estimate correctly the job for which they are qualified. In applying for a job, it is important to be specific. One should not apply for any job that may be available in an organization, but rather for a specific job, such as sales clerk, shipping clerk, messenger boy, vocational counselor, or instructor in psychology. An employer will not consider for a job as a shipping clerk the applicant who is qualified for a teaching job. And yet many job-seekers make the big mistake of believing they themselves can do anything. Not only is this belief unfounded, but also the potential employer is not likely to share it. Of course, it is true that an individual can do any one of a number of jobs equally well. In fact, although guidance and selection operate from different points of view, in both there should always be a specific job in mind and the applicant must recognize this.

In any society there are twin columns, one marching in and one out of the ranks of those citizens who are gainfully employed.

Where the division of labor is intricate, assignment of recruits is crucially important. Considerations of both group and individual welfare demand that job selection be made so as to relate as closely as possible the demands of the job and the qualifications of the individual. The school shares heavily with other agencies of the state, and with the individual, the responsibility of striving to see that vocational choices are made with full knowledge of the consequences by all concerned.

EXERCISES

1. What parts of business education are appropriate for general education?
2. With what kinds of children might an approach to the basic goals of learning be appropriate through business education?
3. What shifts in occupational trends relate to the need for business education?
4. How are private schools of business education able to compete with publicly supported schools?
5. Where is business education taught in England, France, and Russia?
6. Where should a person learn such important but relatively simple things as keeping track of his appointments and filing his letters?
7. To what extent is vocational education shifting from the high school to the junior college?
8. Describe, as fully as you can, the atmosphere of a high school business course. Do you think this atmosphere is capable of an optimum contribution to the aims of the high school?
9. Distinguish between an industrial arts course in woodwork and a course helping to prepare a student for a vocation as a woodworker.
10. How are teachers prepared to teach industrial arts subjects?
11. Choose an industrial arts teacher that you know fairly well and a teacher of literature. Compare the personalities of these two teachers. What parts of your description might be typical of two groups of teachers? Add a description of a chemistry

teacher so that his more general characteristics can be fitted into the pattern you are developing.

12. Trace the entry of the orange crate into the elementary school classroom. Is it on its way out? What philosophical development is typified by this bird of passage?

13. What does research say of the relation of age to the development of hand skills?

14. Trace the historical development of either the Future Farmers of America or the 4-H Clubs. What are your impressions concerning the existence of two such similar organizations?

15. Choose a typical high school shop course and point out the intellectual content of the course. How might this intellectual content be increased?

16. In what ways can shop courses be individualized?

17. Point to the socializing effects of high school shop courses.

18. What might be the educational advantages and disadvantages of an assembly-line operation in one of the school shops?

19. Can you find any careful research on the development of creative skill?

20. Distinguish carefully between physics and the study of electronics.

21. How can shop activities provide students with opportunities to make important choices?

22. Discuss the factors that tend to place skilled manual workers in certain social classes. How do Russian schools work against this cultural tendency? Would activity of this kind be appropriate in America?

23. Is vocational orientation an important function of the American comprehensive high school? Why?

24. Should teachers and guidance workers follow up students as they work at their jobs? Why?

25. Describe a work-experience program in a given school. What advantages derive both to the student and to the school from this program?

TOPICS FOR DISCUSSION

1. Business education is not an appropriate activity for the comprehensive secondary school.
2. A course in typing is appropriate for all students.
3. College preparatory students should learn shorthand before going to college.
4. Much of the time of junior high school pupils should be spent in vocational exploration.
5. One of the important differences between a successful person and an unsuccessful person is knowing which papers and other informational records should be kept, and which should be discarded.
6. Thrift is an important personal quality, but the national economy depends on installment buying.
7. The use of power tools in an industrial arts laboratory.
8. Shop classes for boys and girls together.
9. Maintenance work for schools in shop classes.
10. The aesthetic quality of accuracy.
11. Scope and sequence among the woodworking courses.
12. Modern methods of production of art objects can bring exceedingly good examples to the general public, but the masterpieces are still as remote as ever.
13. Possibilities for abstract thinking in the homemaking classes.
14. Children in public schools should never be taught the serving of alcoholic beverages.

ADDITIONAL READING

Brown, Clara M., EVALUATION AND INVESTIGATION IN HOME ECONOMICS (New York: F. S. Crofts, 1941). *As the preface by T. R. McConnell demonstrates, this book, written by a professor of home home economics education, would be valuable to a wide range of people interested in measurement and evaluation.*

Douglas, Lloyd V., Blanford, James T., and Anderson, Ruth I., TEACHING BUSINESS SUBJECTS (Englewood Cliffs, N.J.: Prentice-

Hall, Inc., 1958). *Provides information concerning the setting in which the business education teacher will work, and describes methods of teaching business subjects.*

Enterline, Herman G. (ed.), EDUCATING YOUTH FOR ECONOMIC COMPETENCE, American Business Education Yearbook, Volume 15. Eastern Business Teachers Association and National Business Teachers Association (New York: University Bookstore, 18 Washington Place, 1958). *Special reference to business subjects as taught in high school.*

Ericson, Emanual E., TEACHING THE INDUSTRIAL ARTS (Peoria, Ill.: Chas. A. Bennett, 1956). *A standard in the field, this textbook covers class organization, management, shop discipline, safety and accident prevention, teacher evaluation, selection of subject matter, and even publicity and public relations. A short chapter is devoted to a consideration of general education through the industrial arts.*

Hatcher, Hazel M., and Andrews, Mildred E., THE TEACHING OF HOME-MAKING WITH EMPHASIS ON TEACHER-PUPIL-PARENT-PLANNING (Boston: Houghton Mifflin Company, 1945). *A textbook, but directed to all interested in the field. Written in an engaging style, and the approach is definitely student-centered.*

Shartle, Carroll L., OCCUPATIONAL INFORMATION: ITS DEVELOPMENT AND APPLICATION (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1959). *A complete survey of the field. A highly technical book designed for the professional in personnel work. It is worth half-an-hour of anyone's time to glance through this book and see the development that has taken place both in the world of work itself, and in the study and analysis of vocations.*

Sutherland, Sidney S., and Thompson, Orville E., TRAINING REQUIRED BY WORKERS IN AGRICULTURAL BUSINESS AND INDUSTRY (Sacramento: California State Department of Education, 1957). *A report for the use of curriculum-makers at the secondary level which can help them to become aware of the great variety of vocational requirements associated with agriculture.*

United Business Education Association, HOW TO TEACH BUSINESS SUBJECTS, National Association for Business Teacher Education, Bulletin 69 (Washington, D.C.: the Association, a Department of the National Education Association, 1958). *Designed as a handbook and reference tool for the use of student teachers of business subjects.*

CHAPTER 14

Allied Activities

ATTENTION WILL BE PAID in this chapter to school activities that used to be regarded as organized play and were classified as extracurricular activities. They came into the program of schools in response to demands from students. These demands were eventually formalized, but at first the children themselves, sensing their needs perhaps with greater sharpness than did their teachers, spontaneously began playing games. Almost at once, teachers watched and sometimes interfered, but in general the students organized themselves. The degree of autonomy permitted to students taking part in allied activities has continued to be much greater than that permitted in regular classes. By and large, these are student activities, and the students run them.

A serious exception has developed with respect to boys' athletics in high school, especially football, basketball, baseball, and track. In these so-called major sports an unfortunate emphasis on interschool competition and money-making has developed so that we are faced with the spectacle of grown men in control of what began as children's games. Indeed, major athletics receive so much

emphasis in American secondary schools that the coach frequently has higher status as coach than as teacher; the team is pulled out of class on the slightest pretext; and when the difficulty of winning demands the presence of a frenzied mob in the bleachers, the whole school shuts down and goes out to the stadium.

An interesting assessment of the value placed by school and community on interschool athletics can be made by observing a conference of high school principals. Dutifully, these men put curriculum questions first on their agenda, and questions having to do with football schedules and eligibility rules are placed last. But arguments over the curriculum, though sometimes spirited, fail to engage the enthusiastic attention of all those present. Bond issues and building programs generate more excitement, but when the talk turns to athletic problems, faces are rapt, eyes shine, tables are pounded, and everyone wants to say something at once.

In no other country of the world is so great an emphasis placed on high school athletics. Despite this obvious lack of balance, American athletes do not run away with much more than their share of prizes in competition with athletes from other countries. Perhaps the responsibility for the conduct of athletic programs needs to go back where it belongs, to the students. Perhaps if the students ran their own show and were given less of a hothouse treatment, more of the basic aims of an athletic program would be realized. The stated aims, development of a healthy body, wise use of leisure, social cooperation, and development of a good character, are all undeniably excellent.

In addition to a study of the program of sports, we will pay attention to student government, school clubs, secret societies, music and drama, school publications, and the general social activities. This is an imposing list and we should not be too surprised if such a very large tail turns out to be capable of shaking the entire enterprise. Because of the nature of the curriculum, allied activities play a minor role in grades one through six. They are more prominent in seven through nine. In grades ten, eleven, and twelve they are highly significant.

A PHILOSOPHY OF ALLIED ACTIVITIES

As a result of the social upheavals that have occurred in the last half-century, responsibility for more and more areas of personality development has been thrust upon the schools. This we will discuss, but we state at the outset that school people should not be supine in the matter. Where the task is clearly too great for the resources to be drawn upon, responsibility for certain areas of personality development, areas formerly regarded as the responsibility of home, church, or other community agencies, should be staunchly repudiated. A solid core of legitimate purposes remains for the schools. Some of these purposes can be attained in part through a well-planned program of allied activities.

Modern theories of personality, though differing widely from each other in many respects, generally share an organismic or holistic viewpoint of the growing child. The student's entire personality must be considered. He reacts to the environment provided according to his bodily, spiritual, and emotional needs, and not just according to his intellectual requirements.

Furthermore, modern theories of learning, though likewise differing widely from each other in many respects, share the concept that learning and doing are inseparable. Hence, acceptable theories of both the personality of the child and the way in which he learns encourage utilization by the school of educational activities in which children can become wholly involved and completely absorbed. Yet involvement of personality and absorption of interest are not the only criteria for judging the worth of educational activities. The basic purposes of school still is the intellectual development of children. The development of social and bodily skills, and even of moral and spiritual values, should and must be regarded by the school but in a subsidiary rather than dominant fashion.

ATHLETICS

Elementary school children play games at noon and at recess and during the physical education period. Often, at these

times, the children are under the direction of a woman teacher. Unless the woman is exceptional, the boys can make but little progress in the acquisition of skill except as they learn from each other. There is some team play, especially in the larger schools, but interschool competition is generally frowned upon and there is little of it.

Junior high schools are sometimes able to field a boys' basketball team or baseball team. Most systems prohibit interscholastic football for this age group as being too dangerous.

Almost every high school has a football team. In rural, sparsely settled areas, where the enrollment is low at all the schools in the county, thriving six-man leagues have developed. In such schools, every boy in school can often be seen "suited up" on the day of a game. The large city high schools sometimes list as many as seventy players on each of the varsity and junior varsity teams. Not all these boys get off the bench during an important game, but probably, if they have received attention during practice periods, they have learned something; at least they have picked up the rudiments of the games so as to be able to watch, in the future, with greater understanding and enjoyment, and they have spent some time exercising in the fresh air.

Many of the advantages just listed are gained by those taking part in peripheral activities: the marching band, the drill team, and the baton-twirling majorettes. These and the team combine to produce events of color and brilliance that please and thrill not only the rest of the students in the school but also many parents and other adults in the community.

The fact that spectators are willing to pay for the thrill of watching a football game introduces a number of hazards. More people go to night games. At night, behavior of the student spectators is more difficult to control, so difficult indeed that a number of city high schools, after going to the expense of installing costly lighting, have discontinued night schedules. Spectators often find the game more exciting to watch if their own side is winning. An overemphasis on winning can mean a temptation to condone or even to encourage unsportsmanlike activities on the part of participants and spectators. Further, this overemphasis may lead to excessive attention on the part of sportswriters and radio and TV commentators. The single educational advantage of picking all-conference, or

all-state, or even all-American teams is that a few star athletes are permitted opportunity to attain the heights to which they are able to climb. Against this dubious advantage must be placed the tendency to disparage the nonathlete, as well as the intoxicating effect of too much success upon the favored adolescent.

Whenever the effect of heavy financial investment in athletic accoutrements leads the administrator to sanction any sort of post-season activity, such attempts to recoup must be condemned as educationally unsound. Exploitation of team athletics from a public relations point of view can easily slip from the educationally sound to the financially expedient.

What has been said about football could be repeated almost entirely concerning basketball, except that fewer boys are involved. In some states, especially in some towns, interest in interscholastic basketball is greater than in football. Occasionally, the will on the part of the townspeople to maintain their high school basketball team has prevented the otherwise desirable union of two small high school districts. One who is aware of the limited facilities for recreation in a small inland community can understand this situation though he may not condone it. Much less fanfare is associated with baseball and track.

Many junior and senior high schools conduct an intensive intramural program of athletics. Because the excitement of these games scarcely ever reaches the feverish pitch of interschool athletics, such programs are often disparaged by both students and faculty. This disparagement is unfortunate and must be counteracted by calling attention to the satisfaction attained by many more students through actual participation in games. The intramural program can include sports which boys and girls play together. Where one of the professed goals of an athletic program is preparation for wise use of adult leisure, such coeducational activities can provide a useful means as well as contributing effectively to the goal of worthy home membership. A man seldom really enjoys playing football with his wife as a member of the team, but he can play golf, badminton, or tennis with her, providing they have both received suitable instruction in their youth. Men and women have enjoyed the sports of skiing, sailing, and swimming together for years. Grand-

parents commonly enjoy the latter two, and have been known to maintain their interest in the first.

Left by themselves, the girls are apt to get short shrift in the assignment of athletic facilities. Such favoritism by the administration is difficult to justify on educational grounds, although the cultural antecedents are easily recognizable. More high schools are installing swimming pools and this permits an athletic activity in which girls often excel. In addition, play days or sports days provide girls from neighboring schools with enhanced social opportunities. These meets do little to build up an intense spirit of competition which might prove harmful.

CLUBS

FORMAL SOCIAL GROUPS are common in American society. There are book clubs, drama clubs, yacht clubs, ski clubs, political clubs—a complete list would be nearly endless. Clubs and societies, open and secret, legal and illegal, have existed wherever schools have been established. The educational possibilities of these clubs was most clearly recognized during the early days of the junior high school movement, but whether they were prohibited, tolerated, or encouraged, clubs and societies have always existed in secondary schools and colleges.

Social and vocational guidance are two of the most commonly expressed purposes of school clubs. The opportunity to develop favorable attitudes toward the arts and sciences through clubs as well as to provide additional opportunity for study and all-round development should not be overlooked.

Little is known with certainty concerning the development of favorable attitudes, but experienced teachers are aware that students often develop new academic interests of considerable intensity as they participate informally in certain club activities. Take the example of a young student with few interests who has been persuaded to join a foreign-language club. If the club is successful he finds that nearly all the older members have intense interest in developing oral facility. The teacher sponsor stays discreetly in the background for much of the time. When she does emerge into the

spotlight she is not the taskmaster of the language class but one who has achieved an enviable fluency and who probably has fascinating stories to tell of travel in the land where the language is spoken. With no course of study to be covered, each club member can proceed at a pace that suits him, and the higher level of noise toleration means that a dozen spirited, if inaccurate, conversations can go on at once. The talk is with friends, the vocational possibilities and lifelong use of the language is explored, visitors familiar with the language are introduced, and field trips are taken. In the warm, friendly atmosphere of the club, a sensitive newcomer will soon develop attitudes toward the language that are as favorable as those of the older members.

Care should be taken by the sponsor that membership be limited to those either already interested or else capable of developing an interest. A trial period for new members is probably desirable. Rules governing membership should be established by agreement between sponsor and student members. Although the students have more freedom of choice than in the typical classroom situation, the bounds of this freedom are limited and it is most important that they be clearly established—at the outset if this is possible. Once the limits have been decided upon, the wise sponsor will interfere as little as possible, balancing nicely the risk of killing the buds of interest against any risk to his professional reputation as being blind to the possibility that certain consequences would arise.

SECRET SOCIETIES

THE HOPE IS OFTEN FONDLY EXPRESSED that where an adequate system of legal clubs is operating in a school the children will experience no inclination to form secret societies. However, too bland an existence drives people to taste the forbidden fruit almost as inexorably as too harsh an existence drives them to seek relief. Nearly all administrators frown upon secret societies and most place an outright ban upon them. Prohibition is probably the soundest administrative policy. When trouble arises, as it frequently will, the administrator and his faculty can say that they cannot condone where they have already prohibited, thus throwing re-

sponsibility back on the parents. The children that have learned to conform will stay clear of the underground organization. The ones who do join will be taking part in an activity which though harmless enough most of the time has an aura of wickedness because of its official prohibition. On the other hand, joining a secret society might forestall delinquency of a more serious nature.

MUSIC AND DRAMA

MUSICAL AND DRAMATIC ACTIVITIES are often found in regularly scheduled classes. This is certainly true in elementary school and in junior high school. Furthermore, colleges and universities usually offer programs in these subjects leading to the bachelor's degree, and perhaps to graduate degrees as well. Music and drama are among the oldest of the liberal arts. Yet there are Calvinistic overtones in the American character that keep people from permanently classifying music and drama among the solid subjects. Whenever a crisis arises, these two have somehow to prove over again that they are among man's outstanding intellectual accomplishments and deserving of professional place. Hence, we periodically find band, glee club, and drama back among the extracurricular activities. Perhaps it is the fact that these two subjects are such appropriate educational media that they are able to straddle the academic fence in this manner.

Because so much time has been devoted to these subjects in a previous chapter, we shall be content to note that band, orchestra, glee club, choir, and dramatics are activities that occupy a central role in the lives of some and a peripheral role in the lives of others.

SCHOOL PUBLICATIONS

NEARLY EVERY HIGH SCHOOL has a paper and almost as many produce an annual. Frequently, production of these publications is associated with a regular class in journalism. However, as with musical and dramatic activities, there is much that goes on outside the regular class periods.

One of the knottiest problems the journalism teacher or publication sponsor has to face is how to have the paper, usually a bi-

weekly, reproduced. Most sponsors prefer to have the paper printed and occasionally a printshop is a part of the school program. These are found usually in the older high schools. When the present race of printing teachers dies out, there is no assurance that new ones will be forthcoming. Not all high school printshops are equipped to handle the publication of newspapers. Professional printing is expensive. Usually, the administration must be willing to underwrite part of the cost, especially if pictures are to be included.

An alternative to printing is the use of a photographic method. This is slightly less expensive if the circulation is small and, to an amateur, the result, using glossy paper, is pleasing. Professionals are more conservative in their tastes and claim that unless a newspaper is printed on newsprint with printer's ink it just isn't a newspaper. Finally, there is either the ditto machine or the mimeograph machine. Smaller schools are often able to produce a creditable paper in this way, and students search just as avidly to find their names in "print."

The school annual is almost invariably printed on glossy paper with plenty of pictures. The cover is usually padded and much of the cost is defrayed by charging the seniors a fairly stiff price. Only occasionally is the annual purchased by lower classmen.

A publications board is one desirable method of responsible control over a school newspaper and yearbook. Usually, more than one faculty member serves on this board and a number of schools find the services of one or more professional journalists extremely helpful. Incidentally, severest criticism of a school often comes from a person in the community whose acquaintance with the details of a school program is slight. Where the criticism is based on false information, service on an appropriate school committee is one of the best ways to acquire correct information about the school. When the criticism is sound, it should be listened to, and the critic should be placed where he will find an unbiased audience.

Chief of the duties of the publications board is the selection and appointment of editors and other staff officers. Election of these officials by the student body is frequently poorly done, although student representatives on the publications board could well be elected officials. Selection of a staff officer should be based in large part on abilities and interest.

There are a number of national press associations and regional organizations with which the local group of students might consider association. Among these are the National Scholastic Press Association and the Pacific Slope Press Association.

The school paper

Most high school papers are issued twice a month. The tabloid size, with five columns and four pages, is most popular, although many variations are in use.

A staff of a dozen or more is needed. Usually, each page becomes the responsibility of a separate editor and quite often reporters are assigned to prominent individuals or groups in the school. In addition, reports and news releases are frequently written by club members who are not specifically on the staff of the newspaper.

A literary corner or supplement provides the budding poet or author with a suitable outlet. With a growing emphasis in the schools upon creativity and talent, a wider editorial choice is provided.

Whether or not great literary talent is fostered and developed by the school newspaper, much learning of a highly desirable kind is possible for a surprisingly large number of students. Development of a style manual calls for attention to acceptable grammar, punctuation, and choice of words. The need to meet a deadline develops responsibility, and the general group activity produces staff members with sharpened critical facilities. One of the most important things learned is the need to use reliable sources of information, for no shame can match that of an editor or reporter caught in an out-and-out misstatement.

Advertisements are a legitimate source of income to the school newspaper. All too often the local merchant is asked to advertise in the school paper in much the same way that he is asked to make a contribution to charity. There is no reason why the advertisement in the school paper should not be a sound investment and when such is the aim of those in charge of the paper, better training is provided for those working under the business manager of the paper as well as for the manager himself.

The school yearbook

Because the yearbook must go to press early if it is to be printed in time to go on sale before the end of the school year, the staff must work hard to achieve a contemporary effect. Further, they must sometimes be given access to information before it is distributed to the rest of the school and to the public generally. Detailed praise of a baseball team that is tying for last place can take the edge off a yearbook just as much as failure to mention a baseball team that is almost ready to take on the Los Angeles (nee Brooklyn) Dodgers.

When a name is chosen for a yearbook, the publications board sometimes forgets that the name will be around almost as long as the school. Novelty choices, though clever and hard to resist, should be either rejected or given the prolonged attention of a large group. In general, simple, dignified names are best. A number of successful annuals are named after the athletic symbol. Perhaps "Spartan" is a suitable name for an annual, but "Wildcat" is doubtful to say the least. A simple listing of the school colors is sometimes a better choice as well as being calculated to produce pleasant memories in later years.

In recent years most annuals have appeared with elaborate, padded covers. Arguments for and against them could be cited. Additional moves in this direction would demonstrate bad taste to say the least.

Most yearbooks contain between 75 and 100 pages, all of which are profusely illustrated. Both formally posed photographs and action pictures should be included. The collection of private snapshots, like those in the gossip column in the school newspaper, should be trimmed unmercifully by the editorial staff.

Production of a yearbook takes the combined efforts of a fairly large staff, many of whom should have had at least a year's experience. The position of business manager is at least as important as that of editor and it should be filled by a person who has been carefully screened largely on the basis of his proved financial acumen. An incompetent business manager can quickly dissipate any student-fund surplus that may have accumulated. Demands for large last-minute subsidies have sometimes been put to the school board, a tactic sure to lower the prestige of the staff. On the other hand,

where representations for subsidies are made earlier, and in an appropriate manner, funds can sometimes be made available in a way that is satisfactory to all concerned. If the production of an annual is a useful educational project, some payment by the governing board is certainly permissible. If the project is not educationally useful, it has no place in the curriculum or among the list of activities allied to the curriculum.

STUDENT GOVERNMENT

PUPIL PARTICIPATION in the government of the school has existed both formally and informally since the days of Plato and Aristotle. A current estimate of the proportion of schools in which some form of pupil participation in government occurs is 85 per cent.

Most important of the bodies in which students participate is the student council. Some have objected to this phrase as it implies a degree of autonomy that has never, and indeed cannot, exist. They refer to the veto power of the principal and to the attendance of a faculty sponsor at all the meetings, and call the body a school council. The objection to the use of the title "school council" is that it implies a consideration of all the problems of the school, whereas the emphasis in debate is almost invariably upon student affairs.

The list of affairs over which the members of the student council have at least partial control is long and varied. Probably the most significant activity of the student council has to do with self-perpetuation—control of elections of officers. More and more principals rely on elected student officials to plan and control assemblies. The master of ceremonies of a school assembly is almost invariably the student body president. Control of behavior in these large meetings is more and more being placed in the hands of student officials, and standards of behavior are passed on by student body officers. Sometimes, a detailed enunciation of rules and regulations originates in the student council and is forwarded to faculty and principal for ratification. Parallel standards are established and maintained for many other activities, especially for major athletic contests. The student council has much to do with coordinating the numerous clubs that are found in junior and senior high schools,

and nearly all the social events are planned in large part by this group of leading students.

A principal can choose one of several policies to follow in dealing with elected student officials. If he is less concerned with educating boys and girls than with operating a smooth-running school, he will probably clearly define the jurisdictional limits of the student council and then adopt a hands-off policy unless the students transgress these limits. On the other hand, he may be jealous of his authority and be so continually present and talking at student council meetings that he provides the so-called leaders with little or no opportunity to grow and develop. A student council needs opportunity to practice decision-making on its own, but it also needs the informed support of the principal. If the principal can be present enough of the time for the students to be able to get used to discussing their affairs in front of him, he may be able to provide considerable leadership by drawing attention to good group process as well as by indicating alternatives that may not have occurred to the students. Further, from his greater experience he may be able to point to consequences of proposed alternatives that the students could not possibly anticipate. Not infrequently, the student body president is an outstanding young man or woman whose abilities can assist markedly in the administration of the school. It is up to the principal to make sure that the student leader does not interfere with his adult assistants, and the principal must be careful to see that he himself does nothing to lower the prestige of his young cohorts in the eyes of other students and in the eyes of the faculty. To strike just the right note, so that all are emotionally ready to pull their weight, calls for deep and enlightened understanding. Sometimes, the student body president is sufficiently adroit to be able to cover the gaucheries of a blundering principal, but this is not the best state of affairs. Fortunately, if the principal is scrupulously honest in his dealings with students and faculty, they will overlook errors in his conduct providing he doesn't make too many of them. Youth is exceedingly resilient and soon recovers from even a severely strained relationship.

Student court

Authorities disagree concerning the value of a student court. Certainly this judicial body should be clearly and definitely separated from the legislative and executive branches of student government.

Where a teacher is available to make sure that the penalties imposed are not unduly severe and when either the principal or school tradition clearly delineates the jurisdictional limits, the faculty and principal need pay but little attention to student behavior in halls, locker-rooms, gymnasium, auditorium, or the grounds, and on nearby streets. Where a considerable number of students drive their own cars to the school the student court can be most helpful.

ACTIVITIES AND CHOICE

FOR YEARS, EDUCATIONAL THEORISTS have looked with favor upon allied activities, perceiving more or less intuitively the educational value of the "co-curriculum." This favor has sometimes been bestowed reluctantly because of the thin intellectual content of many allied activities.

Theorists attempting to define the educational value of allied activities have noted that:

1. By definition, they involve "doing" on the part of the students.
2. They engage the profound interest of the students.
3. Complex social interaction occurs.
4. Character learning takes place.
5. There is plenty of teacher-pupil planning.

An examination of these five representative arguments in favor of allied activities reveals an emphasis on process rather than content. That is to say, a very good educational job is being done with some rather thin material. All five arguments can be subsumed under the rubric of decision-making.

1. The "doing" need not consist exclusively of physical activity. More important than physical movement is the search through memory, and, when this is exhausted, through

books and discussion, for possible alternatives, for the consequences of alternatives, and for ways in which action may be efficient and effective in the direction of the choice.

2. Although students display keen interest in allied activities, it is important to remember that these interests have been learned. To leave the child with his few tentacles of interest is to repudiate much of the teaching function. Interests can be acquired. Teachers must teach them. Students will not work hard at a choice unless they are interested.
3. The reason so much complex social interaction occurs during the process of allied activities is because so many choices must be made. Think of the decisions that must be made by a committee in charge of a school dance!
4. Part of the vagueness of the expression "character development" disappears when it is translated as "practice in the selection of alternatives, and responsibility for choice-determined action."
5. When teachers and pupils plan, they don't just talk; they discuss alternatives, the consequences of alternatives, and the selection of alternatives. When the major choices have been made, action toward these choices produces the need for a subordinate series of choices.

Decision-making provides a useful focus for thinking about the educational advantages of allied activities.

EXERCISES

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1. Check the performances of American athletes in one or two of the more recent Olympics.

2. What community agencies share the responsibility for the moral and spiritual development of children?

3. Try to locate an example where appropriate educational development has been resisted by the requirement that a basketball team be fielded.

4. Describe the recreational activities of children in the elementary school.

5. What are some of the ways of arousing interest in intramural athletics?

6. Describe a high school club experience which you have had, or which you can imagine, wherein an intellectual interest was aroused.

7. Clubs are usually run by the student members. Describe, in detail, student operation of a particular club.

8. Check the law, in your state, governing the formation of secret societies in high school.

9. List the advantages of having a high school paper.

10. Contrast the costs of printing by letterpress and by an offset process.

11. Detail the relationships that might be established between a high school publication's staff and the local press.

12. Search for examples of writing on school newspapers by adolescent writers who later became well known and recognized.

13. What is a manual of style?

14. Suggest examples of poor and good names for high school annuals.

15. Describe clearly the limits of freedom of a high school student council. Support your description with carefully chosen arguments.

16. Try to recall an example in your high school career of a difference of opinion between students and faculty. How did it turn out?

17. How can extracurricular activities be used to teach students to make choices?

TOPICS FOR DISCUSSION

1. Interscholastic football in American high schools.

2. Development of bodily and social skill is a subsidiary purpose of the schools.

3. In dealing with a particular child, can intellectual, physical, and moral development be separated and arranged in any hierarchy of need?

4. The wisdom of choosing all-star teams, even on paper.

5. Coeducational sports in high school.

6. Secret societies in high school.
7. The appearance of baton-twirling high school girls dressed in abbreviated costumes at various civic and noncivic functions.
8. The production of an expensive high school annual.
9. The school annual should be financially self-supporting.
10. The usefulness of a student court.

ADDITIONAL READING

Frederick, Robert W., THE THIRD CURRICULUM (New York: Appleton-Century-Crofts, Inc., 1959). *A complete, modern discussion of the entire program of extraclass activities. There are numerous illustrations and the author makes thoughtful criticisms.*

Johnston, Edgar G., and Faunce, Roland C., STUDENT ACTIVITIES IN SECONDARY SCHOOLS (New York: Ronald Press Company, 1952). *A general textbook giving an over-all coverage.*

Kilzer, Louis R., Stephenson, Harold H., and Nordberg, H. Orville, ALLIED ACTIVITIES IN THE SECONDARY SCHOOL (New York: Harper & Brothers, 1956). *A book dealing entirely with activities that lie outside the ordinary curriculum as taught in the regular periods of instruction. Complete, recent, and authoritative.*

Maguire, Frederick W., and Spong, Richard M., JOURNALISM AND THE STUDENT PUBLICATION (New York: Harper & Brothers, 1951). *This book was written by professors of journalism. It has a quality of expert professionalism that might help the journalism teacher get more of this quality into his school paper.*

Medlin, C. J., SCHOOL YEARBOOK EDITING AND MANAGEMENT (Ames, Iowa: Iowa State College Press, 1956). *This book looks like a school annual, with its many photographs on glossy paper. The writer is graduate manager of student publications of Kansas State College. The book demonstrates that he is highly skilled in this work.*

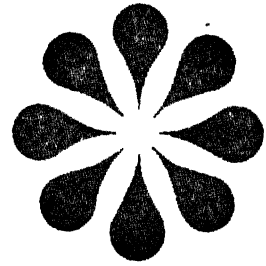
Miller, Franklin A., Moyer, James H., and Patrick, Robert B., PLANNING STUDENT ACTIVITIES (Englewood Cliffs, N.J.: Prentice-

Hall, Inc., 1956). *The special feature of this publication is the description of numerous practices. The word "co-curriculum" is used throughout.*

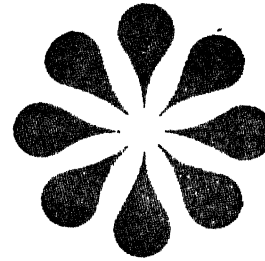
Robinson, Clark, MAKING THE MOST OF SCHOOL AND LIFE (New York: The Macmillan Company, 1952). *A textbook for young people in high school. Stress is laid on personal choice on the part of young people. It deals with all parts of the curriculum, including those outside the classroom.*

Thompson, Nellie Zetta, YOUR SCHOOL CLUBS (New York: E. P. Dutton & Co., Inc., 1953). *A complete guide to five hundred activities for group leaders and members.*

PART III



OVERVIEW



ON THE FACE OF IT, the problem of testing or evaluating a school system seems neither complex nor difficult. Once the goals or purposes of the educational program have been determined, the necessary tests can be devised to measure progress toward these goals, and the tests can be administered periodically to determine whether or not the rate of progress is satisfactory. In engineering terms, a number of equations can be written to delineate the various functions of the school, as $f(x)$, $f(y)$, $f(z)$. These equations can be differentiated with respect to time, the integrals summed for the intervals between the testing periods, and the actual changes compared with the expected changes.

Several lacunae prevent the application of such precise science here. In the first place, there is incomplete agreement with respect to the goals of education not only from nation to nation, but also from state to state, from district to district, from school to school,

and even from teacher to teacher within a given school. Second, completely valid and reliable measures are lacking for determining progress toward many, if not most, of the possible goals of education. Fnally, even where reasonably valid and reliable measures of pupil behavior are available, such as those for the determination of I.Q., reading ability, and arithmetic achievement, no two teachers can be expected to agree on what constitutes reasonable progress for a given pupil in a given area of learning. Given the fact of individual differences among pupils with respect to a single behavioral trait, the wide variety among pupils with respect to a complex pattern of traits, and the enormous and complex variations in the learning situation which includes the characteristics of schools, teachers, administrators, and members of the local community, precise evaluation of the kind suggested is not possible.

On the other hand, the evaluation of pupils, teachers, administrators, schools, and school systems is called for in practice, and a number of steps have been taken to meet the demand. These steps include criticism of the schools in the public press by both laymen and professionals. This section opens, therefore, with a chapter dealing with the nature of such criticism and its probable effect on education. On the whole, the view is taken that such criticism is helpful in that it points up the importance of education and highlights the responsibility of the general public for the schools.

In a few of the articles and books on education that have been written for the general reader, American schools are compared both favorably and unfavorably with those in other countries. A second chapter in this section describes educational programs in England and France in considerable detail and makes mention of a few of the characteristics of schools in other countries.

Offhand statements of opinion concerning the schools are helpful in arousing sentiment, and much can be learned by studying school programs in other countries. More precision and greater objectivity is needed if schools are to be improved. A third chapter included in this section traces the developments in professional evaluation of schools, listing the basic principles toward which this development seems to point, and describing illustrative techniques of evaluation that seem most helpful. Finally, a complex system of

evaluation of schools and school districts is described that carries the reader back to the guidelines for curriculum development that were presented in the final chapter of the section dealing with aims and objectives.

CHAPTER 15

Evaluation by the Critics

A VISITOR FROM OUTER SPACE attempting to make judgments about United States schools during any of the post-Sputnik years, and observing them in the way most easily available to the United States citizen, would certainly have drawn some interesting conclusions. Press, television, radio, and popular magazines have all devoted a great amount of attention to education.

If this observer were limited to these four sources of information, no doubt he would have felt well informed on the subject. It is also quite likely that he would have developed a rather poor opinion of the nation's schools, since much of what he read, saw, or heard would have been sharply critical. He probably would have decided that the principal aim of the public high school in this country is to produce scientists and mathematicians, that the school in this country is doing an incredibly poor job of it, that the chief aim of the institutions of higher learning is to train professional athletes, and that these schools are rated each week by press associations. Certainly, if he extended his reading to include the periodicals of professional education, he would have been greatly confused by

the positions taken by critics and countercritics on every school issue.

It might be difficult to convince our visitor that criticism of educational practice is neither new nor undesirable in this country. It might also be difficult to explain to him that the present tempo of criticism is a natural product of the diversity of opinion permitted and even encouraged in a society where the individual is regarded as the important entity. Parents of pupils who have not been successful, adults who have unpleasant memories of their own school experience, those who "pay the bills," the alarmists looking for a scapegoat, and those with vested interests seeking the promotion of certain ideas and attitudes, all are free to add their voices to the clamor today as they have done in the past. During times of fear and deep national concern the tempo usually increases.

If we are honest we would have to admit to our visitor that the critics have been more vocal in recent years and that the criticisms have reached what may well be an all-time high, in both volume and scope. Part of this increased tempo may be justified in that the opportunity to be heard by most of the people is greater than ever before. Part of the increase can even be credited to efficiency of the schools themselves. More people read and read more. Radio may be less effective as a mass medium of communication than it was a few years ago, but any loss it may have suffered has been dwarfed by the tremendous impact of television.

We should not be surprised, however, if our visitor in turn wonders why educators are concerned about the criticism, if criticism is at all times to be expected in our society. He would point out that educational periodicals hastily publish articles refuting or attempting to refute nearly every significant attack within a few weeks after its launching. Some of these articles have been counterattacks against the motives of the critic, his methods, or his qualifications. Some have been limited to re-establishment of fact, where the writer felt that fact had been distorted or misstated. Some have been deliberate appraisals and have attempted to make some sense out of the mass of criticism in order to aid in giving some direction to educators in establishing policy. Our visitor would also question the effectiveness of these counterattacks in professional periodicals since they do not seem to appear in periodicals which reach the general public.

Our visitor would certainly be justified in expressing his observation that the extreme points of view taken by critics on the one hand, and so-called "educationists" on the other, appear to have led to skirmishing, and the resulting smoke screen confuses rather than clarifies the issues. There seems to be no in-between, or if there is one, those who normally would take the more moderate point of view are either driven or drawn to the two extremes.

"It seems to me," our visitor might well remark, "that a constructive program leading to real progress depends first upon clearing away the confusion, and then upon tying down the problem in terms of clear-cut issues about which the American people must render intelligent decisions."

Thus far, no visitor from outer space has been recorded. Nevertheless, it might be worth while to take a brief look at these current criticisms and their implications for developing a curriculum for decision-making.

PUBLIC OPINION

FOUR HUNDRED AND FORTY-SEVEN critical articles appearing in "lay" magazines, including 280 articles published between July 1, 1957 and November 30, 1958, were reviewed.[1] All of the 447 articles described as "critical" were not critical of educational practice per se. Many presented the attitudes of individuals or groups toward a particular educational problem; e.g., sixty-one articles pertained to integration of schools. Twenty of these were accounts of situations where the problem has been handled effectively and where public acceptance of integration has been satisfactory, while forty-one reflected a pessimistic attitude. Three hundred articles were definitely critical of educational theory or practice, or both. These included criticisms of the curriculum, religion in the schools, costs and methods of finance, academic standards, teaching methods, treatment of individual differences, homework assignments, use of school plant, personnel practices, salaries, teacher certification, teacher education, organization and administration of the school, attitudes toward intellectual activities, progressive education, tradi-

[1] William E. Self, "Public Education—Criticisms and the Critics," unpublished research study, San Diego City Schools, Jan., 1959.

tional education, subversion among school personnel, and numerous other topics.

Some of the most hard-won and cherished traditions of United States public education were challenged. Three articles, two by Rear Admiral H. G. Rickover and one quoting him, suggested that the system of local control of education leaves much to be desired. [2,3,4] One by a professor of journalism suggested that overcrowded conditions at institutions of higher learning should be relieved by denying most women admission to college.[5] Two career women, a columnist and an advertising executive, answered by taking the opposite point of view.[6,7] Four articles advocated a four-quarter school plan which would result in a staggered quarterly vacation, rather than the traditional summer vacation for youth. This was offered as a solution for the school building shortage.

Traditions of United States education were defended as vehemently as they were attacked. Seven articles criticized, by implication at least, the principle of free and compulsory high school education for all youth. Seven articles defended the principle for these same youth. Five articles advocated departure from tradition by including instruction in religion in the schools, while sixteen were against including religion in any form.

Divergent opinion was apparent in other areas. Of twenty-three articles pertinent to the subject of financing education, eighteen suggested ways of obtaining more and better financing, and five indicated that financing is adequate but that school funds are not properly administered or that the American taxpayer is not getting his money's worth. Two articles defended "progressive education," two attacked it directly, and many others took potshots at this while

[2] H. G. Rickover, "Russian Schools Can Teach Us a Lesson," *Popular Science Monthly*, Vol. 172, March, 1958, pp. 107, 248, 250.

[3] H. G. Rickover, "What American Kids Need: Super High Schools," *This Week Magazine*, Feb. 16, 1958, pp. 11, 36.

[4] Charles C. Spiegler, "A Teacher's Report on a 'Tough School,'" *New York Times Magazine*, Nov. 24, 1957, pp. 25, 88–99.

[5] Philip W. Burton, "Keep Women Out of College," *This Week Magazine*, Feb. 9, 1958, pp. 10–12, 36–37.

[6] Bernice Fitz-Gibbon, "Who Says 'Keep Women Out of College'?" *This Week Magazine*, May 4, 1958, p. 36.

[7] Dorothy Thompson, "Oh Professor!" *Ladies Home Journal*, Vol. 75, June, 1958, pp. 11, 14, 16.

concentrating their heavy artillery on something else. Points of view expressed in four articles on the subject of homework assignments ranged from that of the principal of a New York City Junior High School, who wanted to abolish it altogether,[8] to that of a principal of a high school in Babylon, New York,[9] who assigns homework in his school on the basis of forty minutes for each forty-minute class period. Comparative education came in for its share of attention, with twenty-seven articles pertaining to this subject. Of these, ten compared American education unfavorably with that of other countries, notably Russia, and fourteen compared it favorably. Three articles took a neutral stand, being more descriptive in nature.

Much of the writing, while critical, attempted to offer some solution to pressing educational problems. Fifteen articles advocated a wider use of educational television as a possible solution to the teacher shortage. Some suggested that better teacher certification procedures would lead to this same end, and several suggested that the principle of the single salary schedule kept people of high ability out of the teaching profession.

Obviously, there is some agreement among those who write for lay periodicals that public education in this country needs improvement. There is less agreement as to how serious the need is. There also exists wide diversity of opinion concerning how the improvement is to be brought about. A tabulation of the critical articles indicates that four needs are expressed by a significant number of persons.

1. The schools should teach more of everything except, possibly, religion. This need seems to be felt by the general public also, according to a survey cited by Elmo Roper, which showed that the American public wants more, not less, of most subjects taught in the high school. Only extracurricular activities and athletics had a sizable percentage voting to pare them down.[10]
2. Academic standards need to be raised. Nearly all the twelve

[8] Charles H. Shapp, "Let's Abolish Homework," *American Weekly*, March 9, 1958, pp. 5, 34–35.

[9] Cyrus L. Oyer, "I Run a Strict School," *Parade Magazine*, May 4, 1958, pp. 8–9, 11.

[10] Elmo Roper, editorial, "Learning Is Total," *Saturday Review*, Vol. 41, May 24, 1958, p. 20.

articles criticizing standards indicated that pupils were not being taught to think, and emphasized the importance of mental discipline in learning.

3. Better provision for individual differences is required, particularly as applied to the brighter students. This criticism was related to academic standards. Most of the critics claimed that academic standards were geared to the mediocre student.
4. The underlying philosophy of public education needs to be strengthened. That which we now have leads to a negative attitude toward demanding intellectual activity and results in confused and unsuitable aims for education. However, there was no clear idea or agreement as to what the underlying philosophy of education was.

During the three-month period just prior to the launching of the Russian "Sputnik," not a single article critical of the emphasis placed upon instruction in science and mathematics in American schools appeared in a lay periodical. In the six months immediately following this event, no less than thirty-two such articles were published. Only a year later, this criticism had given way to charges that students do not learn how to express themselves clearly, that not enough attention is devoted to the teaching of foreign languages in the American school, and that insufficient emphasis is given to instruction in the social studies, notably history and geography.

Obviously, it is impossible to provide more of everything in the curriculum of the public school. The published criticisms offer little guidance in the development of priorities, and none at all concerning what should be taken out of the curriculum to make room for the proposed new subjects or the increase in emphasis demanded. The critics, in fact, present no clear concept of what the school should be doing; at least none upon which any substantial majority can agree for an appreciable length of time. Nevertheless, criticism channeled effectively into the hands of the general public through the medium of popular magazines cannot be ignored. Educators must find ways to meet it effectively.

Principals and teachers in the schools must work with parents who are at least to some degree influenced by criticism appearing in periodicals. Lack of confidence in the aims and methods of the

school sets up a road block to the kind of relations needed for real cooperation in solving the problems of individual children.

PROFESSIONAL OPINION

SELF [11] ALSO ANALYZED three hundred articles which, to a greater or lesser degree, were pertinent to the topic of improving the educational program.[12] While this sampling may be criticized as being one-sided because it does not include the periodicals relating to the special-subject fields, it can at the same time be defended as being representative of the professional educator's point of view.

Sixty-four articles stated or implied a stand on some aspect of curricular emphasis. Some of these articles suggested directly that a particular aspect of the curriculum was being neglected; others implied as much merely by outlining the importance of a particular field or by suggesting a good, or improved, way of teaching it. Two hundred and thirty-six articles stated or implied a stand on some more or less controversial aspect of education other than curriculum.

A tabulation of the professional articles revealed the following pattern. Regarding the curriculum, educators:

1. would like to see more and better emphasis in a number of curricular areas, less in none;
2. consider emphasis on the teaching of the 3 R's as entirely adequate;
3. would accept responsibility for more religious training in the schools;
4. consider the areas of greatest curricular needs to be science, mathematics, linguistics, the humanities, and moral and spiritual values, in that order.

Writers for educational publications were less influenced by the launching of the Russian "Sputnik" than were those who wrote for lay periodicals, although, as groups, both called for better mathematics and science instruction. All thirty-two articles on this subject appearing in lay magazines were published within six months

[11] *Ibid.*

[12] Max Ascoli, editorial, "Our Cut-Rate Education," *Reporter*, Vol. 18, Feb. 20, 1958, p. 809.

after "Sputnik," while the twelve articles treating this subject in professional publications were scattered over the period from 1953 to 1958.

It would seem that the professional educator is more satisfied with the curriculum as it now stands than is his critic who writes for public media. Although needs regarding curriculum were expressed in fifty-four articles, this total is small compared to the total number of writings reviewed.

Analysis of topics other than curriculum indicates some agreement within the profession regarding at least seven needs.

1. More outstanding teachers are needed. Even if all cannot be artist teachers, there is wide agreement that there is a need to attract and hold more outstanding teachers. This emphasis implies acceptance of the belief that some teachers render significantly better service than most.
2. Financial support of the schools needs to be strengthened significantly. Nine articles suggested some type of federal aid as a way to achieve this. Six articles called for higher teachers' salaries. Seven suggested reduction of class size, this indirectly concerned with finance.
3. The general public needs to know more about the schools, and to take more active part in their operation. A total of twenty-nine articles touched upon this subject, with twelve calling directly for more lay involvement in planning and operation of the schools. Several suggested that school boards should be more active in establishing district policy.
4. More effective professional behavior is needed on the part of all school people. There is a critical need for more courageous and imaginative leadership at all levels. Some writers voiced a need for good leadership among classroom teachers as well as from status leaders.
5. Better treatment of individual differences is still needed. Most of the articles on this topic described improved programs which were under way on an experimental basis, and implied that these pointed the way toward more effective education especially for the academically talented students.
6. There is need for a clearer, better understood, and more systematized philosophy of education. Some articles went further to imply that educators, including classroom teach-

ers, should become more articulate about their philosophy of education.

7. Education and society are producing too much conformity, or "groupism." Individuals need to learn to think critically and make more independent choices. They need to assume more individual responsibility for their success and failure, as well as their behavior in general.

There appears to be divided opinion within the profession on the questions of the need for more discipline, higher intellectual standards, and homework. One thing strikingly absent in the written reactions to critics was a clear statement of a philosophy of education. Of twenty-two articles against critics of education, ten were nothing more than deliberate appraisals of the critic, particular criticisms, or criticisms in general. Five of the articles took a defensive stand and seven attacked the critics, either their methods, motives, or qualifications. None proposed or mentioned the educational philosophy upon which criticism of the critics could be based.

Criticism appearing in the periodicals of professional education is likely to have greater effect upon educational thought and practice than that which appears in lay periodicals. Much of it is written by educators and for that reason may represent trends in educational thinking. It is widely read by educators and is thus likely to influence the thinking of people most directly responsible for the development of educational programs. Most of it is positively stated and thus is cloaked in the context of professional approval.

Educators seldom criticize educational practice directly, even in professional publications. They usually outline a way which they imply is good, and hope it will become accepted practice; or they express the criticism mildly as a need, or as a desirable future step in education.

Even though the criticisms are mild and the basic philosophy is lacking, criticisms appearing in professional publications probably provide a sounder base for bringing about improvements than those which appear in lay periodicals. Their greater consistency has already been noted. Educators seem to be less excitable; they respond more slowly to temporary crises. The immediate post-

Sputnik era produced far less change in the tone of educational publications than in the writings on the topic of education in lay magazines. More attention is paid to causes and less to symptoms, although far too much attention still deals with symptoms only. Sixteen articles called for a clear statement of philosophy, and better understanding and articulation of it by teachers. While there seems to exist mild pressure to add to the already overloaded curriculum without taking anything out to make room for the increased emphasis, this does not appear to be nearly as great in professional writings as in lay publications.

The educators' writing seldom reaches the general public, and when it does, it is frequently misunderstood. The writing of educators is frequently so filled with technical educational terms that it is confusing to the layman; such terms as "dynamic," "forward looking," and "ongoing" are as well worn as last year's shirts, and contribute about as much to clarity. These words label the article as the "writing of an educationist." Few educators appear willing to write boldly, "This is my philosophy of education and of life. This is what I think the schools should be doing, and what I hope they are doing, in the United States." Few lay people will follow a man who cannot formulate a clear statement of where he is going and why, or who cannot explain it in standard English. Lay magazines will not print material that the lay public will not read. And so educators stick to educational publications.

CRITICAL BOOKS

WHILE IT IS PROBABLY TRUE that the most vicious and irresponsible attacks upon public education appear in pamphlets, criticism of this nature is less important in terms of its influence on the general public. Much of this is easily recognizable as propaganda, written for a readership already sympathetic to its doctrine. Some of this material is merely a reprint of speeches or of magazine articles. It also includes the periodic pronouncements of organizations patently opposed to current educational practices.

The most serious criticism is published in book form. The writers of books usually are able to develop a more convincing argument. They can systematize their criticism and unify it so that it is

less confusing to the reader. Their skill in the use of the English language lends conviction to their arguments. The uncritical reader will often be unaware of those instances of distortion, misuse of statistical data, faulty documentation, and deliberate misuse of educational terminology for the purpose of creating confusion. They strike at the heart of the matter more often than do the writers of periodicals. The great majority criticize the philosophical underpinnings of educational practice. When they criticize specifics, it is done most frequently to support their attack on the more basic element.

There is some agreement among the critics who write books that education has made real progress in two areas: methods of teaching and treatment of individual differences. Rudolph Flesch's *Why Johnny Can't Read* constitutes a major exception to the first of these.[13] He attacked educational practice at one of its strongest points, methods of teaching reading. There is ample evidence that, while some children still do not acquire adequate mastery of this fundamental skill, there are fewer of these than at any time in history, and the majority are significantly better readers than were their parents and grandparents. In spite of this, Flesch's book created quite a stir. His emphasis upon a purely phonetic analysis as being the only sure way of guaranteeing reading skill had educators hurriedly assuring the public that phonics still play an important role in teaching reading to young children. A few educators attacked Flesch's obvious assumption that pronouncing words constitutes reading. Still fewer bothered to point out that phonetic analysis is purely a "crutch" to aid in vocabulary building.

Irving Adler takes exception to educational practice in the treatment of individual differences and urges the abolition of intelligence testing as a means of finding out what these differences are.[14] Roger Freeman, in *School Needs in the Decade Ahead,* has provided a unilateral approach to educational problems: that of cost.[15] Mr. Freeman's book has received numerous favorable re-

[13] Rudolph Flesch, *Why Johnny Can't Read,* Harper & Brothers, New York, 1955.

[14] Irving Adler, *What We Want of Our Schools,* John Day Company, New York, 1957.

[15] Roger Freeman, *School Needs in the Decade Ahead,* Institute for Social Science Research, Washington, D.C., 1958.

views in the public press, and at a particularly opportune time for him and his followers. His book was focused at defeating federal aid to education. However, he drags in all the old attacks upon education to support his major thesis. Arthur Bestor, in *Educational Wastelands,* advocates the re-establishment of standards through examinations.[16] He also criticizes the "life-adjustment" curriculum, the "interlocking directorate of professional educationists," teacher training and certification, and the "vanishing sense of purpose in education." In spite of the fact that these authors readily display a woeful lack of knowledge of what really is going on in education and even a greater lack of knowledge of what has been discovered regarding how people learn, these writers have spoken with great authority and have gained the recognition they sought from the general public.

In three major works, Mortimer Smith dissects the pragmatic philosophy which he says underlies modern education in the United States, charges that intellectual discipline has been replaced by planned mediocrity in our schools, attacks the life-adjustment curriculum, and deplores what he calls the "strangle-hold of the educationists" on the schools today.[17,18,19] He says pragmatism has no value system, and education, therefore, has no satisfactory goals. Smith is critical of the educationists' airy dismissal of the philosophic conflict in education and of the academic aptitude and performance of teacher-education students.

Albert Lynd, school-board member and businessman, has written critically of teacher education, the "new curriculum," and the influence of Dewey and Kilpatrick, and of what he considers their progressivist theory, upon educational philosophy.[20]

Winfield Scott and Clyde M. Hill classify what they term the major criticisms of recent public education under the headings gen-

[16] Arthur Bestor, *Educational Wastelands,* University of Illinois Press, Urbana, 1953.

[17] Mortimer Smith, *And Madly Teach,* Henry Regnery Company, Chicago, 1949.

[18] Mortimer Smith, *The Diminished Mind,* Henry Regnery Company, Chicago, 1954.

[19] Mortimer Smith, *The Public Schools,* Henry Regnery Company, Chicago, 1956.

[20] Albert Lynd, *Quackery in the Public Schools,* Little, Brown & Co., Boston, 1950.

eral and philosophical, progressive education, the fundamentals, religion, the social studies, and teacher education. Their anthology covers selected criticisms appearing in lay magazines during the decade ending in 1952, and analyses of these criticisms appearing in educational magazines during the same period. They classify the critics whose opinions attract considerable attention into four groups: scholars, professional educators, professional writers, and outright enemies of education.[21]

Sturges F. Cary has written a concise and lucid defense of present practice in education, and dispassionately evaluated the critics' attacks upon it. He holds that the public school should open its ears to the comments of the ideological critics, whether right or left wing, and discuss differences of opinion without vindictiveness or use of the "straw-man" approach.[22]

Undoubtedly some of the critics of public education are influenced by a personal profit motive, and others by a desire for power or at least recognition. There are reasons to think that several of the current group of organizations professing a desire to reorganize public education with the view to its improvement share the same motive. Although ostensibly independent of each other, the intellectual connection of these groups is apparent. The writings of these groups, while patently critical of the philosophy, the aims and ends, curriculum, intellectual standards, and the end product of education, incidentally manage to get in effective body blows to the point where it hurts most: financing the schools in general and any possible federal financing in particular. The thoughtful reader, surveying the whole pattern of educational criticism, is soon convinced that there is now under way a well-organized campaign to hold down the dollar cost of public education, without regard for other costs which such a program might entail.

BASIC NEED INDICATED BY CRITICISM

THE CRITICS AGREE that we need to continue the development of fundamentals and to improve the ways of teaching

[21] Winfield C. Scott and Clyde M. Hill, *Public Education Under Criticism*, Prentice-Hall, Inc., New York, 1943.

[22] Sturges F. Cary, *New Challenge to Our Schools*, H. W. Wilson Co., New York, 1953.

these fundamentals. The critics also point out that the process of education is the real strength of the educational program for the future. They urge the mastery of creativity and decision-making, not merely problem-solving. It is evident that children must be trained to meet emotional stress, to be realistic and adaptable. The critics in their various ways also indicate that the schools' primary concern is to help youth find values and continue to develop their abilities and talents so that they can create and live with one another in the world of tomorrow.

One causal factor emerges above all others. These criticisms make clear a basic need to recognize, review, and come to grips with varying philosophies regarding education. This does not mean that the varying philosophies should be resolved into a single controlling philosophy. To do so would violate the basic principles of democratic society. By recognizing, reviewing, and coming to grips with the varying philosophies, the task becomes one of finding a common process which will serve as a base for the educational program. Around this common process the school can then be developed.

EXERCISES

1. Select two or three popular articles on education from current magazines and news sources. List the major topics discussed. Analyze the arguments that are presented.
2. What has the recent "Commission on Values" of President Eisenhower had to say concerning the problem of integration of schools?
3. Contrast the proportion of women in the various professions in America and in Russia.
4. What age must a youth reach before he can legally leave school in your state?
5. Question, tactfully, a child or youth of your acquaintance concerning the manner in which he spends his time.
6. Work out the program of required subjects for a college-bound high school youth. Does he have time for electives?

7. Describe, in detail, one or two of the meanings different people attach to the expression, "teaching people to think."

8. What is the psychology underlying the assumption that schools must provide mental discipline?

9. Have the voters in your district supported or turned down a recent proposed tax increase or bond issue for education? On what basis? Do the American people generally seem willing to tax themselves sufficiently to support a first-class program of public education?

10. What aspect of the public schools of America has produced the most comment in recent years? Why is this, do you suppose?

11. Name two criticisms of the public schools about which there is widespread agreement both inside and outside the teaching profession.

12. List ways in which teachers might cooperate to improve their own learning.

13. Ask one or two teachers you know to outline for you their philosophy of education. If they ask you what you mean, you can just ask them for a list of several of their aims and purposes in teaching.

14. A common criticism made of professional educators is that they all think alike. See if you can find evidence of disagreement among educators regarding needed modifications in the schools.

15. Suggest a number of possible reasons for the attacks upon education in the public schools by professors in colleges and universities where the teachers of the public schools have received their preparation.

16. Certain critics of the public school have tried to make the word "educationist" into a term of derision. Trace the origin and development of this word.

17. What are some of the difficulties encountered by an investigator who seeks to compare present pupil achievement with pupil achievement of ten, twenty, and thirty years ago? What is the point, if any, of making such studies?

18. A science of man must, because of the complexity of the subject, be vastly more complex than a science of things. Yet the study of the physical sciences is generally considered more difficult by students than the study of the humanities. Explain this apparent paradox.

TOPICS FOR DISCUSSION

1. Recent criticism of public education in America has had a beneficial effect.
2. Local control of education as practiced in America.
3. Should women go to college?
4. All youth should be educated at least to the age of seventeen.
5. The teaching of religion in the public schools.
6. Schools and colleges should operate twelve months in the year.
7. American children do not do enough homework.
8. People in a democracy have both a right and a responsibility to discuss the methods and purposes of the public schools.
9. The desire to bring education within the reach of all has resulted in an undue emphasis on common learnings and has stopped the schools from paying sufficient attention to the diversity of learning.
10. The study of a given subject can take place at three levels: necessity, usefulness, and as a mode of thought.
11. During the depression years of the 1930's, professors of education described what at that time they thought the curriculum of the schools ought to be. It is this "paper curriculum" that has received much of the criticism in recent years.
12. It is more important for the schools to teach children about science and mathematics than to help them to develop moral and spiritual values.
13. Classroom teachers should have a far stronger voice than they have at present in the conduct of the public schools.
14. Adolescents have always shown a high degree of outward conformity to the group mores.
15. Schools have progressed regarding the treatment of individual differences.
16. What system of philosophy could the schools adopt in a country where one of the great and magnificent freedoms is freedom of belief?

ADDITIONAL READING

Bruner, Jerome S., THE PROCESS OF EDUCATION (Cambridge: Harvard University Press, 1961). *In September, 1959, some thirty-five scientists, scholars, and educators met at Woods Hole on Cape Cod to discuss the improvement of science teaching in primary and secondary schools. This book is a report of the conference. After too many years of efforts by subject specialists and educators in isolation from each other, we have here a rational statement based on the assumption that the work of each is significant.*

Conant, James B., SLUMS AND SUBURBS (New York: McGraw-Hill Book Company, 1961). *When Professor Conant was gathering information for his book on the Junior High School, he was struck by the serious and contrasting problems faced by school people in "culturally deprived areas," in the big cities, and in the residential suburbs of these cities. In the first three chapters he deals promptly and vigorously with educational problems among both whites and non-whites with low socio-economic status. His point of view is both humane and informed, and he has modified his usual writing style in such a way as to permit considerable emotional impact. The other three chapters present the suburban dilemma: high parental ambition, and high selectivity by certain prestige colleges and universities.*

Ehlers, Henry, CRUCIAL ISSUES IN EDUCATION (New York: Henry Holt & Co., Inc.), 1955. *This collection of thoughtful articles is grouped partly under the two headings of freedom for the teacher and freedom for the learner. The reader who is led by this to expect some carefully developed statements will not be disappointed*

Hook, Sidney, MODERN EDUCATION AND ITS CRITICS, from the Seventh Yearbook of the American Association of Colleges for Teacher Education (Oneonta, N.Y.: The Association, 1954). *One of the more penetrating essays on the subject. The author is squarely on the side of the intellectuals, but he engages in*

no theatrics. Instead, he is careful to point out the philosophical basis of the quarrel.

Mayer, Martin, THE SCHOOLS (New York: Harper & Brothers, 1961). *Martin Mayer is a professional writer. His book is based on observations and information acquired at first hand over a period of three years by means of visits to 150 schools and interviews with 1,500 people involved in education. Apart from the charm of the book, achieved in part by short descriptions of classroom events, the book is well worth careful study because of its content.*

Scott, C. Winfield, Hill, Clyde M., and Burns, Hobert W., THE GREAT DEBATE: OUR SCHOOLS IN CRISIS (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1959). *Arthur E. Bestor is selected four times in this collection of writings pro and con the American public schools. There are also debates on two recent additions to the growing library of books on this subject. However, only once does the treatment get below the surface, in an article on philosophical implications by F. C. Neff.*

CHAPTER 16

Comparative Education

MUCH CAN BE LEARNED from a study of schools and school systems in other countries. In such a study the different historical and social settings must be considered. Although all schools in all countries teach languages, history, geography, mathematics, science, and technical and trade subjects, there are vast differences in the manner in which these subjects are taught. Schools in Norway could never be expected to submit to the regimented centralization found in French schools. Much as the Danish folk-schools may be admired by visitors from other countries, the part played by the Danish national character as it has developed historically cannot be overlooked, and it is therefore extremely unlikely that such a system of adult education could be successfully transplanted to another culture. The famous British Public Schools, whatever else they are, must remain essentially British.

Yet the goals of education in the democratically governed countries sound very much alike, stressing as they do a balanced synthesis between the development of the individual as a person and as a future contributor to the welfare of the state. Furthermore, techno-

logical advances have established the inevitability of change in all countries of the world, so that at least a part of the educational effort must be devoted to fostering and developing the social and scientific creativity needed to cope with these changes.

Despite local differences in history and character, these differences may be expected to be less significant in the future than they have been in the past. Industrialization to the point of automation calls for a careful re-examination of national values and of the system of education employed to transmit these values. Undirected, the effect of automation could eventually turn modern men into puppets.

BRITISH EDUCATIONAL AUTHORITY

IN ENGLAND, SCOTLAND, WALES, and the North of Ireland, schools and their method of operation have changed in the past one hundred and fifty years, but the change has been less sudden than in some other countries. The British have managed the same quiet revolution in educational policy that they have in social policy. Without trying to plan every detail in advance, they have held endless committee meetings to discuss the implications of such sweeping legislation as the Balfour Act of 1902, the Herbert Fisher Act of 1918, and the Butler Act of 1944.

A careless observer may receive the impression that as regards the control of education the British Government is highly centralized. The Queen is the Chief of State. She is served by a Minister of education. Attached to the office of the elected Minister is a corps of civil servants. A number of them carry the awesome title of Her Majesty's Inspector of Schools.

These inspectors have almost no direct control over activities in the schools. Although their position was strengthened legally by the Butler Act, a long tradition has persisted whereby the Ministry does not initiate, but rather approves plans made locally. It can advise and suggest, and because the advice and suggestions are backed up with control of finances its advice and suggestions are carefully considered. More than 70 per cent of the cost of education is borne by the National Government. But it is a serious error to

think that a representative of the Ministry can walk in and tell a local authority what to do. Approval or disapproval is usually reserved for plans concerning the construction of buildings and the establishment of certain kinds of schools. Such control almost never touches the curriculum, choice of textbooks, or the selection of individual teaching or administrative personnel.

The local education committees are often quite large. Each county, or county borough, if the county is heavily populated as are those in the London area, assigns elected members of the county council to serve on an education committee and these members are privileged to co-opt additional members from among the clergy, teaching staff, medical staff, college or university faculties in the area, and other interested citizens.

The local education committee can ask members of the Ministry of Education to study specific problems and to provide it with reports on their findings. On the basis of these reports, on advice obtained from local professionals as well as from the Ministry, on its first-hand knowledge of the local situation, and on its own lengthy deliberations, the committee advises the entire county council which has replaced the *ad hoc* school boards as the Local Education Authority.

A director of education is employed as an executive of the L.E.A., much as an American school board employs a superintendent. Although the director often maintains a fairly large staff, including one or more local inspectors, he does not have as much power over curriculum and teaching personnel as an American superintendent of schools. Yet a local inspector often enjoys more status than a consultant from the County Office of Schools in America, especially in schools with modest individual prestige.

Considerable freedom is enjoyed by the headmaster of a school. Traditionally, many British schools were privately endowed and headmasters and headmistresses were selected for their skill in running a school in all its aspects. They were held responsible to a governing board, but these boards used their power to give or take away office rather than to interfere in the detailed operation of the school. Many headmasters of British schools have become world-famous, Arnold of Rugby, Sanderson of Oundle, and Thring of Uppingham, for example. Arnold, who died at the age of forty-

seven, was the father of Matthew Arnold who, though one of Her Majesty's Inspectors of Elementary Schools, is best known as a poet. Lord James, headmaster of the Manchester Grammar School, and known affectionately to his staff as "chief," is probably the best known of those currently active.

A "head" is expected to set his mark on a school. He does this partly by selecting capable assistants who in turn enjoy a high degree of autonomy concerning the details of the courses they offer. But chiefly he does it by creating an image of himself in the minds of the boys who attend his school. Because he usually remains for a lifetime, and because of the existence of boarding schools, the headmaster is frequently one of the most influential persons in the life of a Britisher. As will be made clear later, the leaders in British life have in many instances attended one of a handful of famous Public Schools. Winston Churchill went to Harrow, Montgomery to St. Paul's, Arthur James Balfour to Eton, Neville and Austen Chamberlain to Rugby, G. K. Chesterton to St. Paul's, and Viscount Palmerston to Harrow. Not only is this true of the members of the front rank, but often of those of the third and fourth ranks, so that when one important Britisher meets another, the first personal interchange is likely to concern the name of the school attended, rather than the name of the university by which each was granted a degree. If they are more or less contemporaries and happen to have attended the same school, the next topic will concern some mild eccentricity on the part of the headmaster. Although leaders in British life have, in recent years, come almost as frequently from the lesser known grammar schools, the halo of all this nostalgic glorification of the "head" has tended to spread to headmasters and headmistresses generally, and so they are provided with a fireplace, a carpet, and some easy chairs in their study (office) from which they dispense Anglo-Saxon fair play with appropriate regality.

INFANT SCHOOLS

COMPULSORY FREE SCHOOLING in England and Wales begins at the age of five. Right away, the little ones begin to learn to read, write, and do sums. At the turn of the century these were extremely formal schools. The backless seats for eighty or ninety

babies were arranged in a gallery, and the teacher, almost always a woman, stood pointer in hand where all could see her as she drilled away mercilessly at abstractions that were completely meaningless to all but a very few.

Prodded by such reformers as Robert Owen, with his special school for the teaching of infants at New Lanark, William Lovett the Chartist, and David Stow who founded the Glasgow Normal School, those in charge separated the infants of five to seven years from the older children and provided them with a pleasant, harmonious environment, and a life of happy activity. During most of the twentieth century, a number of training colleges have concentrated on the preparation and training of teachers for early childhood. Many of the ideas of Froebel, Montessori, Dewey, and Decroly have been incorporated. Yet tradition, and pressure from parents with their eyes fixed on the competitive examinations to come, have combined to prevent the infants' schools from too great an emphasis on play. Despite the firm statement from psychologist Sir Cyril Burt that while children should be free to read, write, or cipher at an earlier age, "little or no formal instruction should be given before the age of six at the very earliest," many of those who enter the junior schools at the age of seven read simple books, write without hesitation, usually in script, and do creditable number-work. In addition, their artwork, music, and rhythms have not been neglected. In the better schools, the children know about such things as magnets, and the parts of flowers, and they have usually explored the fascinations of their town's firehouse and post office. It is particularly noteworthy that some of the children are already much farther along with the use of the tool subjects of reading, writing, and arithmetic than are the others. This precocity increases rather than diminishes in the junior school.

JUNIOR SCHOOLS

IN THE YEARS FROM SEVEN TO ELEVEN, the teachers really drive the children as they prepare for the competitive examinations by means of which one in five will be selected for entrance to the grammar schools. In this, the teachers are aided and abetted by the parents. Those who are ambitious, yet find their children

below the top ten per cent, insist upon hours of homework which they either supervise themselves or for which they engage the services of a tutor.

Some teachers in British primary schools try hard for the lighthearted touch, and in this they are encouraged by a few of the children, especially those who have already decided upon a working-class career. But those who know they will soon be competing in an examination which tends very strongly to rank them for life, think of the school as a place to work, work, work. Their only refuge is the land of fantasy found in such novels and poetry as will help them to prepare for the examination.

A few of the well-to-do people send their children to the independent preparatory schools. Entrance to the better of these is competitive. The child's name must be put down when he is born, and at the age of seven he must submit to an examination in reading, writing, and arithmetic. Proficiency in a second language is helpful and not at all uncommon. The headmasters of these preparatory schools are not only extremely well educated themselves, they also carry with them the personal aura of a successful playwright or top-notch business executive. There are just a handful of them in the country, but competition near the apex of any activity is exceedingly keen. Most informed Englishmen would agree concerning the names of the top four or five preparatory schools in England; in America, no two people would agree on how to begin such a selection process.

Entrance to the better senior schools is not assured by success in these preparatory schools but most educators would agree that it is a help. For one thing, the youngsters are assured of plenty of first-class competition as they prepare for the great task ahead.

SORTING OUT THE JUNIORS

FROM SIX MONTHS TO A YEAR before they are to take the famous eleven-plus examination, some primary children in Britain take a parallel form of the three examinations or tests that will be used to select them for advanced educational opportunities. For all intents and purposes, the child's vocational and social opportunities are separated, more or less permanently, along one of at least

two paths by the results of the examination that is taken between the eleventh and twelfth birthdays. The children need to be well prepared and they deserve to be accurately selected.

The three tests are standardized achievement tests in reading and arithmetic, and an intelligence test. Psychologists will not be surprised to hear that the variation in scores is from zero to twenty per cent between the first application of the test and the second, six months or so later. The number of children taking the examination is of the order of one million. Hence an arbitrary cutoff point must be decided upon that contains at least five figures. It is as though a surveyor made use of a rubber chain in a vain attempt to measure land with an accuracy of 0.001 per cent. Fences ought not to be built too permanently on the basis of the survey.

Consideration of teacher marks and personal interviews help to remove some of the injustices, but there is no doubt that many children are selected that should be excluded, and vice versa. Many people will argue that none should be excluded at such an early age. But money for education is short in Britain and tradition is difficult to break.

The foregoing deals solely with the accuracy of tests used to select children at the age of eleven plus. Even if the tests were completely accurate, they could measure only what the child has done in school up to this point. They fail to take into consideration either the child who has not been stimulated to learn, or the child who has been improperly stimulated. Teachers as well as historians know all about the "late bloomers." They also know about the "hothouse specials" that wilt rapidly in the harsher climate of high school and college.

The British are well aware of the difficulty of their problem. They also realize the problem has not been solved. Great hopes were raised by the Butler Act of 1944 which strengthened national support of the secondary modern school. These are schools attended by those children who fail to pass the eleven-plus examination. The law compels them to remain in this school until the age of fifteen, and there is much talk of raising the age to sixteen, or even to eighteen. After the following discussion of the various kinds of secondary schools in Great Britain, a better assessment of the ease of mobility from one kind of school to another can be made.

COMPREHENSIVE HIGH SCHOOLS

THERE ARE IN GREAT BRITAIN a few experimental high schools that are comprehensive in that they house all youth between the ages of eleven and fifteen or longer if they elect to stay in school. Most of these are in the London area and are said to have been built because of powerful representation on the London County Council of working-class people.

The vast majority of the people in Great Britain believe in and accept a class structure that provides them with a ruling elite. The difference between past and present beliefs in the country is that whereas the British were once content to be ruled by a hereditary aristocracy, now they believe that everyone of proved ability should be given ample opportunity to improve his station in life. No doubt this value is partly humanitarian in origin, partly socialistic, and partly born of a grim determination to survive. Talent is needed, no matter what its source.

But as Woodrow Wilson has said, the British invariably live their institutions rather than make them up out of whole cloth. Hence they are content to try out the comprehensive schools so that they can have ample opportunity to solve the major difficulty of such schools. For it must be confessed there is a grave and serious difficulty which has not yet been met in American high schools generally, and that is the achievement of a college preparatory section in which children of high intellectuality can be appropriately stimulated, and yet which is neither cut off nor guarded from the rest of the students of the school. Conant has said that the appropriate courses can be offered in a comprehensive high school. But a serious talk with a group of Upper Sixth Form boys or girls from a good English grammar school will demonstrate quickly the difference between offering courses and effecting education.

THE PUBLIC SCHOOLS

THE HANDFUL OF GREAT AND FAMOUS British Public Schools, among them Eton, Harrow, Winchester, St. Paul's, and Rugby, have been educating a majority of the English elite for the

past five centuries, and there is every indication they will continue to do so. To begin with, a boy has to be both rich and clever, or else exceedingly clever, to get into one of them. His parents must have entered him when he was born. His preparation to the age of thirteen must be both arduous and single-minded.

Once there, he will find close and daily contact with men, each one of them a scholar who teaches passably, chiefly in order that he may spend his life with books. Among the companions of his scrapes and exercises will be sons of famous writers, lawyers, doctors, politicians, and industrialists.

For six or eight years, twenty-four hours a day, he will be drilled in the code so that at the end, he will know instinctively what is "done." His clothes, his walk, and especially his "accent," will be the badge he wears for the rest of his life.

GRAMMAR SCHOOLS

THE CURRICULUMS OF THE GRAMMAR SCHOOLS and of the public schools are similar, but these are distinct from the curriculums of the secondary school.

From twenty to twenty-five per cent of those children who are in school in England and Wales between the ages of twelve and eighteen attend a grammar school. These are schools where seven or eight hundred students prepare for the next examination, the General Certificate of Education. There are two levels, the Ordinary Level and the Advanced Level. Usually, the boys and girls attend separate schools, but coeducational grammar schools are becoming increasingly popular. There are three forms or grades—four, five, and six—and each of these is divided into a lower and an upper section. With a year to each half-form, six years are needed to complete the work of the grammar school, but the lock step implied by this generalization is subject to much variation. Many students spend more than a year in a given part of a form. Many more are able to skip one or more parts of a form.

Students write the G.C.E. Ordinary Level at the end of their year in either the Upper Fifth or the Lower Sixth. Occasionally, a boy or girl will take one or two examinations for several years, so as to be able to concentrate on very few subjects at a time. But the

usual procedure is to write the half-dozen or so subjects all at once. These are essay-type examinations set by the universities. Approximately sixty per cent of the marking of these papers is performed by grammar school teachers, usually under the eye of a man from the university. By American standards, these are difficult examinations, but the boys and the girls have been coached for them carefully. Part of what they are able to reproduce will have to be relearned if it is to be permanent. Much of the content does stick, and relearning is comparatively easy. Examinations are usually taken in physics, chemistry, mathematics, history, geography, botany, zoology, French, German, and Latin, but any given headmaster can call for an examination to be set in quite a variety of subjects including industrial arts and home economics. Use of success in one or other of these subjects for entrance to Oxford or Cambridge, for example, would be most unusual.

For that matter, success at the Ordinary Level of the G.C.E. is very rarely enough to get a boy or girl into one of even the less popular colleges of Oxford or Cambridge. Those planning an important career at the university come back to spend one, two, three, or even more years in the Upper Sixth, before taking the advanced level examinations in two or three favorite subjects. Some of these boys and girls hope to win scholarships. Competition for these scholarships is exceedingly keen.

A few additional remarks on these examinations are in order. The General Certificate of Education is awarded on the basis of a national examination set by any one of nine examining boards. Secondary school teachers serve on these boards, but only in an advisory capacity. The G.C.E. examinations were first held in 1951 and, according to a ruling of the Ministry of Education, replace both the School Certificate and the Higher School Certificate examination. The G.C.E. can be taken in one or more subjects. The Ordinary Level is taken customarily at the age of sixteen, though occasionally at fifteen or even fourteen, in from four or five to eight or nine subjects. The Advanced Level is usually taken at approximately the age of eighteen and in from two to four closely related subjects. It is fairly easy to see why school people in England frown on the taking of the Ordinary Level before age sixteen—from then on, the student will specialize in only one or two subjects. Practically

all grammar school boys and girls take the Ordinary Level. A small but increasing proportion of secondary modern school pupils sit for this examination. A small proportion of grammar school students take the Advanced Level.

Hence the curriculum of the grammar school is colored more or less heavily by the backwash from the G.C.E. examinations. These examinations are not highly reliable, in a scientific sense, but they do demand from the student a knowledge and understanding of the subject that is both broad and deep. The subjects are standard: mathematics up to and often including the use of calculus, plane and spherical trigonometry, and analytical geometry, chemistry including not only general chemistry but some qualitative and quantitative analysis, organic chemistry, and even physical chemistry. In America, the study of chemistry would not proceed so far until the sophomore, or even the junior year in college, and whereas many American college students take only the freshman chemistry course in general chemistry, or perhaps no chemistry at all, a high proportion of sixth-formers in Britain would study chemistry. Many sixth-formers in Britain study physics, pursuing the subject with full mathematical rigor. History and geography are studied separately. A variety of methods apply to the selection of content in history and geography as well to the methods by which the selected content is taught. However, the implied freedom is heavily restricted by the need to prepare the students for examinations.

During their years in the Upper Sixth, boys and girls spend only a fraction of their time in formal course work. They usually read deeply in their subjects of specialization under the tutoring of one of the members of the faculty.

Boys and girls in the Upper Sixth also serve as the prefects of the school and one of them is the school captain. Prefects have a common room of their own and masters usually knock on the door before entering. They derive directly from the "head" a good deal of responsibility for the operation of the school. For example, all the out-of-class discipline is taken care of by prefects. Lower forms are brought to order before the master enters. Library loans are checked. Sports, debates, and concerts are usually run by the prefects. Use of prefects to assist in the operation of the school was emphasized by Thomas Arnold of Rugby, and is now firmly en-

trenched in the British educational program. Boys and girls learn much about their fellows during the process. Under the system the teachers are able to devote as much of their attention as they wish to scholarship and its development, for the sheer running of the school that takes so much of the time and energy of the American high school faculties concerns them scarcely at all.

SECONDARY MODERN SCHOOLS

ALL THOSE WHO FAIL TO GAIN ENTRANCE to a grammar or technical school attend a secondary modern school until they are fifteen. A few stay longer. Theoretically, it is possible for a child to move from a secondary modern to a grammar school if he displays the necessary talent. Very few make the change and the reasons are not difficult to find. When these schools were first established, salaries to teachers in secondary modern schools, even with equivalent training, were lower than in grammar schools. This particular inequality has been removed, but teaching in a secondary modern school does not yet call for a university degree in an academic discipline. Hence the secondary modern schools are staffed largely with those prepared in the teacher-training institutes. A headmaster or headmistress is likely to be chosen for a secondary modern school because of his skill in communicating with children from the lower social classes. He therefore usually has a broadly sympathetic feeling for all his fellow humans, especially the less fortunate, and such a feeling is bound to prevent him from focusing the major portion of his energy on scholarly activity and academic success. Whereas the head of a grammar school would seldom venture from his office without his gown, and sometimes even his mortarboard, the head of a secondary modern school would seldom venture being seen wearing either.

A secondary modern school is like an American junior high school with the college preparatory group creamed off, except that the children are under much more strict control with respect to behavior.

Staffs of secondary modern schools enjoy much more freedom than those of primary schools or grammar schools regarding cur-

riculum choices. Unless the "head" is anxious to establish a reputation for success via the G.C.E., a most unlikely pathway considering the type of pupil his school enrolls, free experimentation with the curriculum within wide limits takes place.

Despite the unselected make-up of staff and students, successful new approaches to the education of British adolescents are likely to come from innovations tried out in the secondary modern schools. This expectation is valid not only because the secondary modern schools are relatively free, but also because the nonconformist teacher and student are both screened out of the grammar school.

Although most of the children leave at the age of fifteen, a small but increasing number is staying on for a fourth or even a fifth year, chiefly in order to prepare for the G.C.E. Because the schools are new (they were officially started April 1, 1945), the heterogeneity that has resulted prevents any large number of generalizations from being taken, and the rapidity with which the curriculums are changing and developing prevents any generalization at all from being taken too seriously.

Only one subject is prescribed by any formal Act of Parliament, or ruling by a Local Education Authority, and that is religion. An examination of the influence of religion upon the political history of Britain reveals a few of the reasons for this regulation, but an examination of the educational history of Britain reveals far more. Until 1870, most of the schools of Britain were supplied by religious bodies, although financial assistance was provided after 1833 to Church of England schools, to schools of the Free Churches, and to Roman Catholic Schools.

So far as the rest of the subjects of the curriculum are concerned, they consist of two groups: English, mathematics, history, science, and geography, known as the basic subjects; and music, art, metalwork, woodwork, domestic science, office practice, and physical education, known as the bias subjects. For this latter group of subjects does incorporate the bias of the secondary modern school. Shop and domestic science are taught in grammar schools, and they are to some extent emphasized in the technical schools, but, on the whole, less extensively than in the secondary modern schools.

The content and method of teaching the basic subjects differ

from grammar school practice only to the extent that these differences are demanded by the abilities of the children, the preparation and availability of the necessary teachers, and the all-important fact that most of the children leave at age fifteen. For example, few children in the secondary modern school study mathematics as a mode of thought.

Many thoughtful Englishmen are watching the experiment of the secondary modern school with profound interest. The Crowther Commission has recently issued a report on the fifteen to eighteen group, for example, that deals most perceptively with the social and individual problems left untouched by traditional educational practices in England. They hold the view that prior to the Butler Act of 1944 far too few British children were satisfactorily educated. They are deeply concerned that external examinations, coupled with failure on the part of the public to treat the new secondary modern schools with patient understanding, will deny these schools the opportunity they deserve as the growing edge in a highly traditional educational system.

On page 391, for example, of the Crowther Commission report just referred to, a chapter is started entitled "The Alternative Road." Here, full recognition of the variety of interests possessed by children of twelve to fifteen is demonstrated. Many of them have clearly formulated ambitions in the world of the arts and of the theater. Others have already acquired a passion for careful and constructive work involving the use of the hands. Still others have gone deeply into the structure and function of such modern machines as cars, radios, television sets, and automatic computers. These interests mean that pupils can probably be led to an interest in ideas from a variety of starting points. The traditional way is to present the ideas first as abstract generalizations and to follow this presentation with explanatory examples. For pupils not ready for this adult approach, the sequence may need to be reversed: first the examples with which the pupils are already familiar and then the generalizations. Some of the generalizations may be worked out by the pupils themselves.

COMPARISON OF BRITISH AND AMERICAN CURRICULUMS

ONE ALL-IMPORTANT DISTINCTION is that timetables in British schools are arranged with a class of students as the unit rather than an individual. As a result, subjects can easily be offered once or twice a week and for periods of varying length. For example, shop, if taken at all is usually taken for half a day, once or twice a week. Laboratory sciences are also scheduled for longer periods of time than the usual forty or fifty minutes.

There is no doubt that British children are much more earnestly provided with information than are American children. All secondary schools display a seriousness that contrasts markedly with the lighthearted quality of most American schools. Probably, the external examinations have much to do with this. Although not all children in secondary modern schools sit for external examinations, there are strong indications that they will soon be doing so. An important point to consider here is whether in either British or American schools a permanent attraction to the consideration of ideas is being developed. Is the serious study of the British children occasioned by a fleeting impulse to pass an examination? Will the sometimes superficial toying with a subject by the American children develop into real and lasting interest?

A third distinction between curriculums of British and American schools is that the fusion of history and geography and even of other subjects into social studies is not nearly so popular in Britain as in America. History and geography are always taught separately in British grammar schools. Again, this distinction results, in part, from the external examinations, but the pronouncements of such dignified and respected groups as the Royal Geographic Society must have been effective also.

Many grammar schools offer extensive programs of Latin and Greek. Until recently, Latin was necessary for entrance to Oxford and Cambridge. On the modern side of the grammar schools, French and German are also taught. The secondary modern schools almost never provide courses in Latin and Greek, French is seldom taught, and German hardly ever. Very few British secondary schools of any description offer a program of courses in Spanish.

In all probability, the size of classroom affects the curriculum. In Britain, even in the new schools built in the new towns, five hundred square feet is considered adequate for a class of thirty to forty children. In America, a room twice this size is usually provided. The smaller room means that children must be seated efficiently and therefore rigidly. At the very least, the method of teaching will be affected.

The British are not impressed by the size of American schools. Most of theirs have a total population of less than a thousand, the modal number being fairly close to five hundred. No doubt the number of children attending a given school has a marked influence on the variety that can be provided in the curriculum.

In Britain, the G.C.E. examinations exercise a strong influence toward uniformity in the schools. There are two dangers; first that only some of the desirable goals of education will be measured by these examinations, and second that the educational currency will be debased by specific teaching for expected questions.

In America, certain popular textbooks exercise a strong influence toward uniformity in the schools. The practice in American schools of working through one text in a course is regarded with strong disfavor by the British.

UNIVERSITIES AND FURTHER EDUCATION

THERE ARE, AT PRESENT, no junior colleges in Great Britain. The academic function is served by the Upper Sixth Form of the grammar schools where the boys and girls who plan on going to a university spend two or more years reading for examinations and serving as prefects for the headmaster or headmistress.

The pre-apprenticeship function is served by a large number of fairly specialized technical institutions that tend to award diplomas and certificates rather than degrees. Again, the evolutionary nature of British educational institutions is evident. When it was seen, in the latter half of the nineteenth century, that industrialization of a country called for more than the three R's for the general population, the Board of Trade, rather than the Ministry of Education, sponsored the first attempts at vocational and technical education. The hand of industrial organizations, especially the trade

unions, is still strongly evident. Over the years, certain of the technical institutes have become deeply committed in the educational enterprise though still highly specialized. These have undertaken to prepare technicians for their vocation, as well as engineers for their profession. Some of them have capped their educational programs with an extensive program of research, much of which is directly supported by industry.

Hence the role of the more important of the technical colleges begins to merge with that of the universities. Indeed, the Imperial College of Science and Technology in South Kensington is a part of the University of London. Even at Oxford and Cambridge, those erstwhile strongholds of the classical scholar, research laboratories such as the Cavendish Laboratory, specializing in theoretical science, are world famous, and part of the teaching carried on in such laboratories goes toward the preparation of those who will engage in the more intellectual branches of the engineering profession.

The technical colleges teem with students, especially at night. Some two million students are attending evening courses in England and Wales, and half a million are released from their jobs to attend school during part of the day.

The general education function performed by the junior colleges in this country is thus carried on wherever other educational aims are being served: at the technical institute and at the university, whether full or part time.

There are eighteen universities in England and Wales, four in Scotland, and one in Northern Ireland. They are attended by approximately 100,000 students. By comparison, California, with one-fourth the population of Great Britain, has over one hundred colleges and universities that are attended by something like 150,000 students. In California, almost anyone can enter one college or another, though not necessarily the particular college or university of his choice.

All British universities are privately endowed and all are autonomous, even though they receive funds from the public exchequer in addition to their endowments. Together, the universities provide representatives that form the University Grants Committee, and this committee has the responsibility of dividing the funds allotted by Parliament to university education. The British are fond

of saying that because they can afford so little money for education they can afford to educate only so many.

The best known of the British universities are Oxford and Cambridge. A bachelor's degree calls for three years of residence. Partly because Rhodes scholarships are open to Americans, a number of people in this country hold degrees from either Oxford or Cambridge. They are obtained after passing examinations which are very searching and call for almost complete and up-to-date mastery of a body of knowledge.

The buildings of these two venerable institutions are made up of a group of colleges, each of which has a high degree of autonomy, and to some extent separate finances. A college is ruled by a Master elected from among themselves by the Fellows. The Fellows serve as tutors, lecturers, and researchers. Most of the undergraduates live in the college in buildings which usually combine with the chapel to enclose a quadrangle. They read, write essays for their tutors, and attend a few lectures. Those reading for a science degree do laboratory work. The granting of a B.A. in a subject area follows only when scholarly independence has beeen demonstrated. Hence the M.A. can be granted more or less automatically after another three years of residence. Doctors' degrees are rarely given. There are many bicycles in the towns of Oxford and Cambridge because undergraduates are not permitted to use private automobiles. At Cambridge, undergraduates usually wear scarves with colors that indicate the college to which they belong.

The University of London is well known in America, but its origins are younger by five centuries than those of Oxford and Cambridge. Nevertheless, this huge institution next to the British Museum in Bloomsbury, and in the heart of one of the world's great cities, has developed an excellent reputation in the world of scholarship that is amply justified. The famous London School of Economics where Sidney and Beatrice Webb taught for so many years is now a part of the university as are the famous Medical Schools attached to the great London hospitals, St. Bartholomew's, St. Thomas', Guy's, St. George's, and St. Mary's.

Other famous British universities include St. Andrew's at Edinburgh, well-nigh as ancient as Oxford and Cambridge, the Uni-

versity of Glasgow, the University of Durham, founded in 1657, and the universities of Manchester, Leeds, Bristol, and Birmingham.

FRENCH EDUCATIONAL AUTHORITY

EVALUATION OF THE SYSTEM

THAT FRANCE HAS CONTRIBUTED more than its share of great men and women to Western culture few informed people would dispute. Much of the American concept of democracy originated with the French. The names of Montaigne, Voltaire, and Diderot in literature, of Descartes in mathematics and physics, of Lavoisier in chemistry, of Pasteur in medicine, of Rousseau in education, of Durkheim in sociology, and of Binet in psychology have only to be mentioned to remind the reader of hundreds of other famous French men and women.

No attempt is made here with this brief reference to well-known Frenchmen to draw a picture of the educational system linking cause and effect. But the reference does imply a vast and magnificent literature written first in the French language, that covers every topic. Hence a bookish education has developed in France, with the ingenuity of the learner striving to cope with a set of ideas that already show a vast complexity; this is in striking contrast with the American measure of success, ingenuity, and originality with relatively uncomplex material.

With the latter approach, gold is, in a sense, where you find it. Hence nearly everyone is educated up to the point where invention of a cotton gin or a vacuum tube, or the plot of a half-hour television story, becomes possible. Enormous effort may still be required, but the effort consists of juggling rapidly a few comparatively simple ideas into an original and practical pattern.

With the former approach, years of intense effort are needed to realize the existence of a problem, and more years of intense effort to trace, imaginatively, the consequences of one after another of the necessarily complex solutions that suggest themselves. Not surprisingly, these suggestions, born of books, return to books.

France leads the world in literary and philosophical production. If ever the ideas do get into practice, as many of the political ideas have, of course, life for people everywhere is enriched and made more complete. The consequences are of a different order than those having to do exclusively with survival, whether it be survival of the individual or of the state. The solution of problems of survival, of vocational preparation, and of family life often leave untouched the vastly more important problems of survival for what.

Apparently, this approach is possible with a system that imposes a rigid selectivity based on the use of certain kinds of tests. Time and again, half the applicants are weeded out by means of the results of an examination.

The great evil of the French educational system is that Frenchmen are cut off from communication with each other, especially at the high levels. Hence the country is split into numerous factions, and this separation is nowhere more evident than in the chaotic political system. French individualism is strongly augmented by the hierarchy of examinations in that every Frenchman feels sure of his place. The American, on the other hand, is forever plagued by doubts. To protect himself, he either works excessively hard, or else merges his individuality in that of a chosen group. Those who suspect themselves of being possessed of unusual talents sometimes refuse to admit it. So long as they perform what are for them the trifles needed to get by, none but themselves knows they should do more. The French system with its never-ending series of examinations is said to cause much pathology of mind and spirit. But the less formulated struggles of American business and political life seem to levy almost as heavy a toll.

Phenomenologically, French examinations are not more valid and reliable than those found elsewhere. The findings of Laugier [1] should not, therefore, be surprising. In a study of the social origins of France's leaders, Laugier found: (1) hereditary transmission of professional activities in the military and in law, (2) narrow social representation among the nation's leaders, (3) marked absence of

[1] Henri Laugier, "France" in I. L. Kandel, (ed.), *Postwar Educational Reconstruction in the United Nations*, 21st Yearbook of the International Institute, Teachers College, Columbia University, New York, 1944.

sons of farmers, laborers, factory workers, and operators of small businesses among the higher professions.

Not only does the educational system of France separate Frenchmen from each other, it also separates them from their time. Until very recently the association between the educational system and the political and social systems was negligible in France. Great ideas are also lasting ideas. An education that consists wholly of an assimilation of great ideas denies the recipient the opportunity to experiment with the impact of these ideas on current practice. On the other hand, the recipient of an education that is narrowly pragmatic either runs out of ideas, or wastes his time in reinvention.

REGULATION OF THE SYSTEM

IN FRANCE THE VISITOR FINDS what the existence of monarchy may lead him to expect in Britain, a rigid, centrally controlled educational system. In France, each school opens on the same October day, with lessons everywhere commencing at 8:00 A.M. and running until 11:00. After a two-hour break for lunch, another three-hour session starts. Thursdays and Sundays are free, and all other holidays are fixed by order-in-council. The national government determines not only the times schools are in session, but also the aims, methods, courses of study, teacher training, and general administration for both private and public schools.

This national monopoly over education dates back to a Napoleonic reform of 1806, creating the *Université de France* uniting all secondary education. In 1845 the country was divided into *académies,* of which there are now seventeen. Each of these, and only these, operates a university, with the rector, or president, appointed by the Minister of Education in Paris. Assisting the rector is an inspector-general, who is responsible for the operation of the normal school and for all the elementary schools in his district. Fanning out from Paris, like the veins of a leaf from its stem, an army of inspectors ensures that every possible educational accessory that is capable of being made the subject of a regulation is proceeding according to the regulation.

That much of education is incapable of being regulated, is the

belief of many people. Some of these would go so far as to say that only the unimportant aspects are susceptible to fiat. The work of the Minister and of his central advisory bodies and his army of inspectors is supplemented by the activities of the local general councils which are chosen by popular vote in each of France's ninety-three *départements* (counties). Much of the internal operation of the elementary schools especially, is subject to the jurisdiction of these excellent councils.

There is, in France, a state of affairs that tends to keep religion out of the public schools. Since France is a predominantly Roman Catholic country, this is often surprising to the visitor. The religious question has had a long and troubled history in France. Recently, advocates of public funds for parochial schools may have been aided by the existence of communism as a political force. The dispute continues and the bitterness of the dispute shows few signs of abating. On the one hand are those supporting the Constitutional provision that no doctrinal instruction shall be offered in public schools; on the other, those holding that public schools should be provided only to supplement the work of religious schools financially supported by public funds.

In December, 1959, a series of Articles was established that made it possible for some or all of the classes in a private school to contract into the public school system. Under this arrangement, salaries of teachers can be paid from public funds for the part of the school so contracted and the classes are inspected by the officials of the public schools. A conciliation committee has been established under these Articles and a completely revised arrangement is to be ready at the end of nine years.

ÉCOLES MATERNELLES

THESE SCHOOLS, attended by infants between the ages of two and six, are delightful places. The teachers, who are always women, are specially trained for this work, and the schools are modern when judged by American standards. Each room conveys the same impression as a first-class kindergarten. The infant-sized tables and chairs are movable, the lighting is excellent, both natural

and artificial, and displays of the children's artwork and nature collections provide warmth and color.

Work in the classroom is interspersed with plenty of play outdoors where there is an abundance of play apparatus, some of it built on the roof of one or two of these pleasant schools. The children in a given class all wear a smock of a certain color and so does their teacher. Teachers can easily spot their children and the children know where to run when they are seeking their own teacher.

Most of the *écoles maternelles* have a cafeteria where the children are given snacks morning and afternoon and a good dinner at noon. After the meal the children go to their rooms, take down their little pallets, and enjoy a refreshing sleep.

All of this presents a sharp contrast to the primary school which may be just across the way. In the primary school life is earnest.

PRIMARY SCHOOL

EDUCATION IS NOW COMPULSORY for children between the ages of six and sixteen. Although separate preparatory schools for the academic high schools were at one time common, nearly all children between the ages of six and eleven now attend the same kind of school although boys and girls attend separate schools. This uniformity has been achieved through the emphasis in all elementary schools on preparation for academic high school. In 1957, the assignment of evening homework was made illegal, but the result of this law has been that it is partially disregarded, and home assignments are worked on after school.

Not all children who seek entrance to the academic high schools are compelled to sit for examinations at the age of eleven. The majority of those who are successful can be recommended by their elementary-school teachers. Nevertheless, the fact that some must write formal examinations means that teachers are very sure of those they recommend, and the nature of the examination exerts a heavy influence on the content of the curriculums of the elementary school and even on the methods used.

A teacher in an elementary school is called *instituteur*. He is paid less than a high school teacher and enjoys far less social status.

He also teachers more hours per week, and must correct all the exercises he sets and perform the other extracurricular duties demanded of most teachers in other countries. He is not usually a graduate of an academic high school. Instead he has taken the *cours complémentaire* which is attached to the elementary-school course. From this primary-school extension he goes, between the ages of fifteen and eighteen, to a teachers training college. There he spends two or three years in academic preparation for at least the first part of the *baccalauréat* which is a standard examination given to students in both the *collège* and the *lycée,* the two nearly parallel forms of academic high school. Afterwards, one or two years are spent in pre-professional training. On the basis of an additional examination, still highly competitive, he can obtain *certificat du fin d'études normales.* He can remain a primary-school teacher, or, if he has demonstrated the necessary academic aptitude, he can push on to the university or even to the *grande école,* finally obtaining the coveted rank of *professeur,* or teacher in an academic high school.

COLLÈGE OR LYCÉE

ANY SYSTEM AS CENTRALLY CONTROLLED as the educational system of France usually finds it easier to establish new institutions than to modify the old. Whether this is the major reason or not, certainly the French have invented many kinds of schools for many different purposes; some of the new schools are not much different from other existing schools.

So it is with the *collège,* originally intended as a modernized version of the *lycée.* The two kinds of school are now indistinguishable and provide France with her renowned system of academic preparation at the secondary level.

Approximately one in five French children of the age of eleven to twelve are selected for the privilege of entering *lycée* or *collège.* Those of whom the teachers feel completely sure are not asked to write an entrance examination but the doubtful ones are asked to write. Needless to say, if all the doubtful ones fail from a particular school, the list of recommended pupils from this school is eyed with some misgiving. Those children who fail to enter the public academic high school but who still wish to prepare for the university

may attend private school, which is generally a Roman Catholic school; they may continue to study for the *baccalauréat* in the elementary school; or they may follow an entirely different route via a technical school.

Students at the *collège* or *lycée* are much less free to choose their courses than a student in the college preparatory curriculum of an American secondary school. For many years, the curriculum of the *lycée* consisted almost exclusively of Latin and Greek. There is still a strong emphasis on Latin. Other subjects now heavily emphasized are foreign languages, physics, chemistry, mathematics, and philosophy. From these subjects, one of nine possible combinations may be selected. Each of the nine combinations prepares the student for the *baccalauréat.* This examination, which has no parallel except in countries that have adopted the French system of education, is given in two parts, the first at the end of the sixth year in the *lycée* or *collège.* Approximately half the candidates fail. Some try again, but many end their formal schooling in this way. A year later, those successful in the first part, take the second part. A third of the candidates fail at this stage. Those who are successful have, at the age of eighteen, demonstrated an unbelievably extensive knowledge of the subjects in which they have been examined. Those who have studied English, for example, would have no difficulty passing the examinations in English literature given to sophomores in the better colleges and universities in this country.

Those successful in the second part of the *baccalauréat* may continue at the *lycée* or *collège* for two more years. These two years are spent in preparation for the entrance examination to the *grandes écoles,* professional schools about which more will be said later. Those unsuccessful may still enter the university, or they may have gone straight to the university after passing the second part of the *baccalauréat.* From the foregoing, it may be correctly inferred that entrance to one of the *grandes écoles* is more desirable to a student than entrance to the university.

COURS COMPLÉMENTAIRE

PREPARATION OF PROSPECTIVE elementary teachers for the *baccalauréat* in this adjunct to the primary school has already

been referred to. It should be remembered that in this school the secondary-school subjects are taught by elementary-school teachers.

In addition to offering the regular secondary subjects of physics, chemistry, mathematics, philosophy, and so on, some of the larger elementary schools offer a variety of vocational courses. Some of these may be taken by young people actually on the job. The standards are high. Those who are successful receive a diploma and are skilled craftsmen who have spent approximately half of their school time upon a variety of standard academic subjects. Forty hours per week is demanded, so that a boy or girl who works half-time on the job must put in a long weary week to do all that is required of him.

Similar to the *cours complémentaire* but quite distinct from it is the upper primary school for those between eleven and thirteen who wish to enter apprenticeship training at the age of thirteen. There are a number of apprenticeship training centers in France, where young people can learn to be plumbers, carpenters, automobile mechanics, and so on.

Separate again, but based on the upper section of the primary is a whole series of agricultural, domestic, and trade courses.

RECENT CHANGES IN SECONDARY EDUCATION

FRENCHMEN ARE NOT UNAWARE of the imperfections of their secondary-school system. At the same time, the French nation as a whole is justifiably proud of the *lycée*.

During the late years of World War II and in the immediate postwar period, dissatisfaction with the complex system of secondary education in France came to a head. Langevin, a leading French physicist, was named head of a commission to investigate, evaluate, and suggest reforms.

The major experiment growing out of the Langevin Report has been the establishment of *Classes Nouvelles*. These classes are chiefly distinguished by a philosophy which recognizes individual differences and through the use of a knowledge of psychology strives for the optimum development of each personality and in particular of a deep sense of social responsibility.

In practice, these classes emphasized educational guidance, a livening of school work through scientific study of both the natural and social environment, an emphasis on the essential unity of knowledge, and a more natural atmosphere in the classroom.

Although the designation *classes nouvelles* has been dropped, these practices have been adopted in all secondary-school classes to some extent. In addition, a few pilot classes have been established in which experiments in pedagogy can be conducted.

Experience with the *classes nouvelles* has not produced a revolution in secondary education in France, and there are a number of reasons for this:

1. The new kind of education is more expensive—more learning aids, fewer pupils per teacher, flexible classrooms.
2. Curriculum development seems difficult when enrollments are swelling.
3. Public support for change is diffuse.
4. The economically and socially conservative group is strong and well-organized.
5. Teachers in the *lycées* enjoy a favorable position in society.

Despite these difficulties, a number of French educational leaders are working hard at the difficult task of reform. The quality of French secondary education in the past leads to the hope that valuable guidance for schemes of secondary education in other countries will be forthcoming.

TECHNICAL EDUCATION

INDUSTRIAL PROGRESS IN FRANCE is seriously hampered by a lack of engineers. The few available are superbly educated but there are just not enough of them to meet the demand.

The supply of technicians, those who know enough science to understand, operate, and repair existing technological devices, is even less than that of fully qualified engineers.

A number of new technical institutions have been established within the past few years. For example, in 1958, three new science faculties were opened in Nice, two new institutions of applied science at Lille and Toulouse, and three schools of engineering at Bordeaux, Clermont-Ferrand, and LeHavre. A capstone to this

fresh emphasis on scientific and technical education is the Institute of Advanced Scientific Studies, opened in 1959, and modeled after the Princeton Institute of Advanced Studies in America. Professors are appointed to the Institute for life and they have no teaching duties.

Development of technical education below the engineer level is taking place. Post-primary schools for this purpose are much less rigidly controlled by the Ministry of Education than are the *lycées* and *collèges,* hence the needed evolution can be expected to be more rapid. Such evolution is aided also by the fact that children of working-class parents can use attendance at the technical institutes to improve their social position without having to break family ties, for the antagonism of members of the French working classes to the *bourgeosie* is proverbial, and, by and large, it is the *bourgeosie* who attend the *lycée.*

In summary, then, technical education at the middle level is carried out in:

1. Apprenticeship centers that are part factory and part school which children enter at the age of fourteen.
2. Agricultural, domestic, and trade courses, many of which are in highly specialized trade schools.
3. Technical courses in the *lycée* and *collège.*
4. Technical courses in the *cours complémentaire.*
5. Technical courses in what used to be called the *école primaire supérieure,* now called the *collège moderne.*
6. *Collège Technique;* students for these schools are screened by examination at the age of fourteen. A large proportion of the time of the students is devoted to the study of academic subjects, and some of the more brilliant students prepare for a special technical form of the *baccalauréat.*

UNIVERSITY AND HIGHER EDUCATION

THERE ARE SEVENTEEN UNIVERSITIES in the French system of public education, sixteen in France itself and one in Algeria. The largest is the University of Paris, known as the Sorbonne. It has approximately 50,000 students and dates back to the twelfth century. However, the Sorbonne is not the oldest university in

France. This distinction is claimed by Aix-Marseilles which is said to have faculties which began in the fifth century. One of France's universities is at Caen. It was founded in 1432 by Henry VI of England of whom it was said:

> Henry the Sixth was perpetually being beaten
> He lost England and France, went mad and built Eton.

For in addition to the University of Caen, he founded Eton College near Windsor Castle in England, and King's College of Cambridge. According to some, the chapel of King's is said to be the most perfect example of late Gothic architecture in existence. The original Caen buildings, perhaps almost equally beautiful, were destroyed in 1944 during the Battle of France. Grenoble, Clermont-Ferrand, and Strasbourg are also well-known French universities. Most of these universities have faculties of medicine, law, and letters, and, in recent years especially, science and engineering. They are devoted to professional preparation at a very high level, including the profession of scholarship.

In addition to the universities, France maintains some thirty institutions of higher education known as *grandes écoles.* Entrance requirements are more difficult to meet than for the universities, but graduates of these institutions are assured high rank and status as civil servants. One of these, called the *École Normale Supérieure,* enrolls two hundred men and makes use of the most important laboratories of the University of Paris. Those who succeed in the *aggrégation* of this institution join the ranks of the eminently respected *professeurs* of the *lycées.* Attendance at the *École Normale Superieure* is not the only route possible to the coveted position of *professeur* but is certainly the most regular. A complete description of the variety of preparation and certification of teachers in France is too complex and varied to be given at this point.

This brief glimpse of French education has demonstrated that despite the emphasis on centralization of control, the structure is inordinately complex. Beyond primary school the emphasis throughout is upon quality rather than quantity—the education of an *élite, ad maiorem Francorum gloriam.*

SECONDARY EDUCATION FOR ALL

THIS BRIEF CONSIDERATION of education in England and France, the more prolonged examination of education in this country, and a summarization of the Great Debate, all point to a single major educational issue—secondary education for all.

The irresistible urge for the survival of society in the face of unprecedented change brought about by scientific and technological discoveries and inventions, as well as humane consideration for all individuals, lead inevitably to the concept that each personality must be developed as fully as possible. The recognition of "growth" as the great purpose of educational effort is universally accepted. What is not agreed upon is the kind of growth that education should foster. Dewey's solution whereby the blueprint of the finished product is deliberately omitted, or at least provided in but shadowy outline, is quite unacceptable to most people. It is far too uncertain. Hence the countries touched by the industrial revolution, and there are almost none left that are not, are feverishly and almost desperately experimenting with secondary education.

Faults in primary education are readily conceded, but the problems posed by these faults seem manageable. By and large, children are learning to read, and to read well. Where they are not, the superficial thinkers are easily convinced that a trifle of phonics or a few extra whippings are all that is needed to make the teaching successful. Communities in countries like India readily tax themselves to build schools for all elementary-school children. It is assumed that teachers of arithmetic can be quickly trained, for according to Skinner, machines can be built to perform this simple task. Although such blunt statements ignore the subtler and far more important tasks of elementary education such as the development of civilized tastes and a deep and moving sense of social responsibility, they do succeed in deflecting the main current of public concern to post-primary education.

At the top end of the educational ladder, the problems of the universities and professional schools are largely ignored by the gen-

eral public because they are either beyond the reach of their knowledge and understanding, or because those that are capable of understanding have a vested interest in the status quo. The certificated doctor, lawyer, or engineer is scarcely likely to devote time and effort to the explanation of flaws in the education and training that have carried him to his present high social position. Those few among the professional classes that turn to university teaching are much more likely, where they see imperfections, to work quietly from within rather than to noise their perplexities among men of affairs.

Hence the present world-wide focus upon the problems of secondary education.

The place of the working adolescent is rapidly shrinking. To guide the exhilarating energy of youth into constructive activities that will benefit society as well as the young people themselves, the age of compulsory school attendance has risen steadily—twelve, fourteen, sixteen, and now, in many places, to eighteen.

Where shall this schooling take place? Aside from the difficulty and expense of providing any kind of housing at all, the question that must be answered is whether all youth shall attend the same school, thereby revolutionizing an institution that for centuries has been devoted to the task of college preparation, or whether separate schools shall be provided, and the youth of the nation arbitrarily divided. Those countries that elect to maintain the purity of the college preparatory institution are faced immediately with the unsolved problem of selection. When, on one basis or another, the selection has been made, those pupils wrongly selected must somehow be transferred, and those who have up to this time rejected the fascination of ideas must continue to be tempted. On the other hand, differential treatment must be employed more effectively than it has so far if all children in an undifferentiated school are to realize their maximum potential.

And what shall adolescents be taught? Proposals for the selection of curriculum content range all the way from no preselection of content, to an extremely rigid, nationally imposed selection of content. A laissez faire attitude with respect to the curriculum in a given community usually results in a retreat into a conforming

orthodoxy, often by the slavish and unimaginative use of textbooks. As Herbert Spencer asked in 1861, "What knowledge is of most worth?"

How shall adolescents be taught? Can any nation in the world feel so sure of the stability of its culture that only knowledge and understanding of the present state of that culture need be imparted, as directly as possible, to the adolescent? Should the child not only be provided with knowledge and understanding, but also given guided practice in the manipulation of that knowledge and understanding into new combinations and syntheses that will provide him with the will and the weapons to solve unforeseen problems, to meet unexpected situations, and to make wise choices?

When shall adolescents go to school? Shall all but a very few enter the labor market at an early age and continue their education far into their adult years? Shall work and study alternate? Shall adolescents attend school more days in the year, or less?

These are difficult and perplexing questions. Few unequivocal answers can be provided by empirical investigations.

Education has become the major social activity in all the civilized countries of the world. The fate of nations is seen to rest on the manner in which this activity is conducted.

EXERCISES

1. What historical events have had particular influence on the schools of America?
2. List six social facts that influence the development of the schools of America.
3. What safeguards have the British used to prevent national control of the curriculum along with the use of national funds?
4. Contrast a British local education committee with one of the school boards in your locality. Comment upon the differences.
5. What people are usually called upon in this country to give advice to school boards? Are these people free from bias?
6. Compare and contrast the role and function of the head-

master or headmistress in England with the role and function of the principal in America.

7. Can you list the names of any principals of American high schools that have been able to achieve a national reputation? Are they known in other countries? Are they still principals?

8. Contrast and compare the infant schools of Great Britain, the *écoles maternelles* of France, and the kindergartens in America. What have been the major influences on schooling at this level in all three of these countries?

9. Discuss the reliability of intelligence tests.

10. Is it true that knowledge of the child's I.Q. tends to focus the mind of the teacher on the past performance of the child?

11. Try to find examples in American education where children are imperfectly selected for advanced educational opportunities.

12. How might provision be made for individual differences in comprehensive high schools?

13. Describe the system of external examinations in use in Great Britain for entrance to the college or university.

14. Distinguish between the General Certificate of Education at the Ordinary Level and at the Advanced Level.

15. What aspects of the British Upper Sixth Form might be appropriate for use in comprehensive American high schools?

16. Why is reform in British secondary education more likely to come from the secondary modern school than from any other of the British schools?

17. What are the bias subjects of the secondary modern school?

18. See if you can distinguish the curriculum of the grammar schools of England from those of the technical schools.

19. A number of people in America seem to think that a high school should enroll approximately 400 students per grade. What are the advantages and the disadvantages of going either above or below this number?

20. Describe and contrast the systems of technical education in England and France. What effects have these differences upon the technological development of the two countries, in your opinion?

21. Choose a British or French university and describe it with some thoroughness.

22. List six famous Frenchmen, other than those listed in the text.

23. Where pragmatic test is possible, falsity is soon discovered. What tests are possible for material that cannot be submitted to pragmatic test? For such material, is conservatism inevitable?

24. List the possible evils of too highly a controlled system of education and discuss these evils. What developments are tending to make the American system a highly controlled system?

25. Compare American and French universities.

26. The statement was made in this chapter that support for change is diffuse. Discuss the obverse of this statement.

27. Describe one of the *grandes écoles* of France.

28. Elicit evidence in support of the statement that education has become the major social activity in all the civilized countries of the world.

TOPICS FOR DISCUSSION

1. When used to educate all, the content of classical education must be reduced to the point of inertia.

2. Little change in the system of education for the very early years can be expected, and methods and procedures now in use in England, France, and America are likely to spread to most of the other countries of the world.

3. The advantages and disadvantages of external examinations.

4. The justice of selecting pupils for higher educational opportunities by means of imperfect examinations.

5. Debate the usefulness of examinations that are almost perfectly reliable but which test only a few of the aims of education against examinations that are less reliable but which test more of the aims.

6. The ideas involved in "souping up a jalopy" are as involved as those concerning the "causes of the American Civil War."

7. The advantages and disadvantages of timetables and schedules worked out with groups of students as the unit, rather than the individual student.

8. The size of a classroom.

9. The size of a school.
10. The textbook as a curriculum control.

ADDITIONAL READING

Crowther, Geoffrey, 15 TO 18 (London: Her Majesty's Stationery Office, 1959). *A report of the Central Advisory Council for Education (England). A large book by a large committee, including many nonprofessionals. Rather strongly on the side of the status quo.*

Dent, H. C., SECONDARY MODERN SCHOOLS: AN INTERIM REPORT (London: Routledge & Kegan Paul, Inc., 1958). *A short and fairly elementary analysis based on a great many personal visits.*

King, Edmund J., OTHER SCHOOLS AND OURS (New York: Rinehart & Company, Inc., 1958). *Takes one country at a time and provides a useful description of the schools in each one. Six nations, including France and Britain.*

Lilge, Frederic, ANTON SEMYONOVITCH MAKARENKO: AN ANALYSIS OF HIS EDUCATIONAL IDEAS IN THE CONTEXT OF SOVIET SOCIETY (Berkeley: University of California Press, 1958). *This penetrating study has received wider acclaim in Europe than in this country. The author, using the biographical device, is able to say much that is pertinent concerning the historical and social setting of Soviet education.*

Mallinson, Vernon, INTRODUCTION TO COMPARATIVE EDUCATION (New York: The Macmillan Company, 1957). *Unusual organization, in that, first, one aspect of education, such as technical education throughout the world, is discussed. Another aspect—for example, secondary education—in a number of countries is then treated.*

Passow, A. Harry, SECONDARY EDUCATION FOR ALL: THE ENGLISH APPROACH (Tiffin, Ohio: International Education Monographs, No. 3, a Kappa Delta Pi Publication, 1961). *Mr. Passow and his family spent a sabbatical leave in England during the academic year 1958–59. Attendance of his three children at English schools during this year, as well as his own visits to 55 schools, colleges, and universities, helps him to present more than a*

summary of official reports. For instance, we find in this book an extensive commentary on the Sixth Form. American educators, generally, are not always fully aware of this exclusively British phenomenon.

Smith, W. O. Lester, EDUCATION IN GREAT BRITAIN (London: Oxford University Press, 1958). *A brief, highly readable account of those aspects of education in Great Britain that lie within the Ministry of Education, the Scottish Education Department, and the Education Acts. The chapters consider such topics as aims, order and diversity, the schools and the community, and current affairs. One of those tiny volumes that Englishmen love to carry about with them to read on the train.*

CHAPTER 17

Evaluation of the Curriculum

THE CONANT REPORT

ONE OF THE BEST-KNOWN, and perhaps one of the best, evaluative studies of recent years is that reported by James B. Conant, former President of Harvard University and former United States Ambassador to Germany. In his book, *The American High School Today,* Dr. Conant was careful to state his chief problem in solvable terms. "Can a school at one and the same time provide a good general education for *all* the pupils as future citizens of a democracy, provide elective programs for the majority to develop useful skills, and educate adequately those with a talent for handling advanced academic subjects—particularly foreign languages and advanced mathematics?" [1]

To provide an affirmative answer to this question, it was necessary to find but one school offering a sufficiently wide range of courses to meet the triple demand. Conant reports that he found eight.[2]

[1] James B. Conant, *The American High School Today,* McGraw-Hill Book Co., Inc. New York, 1959, p. 15.

[2] *Ibid.,* p. 22.

He also listed a number of recommendations, all of them frankly embodying his own opinions regarding education. These are eminently worth reading, but they are still one man's opinions. A third aspect of his report has received extensive publicity—his academic inventory. This instrument provides an easy method of listing the courses taken by the brightest and best students. By limiting his evaluation to a listing of the courses offered, Conant "has directed his attention to variables which can be readily observed and easily quantified." [8]

ACCREDITATION BY COLLEGES

CONANT, AS A FORMER MEMBER of the faculty and long-time president of a prominent university, is following a long tradition of college influence upon the high school. The earliest grammar schools in this country were established for the express purpose of preparing boys for the university, and despite the practical influence of the academies, the influence of the universities has persisted. Today the colleges, either singly or in groups, send representatives to the high schools in order to accredit them. When a given high school offers a certain pattern of courses, is staffed by a faculty with the appropriate degrees and certificates, has enough of the right kind of books in its library, and sends graduates that do reasonably well in college and university courses, the school is "accredited" by a state, or a university, or by an association of colleges and universities, and may continue to send graduates to those institutions recognizing its accreditation.

In two states, California and Michigan, accreditation is the exclusive prerogative of the state university. A special device used by the Office of Relations with Schools of the University of California is the comparison of grade point averages in high school and college or university. A differential is permitted between high school and college and a somewhat larger differential between high school and the university. If this differential is exceeded, the high school is sent a letter requesting that it raise its standards for A and B grades. The reason for this apparently highhanded treatment is that stu-

[8] T. Bentley Edwards, "Analysing the Conant Recommendations," *California Journal for Instructional Improvement,* Vol. 2, No. 2, May, 1959, pp. 3–4.

dents are admitted to the University of California on the basis of grades received in a certain pattern of high school courses.

Four voluntary associations of colleges and secondary schools exist. These are:

1. Middle States Association of Colleges and Secondary Schools (1892).
2. North Central Association of Colleges and Secondary Schools (1895).
3. Southern Association of Secondary Schools and Colleges (1895).
4. North West Association of Secondary and Higher Schools (1918).

In addition, the New England Association of Colleges and Secondary Schools, organized in 1885, continues to exert considerable influence over the high schools of the area but it does not accredit the high schools in a formal way.

In most states, accreditation of the high schools has reverted to the State Department of Education, a form of accreditation which tends to be carried on by clerks armed with check lists.[4]

All of the accrediting bodies make more or less use of the Carnegie Unit. This term was defined in 1909 by the Carnegie Foundation for the Advancement of Teaching as the study of a subject in high school for one period a day throughout the school year of thirty-six to forty weeks.[5] A college was defined by the Foundation as an institution requiring at least fourteen units of high school instruction for admission.

Partly as a result of this strong historic influence, mechanical devices such as the Carnegie Unit have persistently dominated methods of high school accreditation throughout the United States.

To broaden the base of high school accreditation, the Associations of Secondary Schools and Colleges produced the Evaluative Criteria for Secondary Schools.[6] This set of criteria may be

[4] Grace S. Wright, "State Accreditation of High Schools," *U.S. Office of Education, Bulletin 1955,* No. 5, p. 4, Government Printing Office, Washington, 1955.

[5] Ellsworth Tompkins and Walter H. Gaumitz, "The Carnegie Unit: Its Orgin, Status, and Trends," *U.S. Office of Education, Bulletin 1954,* No. 7, Government Printing Office, Washington, 1954.

[6] "Evaluative Criteria," *Cooperative Study of Secondary School Standards,* Washington, 1950.

taken as an illustration, if not the starting point, of a highly commendable movement in the direction of evaluation which is more than the mechanical listing of courses offered and taken. The production of replicable information grows extremely difficult as soon as attempts are made to do more than count the number of bodies in any given classroom.

The Cooperative Study of Secondary School Standards is justly famous. The manner in which evaluating teams developed, especially in states along the Atlantic seaboard and in the Middle West, is well known. Small groups of educational leaders in universities, colleges, and school districts, along with ample representation from the teaching faculties of high schools, were trained to make the best possible use of the Evaluative Criteria for constructive evaluation of innumerable schools and school districts. Prior to the Second World War, cooperative evaluation of this kind did not spread to the western states, although many attempts were made to encourage school leaders in other parts of the country to make use of the carefully tested techniques. Since 1946, use of modifications of the method has steadily increased in California and this development will be described.

ACCREDITATION BY CASSA

THERE ARE SEVERAL REASONS why a fairly extended discussion of the CASSA (California Association of Secondary School Administrators) accreditation procedure seems appropriate in a general consideration of the evaluation of curriculum in American schools. First, and most significantly, we do not have a national system of schools in this country. We have a collection of fifty state systems. Hence, the systems in one or more states must be chosen to exemplify American schools.

California is one of the larger and more rapidly growing states. It is also a state in which the full range of rural-urban living occurs, and presents one or two striking examples of the nearly insurmountable difficulties faced by modern cities.

Approaches to educational problems are perhaps no more significant in California than in a number of other states, but because of the rapid increases in population, the problems are especially

acute. In the pages that follow, emphasis on California's experience will be encountered, perhaps *ad nauseam.* This emphasis is believed to be justified because the experience of this one state exemplifies, in an exaggerated fashion, the experience of many states.

The California Association of Secondary School Administrators has recently gone into the business of accreditation in a steadily increasing fashion. Using some of the clues supplied by the Evaluative Criteria, a committee of the high school principals of California has developed a number of extensive instruments and a procedure for the use of these instruments for a kind of self-evaluation that is nevertheless subject to approval and checking by an outside committee.[7]

The instruments consist of extensive lists of questions concerning every part of the high school program. These lists are divided into sections to be answered separately by administrators, teachers, classified staff, and students. Often, the same questions appear on each of the four lists; other questions are peculiar to the section. These questions are answered by committees democratically elected by each of the four kinds of school personnel just listed, and these committees spend at least a semester trying to determine, as accurately as possible, the proper answers to the questions posed.

Most of the benefit of the evaluation to the school itself takes place during this period of searching self-inquiry. Neglected aspects of the school program, minor difficulties in communication, lack of a statement of objectives, and unknown facts concerning both the student body and the community generally are brought to light. The school does not neglect these matters consciously, so that the direction of attention of administrator and faculty to their evaluation is all that is needed to produce improvement.

When the thick booklets of information have been prepared, copies are forwarded to the visiting committee which consists of an administrator from a neighboring school, a representative of the State Department of Education, a member of the County Office of Education, and a professor from a university or college. These committee members spend a couple of weeks examining the written information that has been provided and then convene at the school

[7] "CASSA Accreditation: Why-What-How," *The Association Newsletter,* California Association of Secondary School Administrators, No. 2, Oct., 1957.

for a two-day period. At the school they meet with representative groups of administrators, teachers, students, and members of the classified staff, largely for the purpose of verifying the written material. They look especially carefully for any signs of coercion regarding the written responses. They also visit classrooms and laboratories and other learning centers while the school is in operation in order to test the reliability of the information provided and to gather a basis for an informed opinion where marked differences appear among the responses provided by two or more of the school groups.

Community representatives such as school-board members and officers of the parent-teachers association attend many of the sessions convened by the visiting committee. In this way, the evaluation is more properly understood and the results correctly reported.

At the end of the visit, the evaluation team writes a report of several pages which is forwarded to the school board for whatever local distribution they think to be appropriate. The team also recommends, if it deems appropriate, to the governing board of the California Association of Secondary School Administrators that the school be accredited for a period of one, three, or five years.

No attempt is being made at present to provide this activity with the authority of law by the passage of appropriate legislation. It is thought that by leaving this type of evaluation on a completely voluntary basis and by providing both a service to schools and important information to colleges and universities, the CASSA evaluation will eventually attain a high degree of prestige among a number of devices being used to maintain high educational standards in the secondary schools of the state of California.

The CASSA evaluation process has much to commend it. Procedures used are constantly being modified in light of increasing experience. There is wide participation. Recommendations for reform are discussed with the teachers and with others before being included in the final report. Wherever possible, findings are based on sound evidence, carefully collected.

The CASSA evaluation process has gone so far in its attempts to measure high schools that the temptation to make suggestions for further improvement is irresistible. Use of scaling techniques and other modern techniques of instrument construction would greatly increase the reproducibility of the initial findings. At pres-

ent, also, the evaluation committees make use only of test data already collected by the school. An insistence upon the collection of a wider range of test material and some pioneering activity in the use of such material would broaden the basis on which evaluation is made. Intelligence test scores, reading and mathematics achievement, and other scattered achievement test data are presently made available. Scores on tests of critical thinking, on interest and attitude inventories, on personality inventories, obtained at set intervals so that some indication of a rate of development is available, would help the evaluators to make more valid and reliable judgments. The wide resources of the Association could make available machinery for the computation of increasingly complex survey data. If methods were pioneered for the recording of classroom procedures, beginning even with continuous visual and sound recordings, and continuing with the assessment of the dimensions of classroom activity that such sound pictures would suggest, a giant step could be taken toward more validity and reliability and away from the wholly private and subjective estimates of teacher behavior now being used. For to break an over-all subjective judgment into a number of smaller subjective judgments seldom brings more than the appearance of reliability and validity.

If some of the foregoing suggestions were put into practice for the collection of basic data, the need for value judgments with respect to the goals of the school and for a proper balance of effort toward these goals would still be present. As soon as possible, members of academic departments of colleges and universities should be called upon to assist when these judgments are being made. At present, there seems to be a fear that these people, a number of whom have alarmed many school people with the violence of their criticism of the schools, will be much too rigid to do anything except to destroy the activity. This fear is not justified. A great number of academic professors have already sat down at the conference table, and gone out into the schools with those educators whose chief concern is with primary and secondary education in America, and a useful and powerful synthesis of points of view has resulted.[8]

[8] Dept. of Education, Field Service Center, "Mathematics and Science in the Public Schools," *Field Service Center Leaflet No. 8,* University of California, Berkeley, May, 1958.

The final and most important criticism of the CASSA process has to do with the manner in which final judgment is made. The visiting team consists exclusively of members of what are generally regarded as the upper echelons of education. To anyone who has served on one of these teams the signs of his status are readily apparent; the timid wear too broad a smile, the aggressive too deep a frown, and with slight provocation a torrent of justification floods loose. A shift of emphasis, whereby the final judgment is made locally, but with a number of visitors present, would seem to be more likely to produce desirable changes.

COOPERATIVE CURRICULUM DEVELOPMENT IN ILLINOIS AND CALIFORNIA

TWO OTHER EXAMPLES of cooperative activity of this kind will be reported. These are more heavily in the direction of instructional improvement than those so far reported, but the twin processes of evaluation and improvement are not easily separated, even for purposes of discussion.

The first is the Illinois Curriculum Program [9] and the second is the Regional Project in Secondary Education in California.[10]

The major purpose of both these cooperative activities for curriculum improvement is to make available a very wide range of resources to a local school, providing the local school takes certain steps on its own initiative.

The Illinois Curriculum Program was originally confined to high schools, but since the first few years of operation, the scope of the program has broadened to include elementary schools. The project is state-wide and the numerous activities are coordinated by a full-time director.

Schools taking part in the enterprise are known as participating schools and they must volunteer to take part. Prerequisite to par-

[9] Kenneth D. Benne and Bozidar Muntyan, "Human Relations in Curriculum Change," *Illinois Secondary School Curriculum Program Bulletin No. 7*, Circular Series A, No. 51. Office of the State Superintendent of Public Instruction, Springfield, June, 1949.

[10] T. Bentley Edwards, *The Regional Project in Secondary Education in California*, University of California Press, Berkeley, 1956.

ticipation is the identification, though not necessarily the complete definition, of a curriculum problem, and the assignment, by the local school board, of the necessary funds to support the local activity. For example, the Illinois Curriculum Program requires that funds be provided for certain teacher workshops, for the payment of consultants, and for similar expenses that may be incurred.

From the central staff of the project, a local school or school district receives help in defining its problem, in planning procedures aimed toward the solution of the problem, and in selecting and obtaining the personnel and material resources that are required. Perhaps most importantly, it receives the stimulus needed to sustain the activity once it has been initiated. At the conclusion of the activity, a report is usually written.[11]

The ICP is widely known for the preparation of instruments with which to assess a local school situation. These instruments include those for the assessment of pupil opinion, hidden tuition costs, and area consensus. One of the most widely read publications on this project links the work of schools with national security.[12]

Nineteen schools were involved in the Regional Project in Secondary Education in California which flourished briefly between 1950 and 1953.[13] Operation of this project was similar to the ICP though on a much smaller scale. Each school carried on an extensive curriculum activity and a number of interesting reports were written.[14]

The project was planned for three years and was intended to demonstrate the usefulness of cooperative curriculum activity of this kind. In the opinion of all but one of the many people taking part in this activity, the demonstration was highly successful.

[11] Charles W. Sanford, "The Story in Nineteen Schools," *Illinois Secondary School Curriculum Program Bulletin No. 10,* Circular Series A, No. 51. Office of the State Superintendent of Public Instruction, Springfield, Sept., 1950.

[12] Charles W. Sanford, Harold C. Hand, and Willard B. Spalding, *The Schools and National Security,* McGraw-Hill Book Co., Inc., New York, 1951.

[13] T. Bentley Edwards, *The Regional Project in Secondary Education in California,* University of California Press, Berkeley, 1956.

[14] Robert Morris, "Regional Project in Secondary Education at Gridley," *California Journal of Secondary Education,* May, 1953, Vol. 28, No. 5, pp. 251–56.

NATIONAL DEVELOPMENT IN SCIENCE AND MATHEMATICS

THE TWO PROJECTS JUST DESCRIBED indicate the limit to which evaluation has been combined with curriculum development at the local level. Even these projects, which were far from a theoretical limit, were a long way from average practice seven years ago. Since that time, the self-consciousness of many school systems has been rendered acute almost to the point of embarrassment by the spotlight of public criticism, so that free-wheeling curriculum experimentation, designed at the local level, has largely stopped. Instead, school people with an urge to modify procedures have tended to link up with nation-wide movements of a very specific nature. They have been willing to try out new texts in science and mathematics such as those prepared by the Physical Science Committee at the Massachusetts Institute of Technology,[15] the School Mathematics Study Group at Yale,[16] and the College Entrance Board of the National Education Association.[17] Evaluation of these texts has so far been confined to a collection of subjective opinions by teachers and students.

Uses of television and of filmed series of lessons, especially in science, have been introduced. Again, evaluation of these new materials of instruction has tended to be in highly subjective terms except for some comparisons of achievement test results.

EVALUATION BY SCHOLARS

DEMOCRACY IN AMERICAN EDUCATION has been so interpreted as to leave decisions in the hands of 50,000 school boards. In times like these, the members of these boards, while recognizing the

[15] Physical Science Study Committee, *Physics,* Vol. 1, Preliminary Ed., Massachusetts Institute of Technology, Cambridge, 1957.

[16] *Mathematics for High School Geometry,* Part I, Panel on Sample Textbooks of the School Mathematics Study Group, Yale University, New Haven, 1959, photolithoprinted.

[17] *Introductory Probability and Statistical Inference,* Commission on Mathematics of the College Entrance Examination Board, 425 West 117th St., New York 27, 1959.

privilege of freedom, quake at the responsibilities thrust upon them. In a quick quest for certainty, some of them turn to scholars for consultation.

Two reports by scholars will be described and criticized. The first was an evaluation of the San Francisco school system made by four professors from Stanford University and four professors from the University of California at Berkeley.[18]

There were eight members of this group, two each from English and mathematics, and one each from the departments of economics, history, chemistry, and biological science. All of these men are eminent and highly respected scholars in the fields they represent. They spent limited time visiting schools and classrooms, but they evidently devoted unusual care to the wording of their report. Many of the recommendations demonstrate the creative intelligence available among this group of scholars. Their report will no doubt do much to stimulate educational efforts in the city and county of San Francisco on the part of professional staff, and it has already done much to increase the interest and support of the local community.

Superintendent Harold Spears has written a careful reply to this report, taking up the substance of the various recommendations one by one. He divides the recommendations into three groups: first, a fairly large group of those that he supports; second, a group dealing with conditions outside the control of the local district; and third, a group that would call for major budget allotments, some of which the superintendent recommends.[19]

The present discussion of the report will be twofold. First, the substance of the report will be considered as a contribution to educational theory and practice; and second, the process of making the report will be analyzed. Both parts of the discussion will seem critical. Yet the present writers are convinced that the ideas and values of scholars such as those who produced the San Francisco Report must continue to influence the schools. Some of their recommendations should be supported by all who strive for quality in

[18] Mark Schorer, William Irvine, *et al., Report of the San Francisco Curriculum Survey Committee,* San Francisco Board of Education, San Francisco, 1960.

[19] Harold Spears, *Preliminary Reactions to the Report of the San Francisco Survey Committee,* San Francisco Unified School District, May 13, 1960, p. 47.

education. Where the scholars plead for serious study and for a development of a love of learning, and where they demonstrate their own good taste and impeccable sense of values, we can only applaud.

A major criticism of the report is its failure to tie in with an established body of educational theory. As it stands, the report is an isolated effort. Cumulative value can accrue only with the efforts of others. Unless the findings are carefully built into a workable system of evaluation, they can have no effect on schools elsewhere in the nation, and, in time, the effect on San Francisco schools will be nearly indistinguishable.

An example of the insularity of the report is the tendency to make unsupported assertions which demonstrate a rejection of the findings of educational experiments. For example, the usefulness of ability grouping is accepted without question. External examinations for the selection of students for advanced educational opportunities are recommended with no comment regarding the difficulties encountered in places where such examinations are used. These difficulties arise, in part, from the unreliability of even the best of the tests, and in part from the impossibility of assigning anything like universal validity to such examinations.

Turning from the substance of the report to the manner in which it was produced, the reader notices that the scholars wrote their report as separate individuals. They state that it was "a matter of some surprise and more gratification to find that we were in almost all respects in very close accord. . . ." They made it necessary for others to produce statements which are biased in another direction.

Perhaps this writing of conflicting reports is the way to proceed. Instead of spontaneous remarks made face to face at the conference table, we have a series of considered statements made at long range. Misunderstandings and hard feelings are bound to result, but these are of little significance if improvements occur in the conduct of the schools.

Recently, a group of eleven professors of academic subjects was asked to report to the school board of the city of Oakland, which is just across the bay from San Francisco. These professors were not assigned the task of evaluating the schools generally; instead they

were requested for comments on the college preparatory curriculum of the high schools, especially as regards preparation for the university. Although the members of this group were, on the whole, much less willing to make broad generalizations regarding the schools, they each wrote separate reports. However, they met once with certain of the administrators, and their reports, though highly critical at times, display a sympathy for the special problems encountered in American comprehensive high schools.[20]

The fullest report was written by Professor Wayne Shumaker of the English Department. His main objection was to the inclusion of extraneous content such as a study of vocations in courses labeled English. This objection appears in the third part, together with the following significant statement: [21]

> Even University professors who admire John Dewey, from whose philosophy recent educational practices are said to derive, are not likely to approve of the tendencies just described. Dewey's problem-solving assumed the inadequacy of accepted notions and sought by logical thinking and experiment to supplant them. A program based on the NEA objectives, although not intended to deny students opportunities for real mental growth, must aim largely at a graceful social conformity.
>
> Such a judgment will astonish the school administrators as much as the principles implied by the *Language Arts Units* and the *Guide* astonish a university professor of English. The administrators are accustomed to regard themselves as having advanced notions and as holding revolutionary, not reactionary ideals. Their good will, moreover, is beyond question; the writer of this report, at least, is convinced of their devotion to the public weal and honors their indefatigable efforts to improve education and the state.

This statement reveals a sympathy for the problems of educators and a willingness to help in their solution. It also reveals a depth of understanding that has too long been absent from the conference table. However, only at the conference table can the prob-

[20] Office of Relations with Schools, and Field Service Center, University of California (Berkeley), *An Informal Report to the Oakland Board of Education by a Group of University of California (Berkeley) Professors Concerning the Oakland Senior High School Curriculum Content*, Jan., 1960, mimeographed,

[21] *Ibid.*, p. 22.

lems of education be flooded with uniform light. So long as those interested in education, with their varied viewpoints, remain separated from one another, so long will the searchlight of scrutiny continue its senseless gyrations.

THE EIGHT-YEAR STUDY

IN THE DECADE preceding the Second World War, nearly all accredited colleges and universities in this country agreed to accept students for a period of eight years from thirty selected high schools [22] on the basis of (a) recommendation by the principal, and (b) a carefully recorded history of the student's school life and of his activities and interests. During the experimental period, and from the limited group of cooperating schools, nearly all colleges agreed to accept students without regard to the course and unit requirements then in force, and without further examination. Four institutions, Harvard, Haverford, Princeton, and Yale, waived course and unit requirements for the period of the experiment, but continued to require that candidates take the College Entrance Board Examinations.

The list of findings of a Commission on the Relation of School and College, which prompted the experiment, becomes interesting when it is pointed out that the commission was appointed by the Progressive Education Association. The full list is quoted,[23] but, except in the case of the fourth finding, without the given explanation for each item:

1. Secondary education in the United States did not have clear-cut definite central purpose.
2. Schools failed to give students a sincere appreciation of their heritage as American citizens.
3. Our secondary schools did not prepare adequately for the responsibilities of community life.
4. The high school seldom challenged the student of first-rate ability to work up to the level of his intellectual powers.

[22] Wilford M. Aikin, *The Story of the Eight-Year Study*, Harper & Brothers, New York, 1942.

[23] *Ibid.*, pp. 5–11.

It was easy for him to "get his lessons," pass his course. The result was that many a brilliant mind developed habits of laziness, carelessness, superficiality. These habits, becoming firmly established during adolescence, prevented the full development of his powers. Even the conscientious student of superior ability did not often find himself seriously involved in a great intellectual enterprise. Seldom was any student "set on fire" intellectually, eager to explore on his own, ready to conquer difficulties and go through whatever drudgery might be necessary to achieve his purpose. The individual and society were both losers.

5. Schools neither knew their students well nor guided them wisely.
6. Schools failed to create conditions necessary for effective learning.
7. The Commission was conscious, also, of the fact that the creative energies of students were seldom released and developed.
8. The conventional high school curriculum was far removed from the real concerns of youth.
9. The traditional subjects of the curriculum had lost much of their vitality and significance.
10. Most high school graduates were not competent in the use of the English language.
11. The Commission found little evidence of unity in the work of the typical high school.
12. The absence of unity in the work of the secondary school was almost matched by the lack of continuity.
13. Complacency characterized high schools generally ten years ago. (Written in 1942 and therefore referring to the schools in 1932.)
14. Teachers were not well equipped for their responsibilities.
15. Only here and there did the Commission find principals who conceived of their work in terms of democratic leadership of the community, teachers, and students.
16. Principals and teachers labored earnestly, often sacrificially, but usually without any comprehensive evaluation of the results of their work.
17. The high school diploma meant only that the student had done whatever was necessary to accumulate the required number of units.

18. Finally, the relation of school and college was unsatisfactory to both institutions.

To try to meet the criticisms contained in these findings, the schools began to plan their experimental programs in the fall of 1933. Each developed its own plans and decided for itself what changes should be made in curriculum, organization, and procedure. Through the membership of the directing committee and its subcommittees, specialists of many different kinds gave every possible assistance sought by the schools, but avoided any tendency to dictate thought or action.

At first, the teachers and administrators were confused and bewildered by their newly granted freedom. Perplexed, they first sought reassurance from one another, and two major principles were enunciated:

1. The general life of the school and methods of teaching should conform to what is now known about the ways in which human beings learn and grow.
2. The high school in the United States should rediscover its chief reason for existence. (To lead our young people to understand, to appreciate, and to live the kind of life for which we as a people have been striving throughout our history.) [24]

These principles are extremely broad and the range of experiments begun in the schools was wide indeed. But the experimentation was aimed at common goals explicitly stated: [25]

1. Adaptation of work to individual needs.
2. Greater mastery of skills.
3. More opportunity for the release of creative energy.
4. More continuity in learning.
5. Greater unity of school experiences.

Descriptions of the experimental programs make fascinating reading, but these descriptions are not particularly relevant to the present discussion. More relevant are the new devices pioneered for the testing of individual progress. The sixteen evaluation instruments that were widely used included Interpretation of Data, Ap-

[24] *Ibid.*, pp. 17–18.
[25] *Ibid.*, p. 29.

plication of Principles, and the Nature of Proof. The names of these tests are a clear indication of a search for reliable and valid devices that will measure pupil progress across a broad front.

When the graduates of the thirty schools went to college they were matched with other students in the same college who had graduated from some school not participating in the study. Nearly 1,500 matched pairs were investigated. In general, the students from the experimental schools were better than those from the more conventional schools and the best students came, in general, from the most experimental schools.

World War II began before the eight-year study was completed. A nation with its back to the wall has little energy to experiment with a long-range program of education. Slowly, the excitement generated by the eight-year study has dissipated, the movement has failed to spread, and even the programs in the thirty schools themselves have become increasingly conventional.

The ideas on which the eight-year study was based are sound. As attention is increasingly paid to high school curriculums, more and more people will turn to the reports of this monumental activity for guidance and inspiration.

COOPERATIVE EVALUATION OF THE SCHOOLS

THE CONANT REPORT, the accreditation of high schools by colleges and universities, the Evaluative Criteria, the CASSA evaluation, the Illinois Curriculum Program, the Regional Project in Secondary Education in California, the reports from San Francisco and Oakland by members of academic departments, and the Eight-Year Study, provide us with certain information and understanding that should be applied in the evaluation of a school. The background for the following generalizations has been developed:

1. In the evaluation of a given school, the students, faculty, staff, community representatives, and college and university personnel should all take part.
2. There is a close association between evaluation and instructional improvement.
3. The privilege of freedom is to be extended with appropri-

ate and clearly defined limitations to states, counties, districts, schools, teachers, and students with respect to both educational aims and curriculum choices pointed toward the aims.

4. Evaluation of all aspects of the work of the schools should be conducted from the local and in some cases from the individual viewpoint within the limits assigned for local and individual jurisdiction.
5. Individual students vary widely with respect to abilities, attitudes, and skills.
6. There is a need to evaluate all aspects of the work of the school, not just preparation for the next level of schooling.
7. Reliable and valid measures of pupil progress exist toward some but not all of the goals of education.
8. In the interpretation of test results, consideration must be given to as many aspects of the total school situation as can be encompassed.
9. Student selection for special and advanced education on the basis of entrance examinations is inadequate.
10. Student selection for special and advanced education on the basis of courses taken is inadequate.

A permanent committee on evaluation should be established for each school. With the local principal or someone appointed by him as chairman, this committee should consist of representatives of the school board, county office, nearby college or university faculty, and parent-teacher association, as well as the appropriate number of representatives of the general community served by the school and one or more elementary and high school teachers. The function of this board should be to receive and consider reports of evaluation at regular intervals. In reading and considering these reports they should check to see that the following twelve procedures have been employed:

1. *In any given community, evaluation of education should go on across the board. That is to say, high school teachers should meet with evaluative committees of elementary schools and vice versa.*

The segregation of elementary schools from secondary schools in this country is deplorable. When children start going to high

school it is as though they were saying goodbye to their former friends and helpers forever and leaving to take up residence in a foreign country. Teachers in high school could learn much from elementary teachers, and they could teach them much. But the teaching could never take place in any kind of formal way, the greater prestige of the high school teacher is so firmly entrenched. The teaching could take place in the untrammeled give and take of the conference table, where the attention of the teacher and of those being taught are focused on other matters.

2. *High schools and colleges and universities need to be closely articulated.*

Closer, more complete, and more frequent communication is taking place between the personnel of high schools and colleges. Not so long ago, the only college professors to visit high schools were professors of education. In the summer, high school teachers went to school, largely to take courses in education. At the present time, teams of professors from academic departments are visiting school systems, and high school teachers are studying "subject matter" at colleges and universities, especially science and mathematics. More and more professors are writing and speaking about high school activities.

This closer communication should be fostered until the colleges and universities know exactly what is going on in the high schools nearby, and the high schools are made explicitly aware of what students need to know and be able to do in order to succeed at the university. When this degree of intimacy prevails, admissions officers may be willing to place less reliance on formal accreditation and entrance examinations. At any rate, the accreditation and the interpretation of the examination results should be carried out with greater understanding.

3. *Representatives of business and industry should be recruited for evaluation committees of schools.*

At one time, possession of a high school diploma was at least a partial guarantee that the possessor had demonstrated his competence in a restricted group of academic subjects. Now that the doors of the high school are open to all youth, the diploma does not necessarily carry this meaning. In an earlier day, the high school principal was personally acquainted with the town's leaders in business, industry, and labor, as he still is to

a certain extent in small towns, and his informal evaluations accompanied the more formal documents included in the application by a high school graduate for a position.

There seems no real reason why representatives of American industrial firms and labor unions, even the very big ones, should not meet with evaluation committees. By so doing they could learn to interpret more meaningful documents that could be substituted for the high school diploma, and at the same time they could acquaint school people directly with their personnel requirements.

4. *Evaluation of a school must make use of as much valid and reliable information as it is possible to obtain.*

This information is the kind that is available to scientists and engineers. Reliable instruments must be used to obtain it. Acceptable theoretical formulations must also be available with which to interpret this information, if the information is to be useful.

5. *Evaluation should be made in terms of a clearly stated philosophy of education that is consistent and generally accepted by both school and community.*

Implementation of this procedure presupposes the existence of a committee working fairly constantly at the difficult and important task of formulating a detailed statement of philosophy. Those with a liking for this demanding work should be recruited from professional and lay people in the district, and the services of an expert in the formulation of philosophic statements should be made available when necessary. In the early stages of this work, especially, the committee should be permitted to select from among a number of carefully formulated statements, rather than be expected to write an original set of statements. Such statements are available in the Evaluative Criteria already referred to.

6. *Evaluation should always be made in such terms and by such people that needed modifications of the instructional program can be carried out without unnecessary delay.*

Evaluation needs to take place constantly by a number of different individuals and by several committees.

Evaluation of the work of students for the purposes of receiving marks or grades is the prerogative of individual teachers. However, subject-matter committees, grade committees, ad-

ministrative committees, and articulation committees should all be making those decisions that will ensure the necessary coherence and meaning to the actions of individual teachers. When the work of these committees is properly related, teacher action will be properly supported. Nothing is more frustrating to a teacher than the feeling that he operates in complete isolation except the contrasting feeling that his rightful prerogatives are being usurped by a dictatorial administrator or an unwise committee.

Evaluation of the work of professional personnel is an extremely difficult topic. At the present time most beginning teachers are rated formally by the administrator. He usually makes use of a rating form for this purpose. In enlightened districts, teachers rate themselves and ratings made by the teacher himself and by his administrator are compared during a conference period. There are several arguments against the use of rating sheets. McCall [26] has found that ratings by principals bear almost no relation to the success of teachers at getting across their subject to pupils. Principals who try to make use of supervisory procedures calculated to modify teacher behavior find that the necessary rapport evaporates quickly and irrevocably when the rating form is produced. While these forms produce the appearance of objectivity, the choices on them must all be made subjectively. The effect of the administrator's general impression of the teacher, received sometimes as he walks by the open classroom door, is reflected in his rating of the teacher. Research has yet to produce a reliable and valid method of teacher evaluation. We suggest, therefore, that rating forms for teachers be abolished and that where a teacher wishes to question the action of a principal in recommending that use of his services be discontinued, the teacher have recourse to the judgment of a committee of three of his peers, one to be chosen by the principal and one by the teacher, and that these two members of the review committee suggest the name of a third member.

Superintendents make an informal evaluation of principals usually in a face-to-face situation and without the use of documents. Again, some recourse to the action of a committee

[26] William A. McCall and Gertrude R. Krause, "Measurement of Teacher Merit for Salary Purposes," *Journal of Educational Research*, May, 1960, Vol. 53, pp. 73–75.

of his peers should be made available where the recipient disagrees with the evaluation that is made.

Evaluation of personnel is linked closely to their selection. An exciting and interesting suggestion is that when a vacancy opens for a new faculty member, a single faculty member be made completely responsible for locating and selecting him. For one thing, the new member of the faculty will be assured of at least one other faculty member who is vitally concerned that he be successful.

7. *The services of those who know how to interpret test data should be available to evaluation committees.*

A number of evaluation committees will be at work in a large district. In all probability someone from the district will be available to help with the interpretation of test data. For small districts, or individual schools, help can be obtained from the county office, from the local state college, or from a neighboring community.

8. *The services of those who know about group process should be available to an evaluation committee.*

Evaluation is a difficult and sensitive task. Many of those serving on evaluation committees will be vitally concerned with the findings. If the level of conflict is to be kept down to manageable proportions, competent leadership must be supplied.

9. *An evaluation committee needs to know accurately the limitations and the extent of local freedom with respect to curriculum choices.*

Evaluation, the development of the curriculum, and the improvement of instruction cannot be completely separated. If the findings of evaluation committees are to modify instructional procedures, many teachers must be serving on the committees. Unless the program is to run wild, areas of choice open to teachers in individual classrooms must be sharply delineated.

That kind of administrator who puts teachers on committees just for the sake of keeping them busy is not to be tolerated. But a well-meaning though ignorant and short-sighted administrator can set a committee to work when he really ought to know that the kind of decision they are being called upon to make is not the kind that requires the services of a committee. Committees consume so much of precious teacher time that they should be working only at the development of choices where group action is necessary. For example, a committee might well

be called upon to decide upon a set of rules and standards for the choice of textbooks. Actual choice of a text should be left to the teacher giving the course.

At the same time, care should be taken that the time of committees not be wasted over matters that are really beyond their jurisdiction. For example, a committee on visual aids might spend hours making up a list of films to be purchased by the school only to find that purchase of films by an individual school is contrary to district policy. More subtle boundaries upon the freedom of teacher committees should be carefully demonstrated by the administrator before committee action. Nothing kills cooperative activity among teachers faster than the quick and persistent veto.

10. *All aspects of the work of the school should be continuously evaluated and all such evaluation and modification of practice carefully synthesized.*

Teaching and learning in the classroom, pupil participation in extra-class activities, the guidance program, the relationship of the school to the community, articulation of the school vertically, with feeder schools and with institutions of higher learning, and horizontally with schools like the one being evaluated, buildings, pupil conduct in halls and on playgrounds, the athletic program, and all possible aspects of the school must be given regular and careful evaluation. The recommendations arising from all this evaluation must be carefully synthesized so that the many facets of the school remain reasonably balanced. Occasionally, the classroom program suffers because of the need to field a strong team, or to put on a play. At certain times of the year, the guidance personnel may be tempted to conduct an excessive program of testing. Agencies in the community, though well-meaning, sometimes initiate projects that take too much time and energy from both pupils and teachers.

11. *The findings of evaluation committees should be formally reported to committees of professional school people and widely disseminated in the local community.*

If the reporting of the results of evaluation procedures is left to the judgment of the press, the members of the local community may be properly informed, or they may be led to believe that a crisis is imminent. Evaluation and the recommendations put forward tend to be complex. Unless these are communicated to the public with the utmost care, the community

may receive a false impression concerning the excellence of their schools. Only confident and well-informed citizens can be expected to vote in favor of bond issues and tax increases.

12. *All those taking part in the school program should receive fair consideration.*

Many people seem to feel that a "squeaking wheel gets the grease." This cynical attitude is not always completely unjustified, for in the schools as in politics, unwarranted attention is sometimes paid to pressure from aggressive individuals and tightly organized groups.

Teachers who have been at the school for many years, football coaches, and even custodians, may, in the nature of things, be expected to state their case more forcibly than other school people who, for one reason or another, feel less secure. But teaching excellence has not been proved to correlate highly with the trait of aggressiveness, either positively or negatively. Evaluation committees are therefore showing more concern for peace and quiet than for instructional excellence when they use a decibel meter as their single indicator of need.

At present, science and mathematics departments are riding a wave of high prestige. In addition, the teachers of science and mathematics, perhaps by the nature of their preparation and their work, tend to form tightly knit groups. In an earlier day, shop teachers sometimes constituted a solid phalanx. In rural areas, the special teachers of vocational agriculture and home economics sometimes manage to convey the impression of their federally derived strength.

If the work of the school is to show a satisfactory balance in all departments, evaluation committees may find it necessary to seek out an area of need instead of expecting always that such need will proclaim itself.

So far, discussion has stressed evaluation of schools and school systems as a kind of checking procedure. Committees are formed, evidence is collected, and common-sense judgments are rendered. A strong element of competition between systems, schools, and individuals is heavily implied. To see how the schools of a given district are doing, standardized tests with known norms are administered. One school in the district seems to be running away with the prizes and scholarships. An individual boy does particularly well at

the university. School A is accredited for five years, school B for only three.

Competition of this kind can easily be overemphasized. On the one hand, use of the word "norm" to mean an average instead of an ideal directs attention to the "passable" instead of the "possible." On the other hand, success tends to be measured by the symbols of attainment. Perhaps the greatest evil comes from the antagonisms that are aroused: school against school, teacher against teacher, and student against student. Even the mothers of little children sound a snarl or two.

Yet the goal of all evaluation is the improvement of instruction. The checking and the competition are valuable only so far as they result in better education.

RESEARCH AT THE UNIVERSITY

A DIFFERENT KIND OF EVALUATION has long been conducted in the universities, largely in departments of education. Here, scholars have abstracted generalized aspects of the educational scene in order to test them. The process is known as educational research. Much of the research is directed at an understanding of individual behavior and is performed by psychologists. Interest is shown in general topics which can be explained by theories of learning and of the human personality. Other researchers become interested in relationships demonstrated by groups of human beings connected with schools and so are known as sociologists or social psychologists. Many educationists study methods of teaching and of administration.

The results of such research can seldom be applied directly by the schools. Because of his need to greatly reduce the natural complexity of a situation in order to study a single variable or dimension, the researcher has so lifted the item of investigation out of its context that it no longer bears much resemblance to anything encompassed within a teacher's experience. Current research, therefore, is of little immediate value to the practitioner and so we usually find a lag of from a quarter to half a century between research and practice. This should by no means be taken as a statement

intended to belittle research. Research provides the only sure knowledge, and eventually there will be enough of it to guide the teacher out of the woods. Unfortunately, the history of education also shows examples of research findings being followed too eagerly and too immediately by the schools. As a result, there has been a great scurrying back and forth as the research compass pointed uncertainly first in one direction and then in another. A few misapprehensions have managed to get themselves cemented in.

RESEARCH BY SCHOOL DISTRICTS

In recent years, a kind of activity has been engendered that is more like engineering than science. It is called action research. The activity aims at the improvement of schools by using the techniques and findings of other research to test a practical situation with the aid of teachers, students, and administrators already present. Nearly all large districts and many county offices of education now have departments of research. Much of the time of the personnel in these departments is of necessity taken up with nose-counting jobs, but a few of the better ones are doing extremely valuable and pioneering work.

With the guidance of a well-trained research department the self-evaluation of the schools in a given district can become a first-class study in comparative education. With the aid of carefully developed research techniques, ongoing programs can be accurately assessed, and experimental forms of instruction can be tested in one school or in a few classrooms before receiving wider use. An interesting and useful task performed under the guidance of the research department is the establishment of population trends for the purposes of projection into the future. Population growth in a city and its suburbs is uneven. Unless the utmost diligence is exercised, schools can be located in such a way that some classrooms are half-empty, while others are jammed. Research departments conduct opinion surveys among teachers, pupils, parents, and the general public. Because these departments are accurately and completely informed, not only with respect to the local schools but also generally, concerning the educational scene, they are often called upon to communicate directly with the public or to provide the

information used by others for this important purpose. Each of these activities of a typical research department will be described in some detail.

Comparative studies

Frequently it is necessary or advisable to compare curriculum practices of one district with other districts in order to identify possible strengths, weaknesses, or avenues for improvement. Although such status studies may not always provide exact answers, prescribe the exact direction in which improvement should be made, or set standards to be achieved, they do provide valuable ideas and suggestions.

Frequently it is advisable to compare one type of classroom organization with another, one type of course sequence with another, one method of teaching a subject with another, in order to determine the most appropriate organization, sequence, or method for the particular school or community in which the curriculum must operate.

Few, if any, comprehensive evaluations of school programs in this country exist which make it possible to compare and judge alternative types of educational programs or which make it possible to compare how effectively the schools are achieving common and agreed-upon objectives. Comparative evaluations of different programs are difficult owing to a number of factors. Some of these complicating factors are: local control and support; variations in community resources; differences in social, intellectual, and environmental backgrounds of youth; differences in plan of educational programs; differences in the quality of teaching; differences in the quality of educational leadership; and differences in community aspiration levels. Comparative types of evaluation, because of the number of factors that must be controlled or equated, are difficult and hence seldom are used to make over-all comparisons. Similarly, comparative evaluation studies are ordinarily not used to compare single problems or issues in a large number of schools. However, the development of high-speed data-processing equipment and multivariable analysis techniques are now making it possible to do more large-scope, multischool comparisons.

The comparative type of evaluation is most often used on narrow-scope, simple-problem and single-issue studies. Thus, it is possible in a school or the schools of a district to make many

kinds of comparative studies which will provide reliable information. This type of study is useful in many ways, whether it is selecting the best textbook, or the better of two methods of teaching arithmetic.

The degree of confidence that can be placed upon the apparent answers obtained by the comparative study is influenced by the type of problem studied, the design of the study, the method of obtaining data, and the method of analyzing the data. If only a general answer is needed, then the study can be quite simply developed and interpreted by simple inspection of information obtained.

On the other hand, the study can become quite complex. If this research is based primarily upon qualitative factors dealing with how people feel, what they experience or remember, and the reasons for acting as they do, the problem of converting a series of qualitative facts (opinions, impressions, attitudes, interests, etc.) into quantitative terms that can be treated statistically, may become quite complex.

Converting qualitative to quantitative data for analysis and interpretation has been one of the most perplexing problems of research. Such techniques as rating scales, behavioral rating observations, pooled ratings, rank-order scales, social distance scales, sociometric graphs, the Thurstone technique of scale values, paired comparisons, scalogram analysis, Q-sort, and various other types of nonparametric analyses—accompanied by statistical formulas—have been developed for studies requiring a considerable degree of assurance that the best answer has been found.

Important elements in comparative studies are the standards (criteria) by which the information and facts are to be judged. The results and conclusions of the study are no better than the criteria upon which they are based. For example, the selection of curricular materials based upon a comparison of various materials should be guided by the extent to which the materials accepted adequately correspond to selected educational objectives. The type of criteria used in a comparative study of certain areas of the school curriculum should conform to the established principles of curriculum construction. And, of course, the evaluative criteria should include such practical considerations as money, time, effort, and acceptability to the staff and community.

Trends and projections

Certain types of curriculum development problems can best be approached through studying trends and, through analysis of the trends, making estimates of future needs. The trends are facts; the projections, best estimates. Population, enrollment, and staff needs are the most familiar examples of the trend and projection type of evaluation. It is also possible to apply this technique to other important aspects of curriculum development, such as predicting changes in the various courses of study, predicting the quality of instruction in various subject areas, predicting changes in educational needs of the community, predicting changes in laboratory design or equipment, predicting needs for particular types of materials and textbooks, and so on.

Many of the complicating factors affecting comparative studies also affect trend studies. Just as in the case of comparative studies, trend studies may not prescribe the exact direction in which improvement should be made, but they do provide valuable information and suggestions.

Since enrollment—the number of students to be educated—is an important element in curriculum development, enrollment trend and projection studies can be used as an illustration of this type of evaluation. If the only criterion is to obtain a general estimate of the approximate number of senior high school students (grades ten, eleven, and twelve) in the district five years from now, it may be sufficient to project the number of students currently enrolled in grades five, six, and seven. However, the following two conditions should also exist in the community if this projection is to be used for other than general information:

a. The community should be a stable community with a history of no noticeable increase or decrease of population and no likelihood of significant change in this growth pattern in the near future.
b. The school should have a youth population history with no significant dropout between grades five and twelve—the holding power of the school should be high.

If either or both of these conditions are not stable, the study becomes more complex. Population conditions in most school districts across the nation today are not stable. General

population growth, significant population shifts and mobility, significant school dropouts in grades nine through twelve in most districts are all complicating factors in enrollment estimating. For example, one large city school district on the West Coast has had an average annual population increase of 6.6 per cent and an average annual enrollment increase of 8.4 per cent for the last decade. In addition, there has been an average in-and-out migration of students of one per cent per month during the school year and an average ten per cent turnover during the summers. To add to the picture, there has also been an average movement of students among the schools of the district during the year of one per cent per month. To still further complicate the estimating problem, an average of 1,200 high school pupils who enter school in the fall drop out of school during the year.

If the single criterion of "estimating the approximate number of high school students in the district five years from now" were expanded to include additional criteria, the study would be more complex. For example, suppose these criteria were added:

a. Estimate the number of children at each grade level in each school of the district for the next five years.
b. Estimate the number of schools at each level and classrooms of each type needed each year for the next five years.
c. Estimate the number of new teachers needed each year in each grade level in the elementary schools and in each subject area in the secondary schools, for each school for the next five years.
d. Estimate the amount of money needed each year for teachers' salaries, other salaries, textbooks, maintenance, operations, and supplies for the next five years.
e. Estimate the amount of money needed to build and equip new classrooms each year for the next five years.
f. Determine the type of administrative organization needed to operate a district twice the present size, indicating stages of change, the target year for accomplishing this, and what changes should be made within the next five years.

These criteria would indicate a series of interrelated and complex trend and projection studies. These were actually criteria presented to the research department of the previously mentioned school system during the school year 1958–1959.

Here are some of the actions taken as a result of the studies implemented by the criteria, illustrating the value of such studies to curriculum development.

a. For the opening of school in September, 1959, 750 new teachers were employed. Of these, 496 were for replacements and 254 for additional positions due to growth. Each teacher was employed to teach at a specific grade level or pattern of subjects.
b. A $44,800,000 bond issue was voted on and passed in June, 1960, to build classrooms for a three-year period. Specific amounts were indicated for a specific number of new schools and classroom additions for each level of program —elementary, junior high, senior high, and junior college.
c. Plans for an election on the question of raising the tax limit are being made, the election tentatively being scheduled for the spring of 1962. A tax-limit raise will be needed to finance the school operating budget in 1962–1963.
d. Proposed administrative organizational plans were presented to the board of education during the summer of 1960. Target date for completion of reorganization has been set for the school year 1971–1972. Reorganization is scheduled in four stages.

The trend and projection studies pointed the way. There will be a certain amount of error in each one. However, adjustments will be made continuously as new trends develop in each area studied. Needs for additional evaluations are also arising, especially at the secondary level where the need for reorganization and improvement is being demanded. Some of these evaluations will be of the trend-projection type.

Experimentation

A common error of curriculum development made in both small and large districts is the institution of changes before these changes have been tested and approved locally. Someone in charge hears about a new scheme of teaching reading (or an old scheme refurbished) and he finds the evidence concerning its use most convincing. Without pilot operation in one or two local classrooms the scheme is swept into all the classrooms of the district. The scheme is strange to the teachers and they were comfortable with the old scheme. Their discontent spreads to the pupils and the new scheme is a total failure.

Lack of understanding by the teachers is only one reason for failure. Key materials may be lacking; the method may not fit the achievement or the motivation of the local pupils; or the local parents may not have been prepared to hear stories of its use. Experimental evaluation is useful in testing methods, courses, course sequences, organizational concepts, curricular offerings, laboratories, textbooks and equipment, and in many other ways.

The same basic methodology is applied to all experimental evaluation. The difference in complexity usually is directly related to the number of variables that must be controlled, and their effects are analyzed in the experiment. Those variables which complicate experimental evaluations are extraneous variables such as the effects of teachers, backgrounds of pupils, environmental effects, climate of opinion, and many others. The more of these extraneous variables that are eliminated or compensated for, the more complex, but also the more reliable, is the experiment.

Those variables which are the very heart of the experiment are induced variables which are set up to be tested by the experiment. The more of these variables that are to be introduced and tested, the more complex the experiment. The ideal experiment would be to control all extraneous variables and to introduce only one induced variable at a time. However, this is impossible in most experiments.

Experimentation in the physical sciences has followed the principle of the single induced variable and strict control of all extraneous variables. Experimentation on the problems of education, however, ordinarily involves a complex of variables which must be handled simultaneously. Thus, the newer statistical techniques of variance analysis and multivariate analysis have helped educational experimentation considerably. These techniques provide a means of studying causes and effects as the variables interact with each other in different combinations.

Experimental evaluation, if it is to be significant, must follow definite "ground rules." These are sometimes referred to as the scientific method. Since the major purpose of experimental evaluation is to describe the effect of certain possible changes or possible actions upon the students or staff within the educational program, the evaluation must be controlled by an experimental

design. The experimental design ordinarily includes the following:

a. A definitive statement of the proposed changes or actions to be tested.
b. A definite statement of the hypothesis—a tentative theory or prediction of possible effect of the changes or actions in order to guide the evaluation.
c. A brief review of the history of prior experiments or pretests which support the hypothesis.
d. A statement of the steps and methods to be used in carry-out the experiment.
e. A statement of what measurements will be made to test the effect of the experiment upon the pupils or staff.
f. A statement of how the significance will be determined from the information obtained in the measurements.
g. A statement of possible action, costs, and so on that will be involved if the hypothesis is significantly proved in the experiment.

Three basic designs are used for the more simple experiments. In the more complex experiments, variations or combinations of these designs may be used. These three basic designs are: random sample, random group, and group-within-group. These designs can usually be tested with relatively simple measuring instruments and significance can be determined by use of the t-test. When comparisons are to be made simultaneously among several variables, different and more thorough analytical procedures are used and different tests of significance are required.

Although the base remains very much the same, some of the more complex designs involving more complex analysis-of-variance techniques are: treatment by levels and by subjects, factorial experiments, split-plot designs, three-dimensional, higher-dimensional, complete and incomplete factorial designs, Latin square and Greco-Latin square, Gouden squares, Lattice squares and cubic lattice squares, randomized-block and incomplete-block designs, and so on.

In all the above basic and complex experimental designs, the major problem involved is with extraneous variables. These extraneous variables are handled in numerous ways. Some of

these are handled by equating groups or individuals between groups to take the variables into account. This technique is sometimes known as the control-group comparison or the paired-comparison, depending on whether the experimental group or individuals in the experimental group are equated with one or more control groups.

Where group or individual equalization is not possible, a method of counterbalancing is used, so that the total effects of variables in each group are equalized even though these effects may vary within groups. This method is often referred to as the group-rotation technique. In effect, the experiment is rotated among the various groups, the experimental and control groups being interchanged at intervals in the experiment. In effect, this method tries out the experiment with different selected groups, each in turn acting as the experimental and control group. In this manner, the combinations of variables among the groups are counterbalanced.

The third basic method is appropriate where it is impractical to use either the matching- or rotated-group techniques. It is also useful where the extraneous variables are not known. In this method, the subjects or the induced variables are assigned in some random way to the experiment and control groups. This is often referred to as the random-sample technique. There are also several theories governing the selection or distribution of the random samples.

The experimental type of evaluation is basically a testing procedure, wherein the hypothesis is tried out and sample measurements are made before, during, and after the experiment is implemented. Thus, the selection and use of measuring instruments becomes important. In addition, the categories of data collected by the measuring instruments must be clearly and specifically defined in order that tests of significance may be applied.

Various types of measuring instruments may be used: standardized tests, systematized observations, documentary evidences, controlled interviews, response scales, case studies, and so on. In order to avoid arriving at insignificant conclusions or involved conclusions, the methods of analysis must be considered when plans are being made for collection of data. A careful consideration of measuring instruments and methods of analysis also helps to determine what kind of information is

needed. From these three should be developed the criteria for the analysis—the kind of information needed, the measuring instruments, and the types of analysis. The criteria, in turn, assist in the classification of the data as they are collected. From the classification of data, it is then possible to select those that have a clear influence upon the hypothesis being tested. The facts revealed by the selection of data should then be combined and analyzed to arrive at a common result or conclusion regarding the significance of the hypothesis.

Tabulations, frequency distributions, tables and graphs, and statistical calculations are ways of analyzing the data collected. These analysis methods range from the simple graphic to the complex multivariate statistical. The type or complexity, to some extent, depends on the degree of confidence needed in order to prove, or reject, the hypothesis. It is important that at least a few of the basic computational concepts be used if possible, such as frequency distributions, measures of central tendency, measures of variability, and measures of relationship. Some of the more common statistical names and their computation should be familiar to those making experimental evaluations; such as the histogram, frequency curve, mean, median, percentiles, range, interquartile range, standard deviation, Z-scores, T-scores, correlations (several types). These are not difficult to learn and are ways of interpreting the collected data in order that the level of significance may in turn be determined; such as the t-test, level of confidence, and degrees of freedom.

Thus, for example, the staff may have originally been interested in the possible development of junior first-grade classes as a possible approach to providing a more adequate educational program for those children who, during their kindergarten year, had indicated they were not sufficiently mature to enter directly into first-grade reading activities. From experiments tried in other districts, the staff developed the hypothesis that such students placed in junior first-grade classes would benefit from such a program. The staff then developed a junior first-grade program and tried it out on an experimental basis to see if it would work satisfactorily in their schools and produce results of sufficiently significant value to establish such programs on a regular basis where there were sufficient pupils of the type desired. The staff drew up a design for the experiment, selected the pupils, grouped the pupils into control and

experimental groups, selected or devised the measuring instruments, carried on the experiment, collected the information, analyzed the results, and finally came to the conclusion that the experimental classes proved such classes produced results of sufficient value to warrant their continuance.

Implicit in this illustration are many decisions that had to be arrived at as a need grew into an experiment and the experiment grew into a program. The value of the experimental evaluation, of course, was probably directly related to the effort and care that went into the decisions and the process. There must have been a final test leading to the final decision that the experiment was of such significance as to warrant a continuation of the program—significance of sufficient confidence that would justify the effort and cost of adding a new program.

Opinion surveys

Curriculum development frequently depends upon what people think about the program. The schools are public agencies and are thus cast into the sociopolitical arena. Opinions and feelings are facts that cannot be brushed lightly aside.

Opinions are obtained by means of questionnaires and interviews and by the examination of documentary evidence.

A brief consideration of the requirements of a reliable and valid questionnaire will demonstrate that construction of such an instrument is not a task for amateurs. In the first place, the items must be clear, and all nonfunctional words must be eliminated. Aside, it may be noted that the degree to which a word is functional or nonfunctional varies from individual to individual. The required answers must be as brief and simple as possible. Somehow, the respondent must feel constrained by the nature of the question to respond truthfully and easily to an unseen, unknown, inquirer. In addition, the validity and reliability of the instrument must somehow be demonstrated.

Techniques of interviewing have developed rapidly in recent years. In order that interviewers may be trained fairly quickly to obtain reliable protocols, interview schedules have become more formal. If the interview is rigidly prestructured, there is not much chance of getting unexpected information from the interview. In other words, reliability is usually gained at the expense of serendipity. However, since validity implies correspondence with theoretical constructs, there is not much use obtaining meaningless information. In the early, explora-

tory stages of an inquiry, unstructured interviews with many open-ended questions may be helpful in hypothesis construction; well-structured interviews that come to resemble verbal questionnaires are needed for precise hypothesis testing.

Documentary evidence is the kind a historian uses, whereas the questionnaire and interview would be appropriate techniques for the psychologist and sociologist. Included among documentary evidence would be that obtained from reports of events, official documents, periodicals, and courses of study. Analysis of these data requires that the categories be clearly defined. Inevitably, the bias of the researcher will have effect. This effect should be noted and counteracted wherever possible.

Evaluation of the curriculum

This is a book on curriculum. Yet there is much in it that is not precisely curriculum, but rather related to curriculum. School buildings, qualifications of teachers, administrative procedures, and the many other important school topics that have been touched briefly and even, in places, explored with some persistence, are not, strictly speaking, a part of the curriculum. But curriculum is not a thing apart. It consists of all those experiences which children and youth enjoy because of the existence of schools. Unless these experiences are to be described in infinite detail, generalizations must be employed. If the generalizations are to be useful, they must be made in terms that lead to control. If the generalizations are to lead to understanding, they must strive to match the complexity of school experience.

A broad evaluation of a school or of a school system is readily justified as part of the evaluation of the curriculum. Whether the evaluation of the curriculum be broad or specific, criteria of successful practice must be provided.

To supply criteria with which to judge school experiences, we must have the aims, purposes, objectives, of a particular school clearly defined. These purposes must be socially appropriate. They depend, in part, on the nature of the society; but only in part, for modern societies are in a state of change. The purposes must be realizable and so they depend on the capacity of children to learn. Teachers show stable characteristics, hence these characteristics affect the goals of education. Schools are institutions. Hence the institutional qualities of schools affect goals.

The child's capacity to learn is probably far more dependent on the way he is taught than most teachers will admit. If children can learn, teachers can too. Schools were made by man, so they can be changed by man.

Therefore, a statement of educational goals is forced to use a spate of words describing and providing for an ebb and flow of events. Yet the philosophy of a school should have something more to it than the purpose of teaching children and youth how to remain sane and whole in a perplexing environment, although this is indeed an important purpose of the school. The theme of this book has been that the chief purpose of the schools is to teach children first to want, then to acquire, and finally to use, ideas of increasing complexity to guide them as they make their choices as free men.

As criteria of evaluation, the aims expressed leave much to be desired. Traditionally, schools have evaluated pupil progress, and therefore, indirectly, the curriculum, almost exclusively according to achievement in such traditional school activities as reading, writing, and arithmetic. The question arises as to whether such measures are all that is needed to evaluate the curriculum.

The writers of this text are strongly committed to the point of view that while measures of pupil achievement are essential they by no means comprise all the relevant data. Indeed, taken by themselves, they can lead to injustice, complacency, and inefficiency.

An illustration of this point is perhaps appropriate. Throughout the history of education an endless succession of devices has been recommended to guarantee teaching success. Each one has been presented by an enthusiastic group as the infallible gadget which can substitute for human intelligence and art. The most recent suggestion is automated teaching. This makes use of devices whereby an individual child is programed through a series of responses to sequential stimuli. To the child's errors, the machine responds negatively, some of the more complex machines being able to indicate the source of the error. A correct response is its own reward and leads to the presentation by the machine of a fresh stimulus. Now this is wonderful and the invention of teaching machines probably deserves high praise for supplying a device that can help the

teacher by performing the most repetitious and tiresome of his tasks. The point is that the program of the machine must be set up according to the logic of the one doing the programing. The child can seldom enjoy the privilege of seeking the answers to his own questions. Further than this, the child can demonstrate only those insights for which the program has made provision.

In general, achievement tests measure the kind of learning that is possible under the influence of teaching machines. They measure growth of a desire for learning only by inference, and they examine a limited range of pupil behavior.

Achievement is affected by a long list of widely ranging variables, among them being intelligence, socioeconomic status, modal attitudes among peers (school atmosphere), other personality characteristics of children, personality characteristics of teachers, administration, support for education in the community (including the nature of that support), teaching skill of teachers, nature of school buildings, teaching aids provided, climate, history of education in the community, rate of population increase, and so on almost indefinitely. Where achievement test results constitute the sole method of evaluating the curriculum, those schools which are fortunate with respect to the long list of variables just exemplified are rated far too high, and those schools which are unfortunate are rated far too low.

In the evaluation of a school curriculum, every effort should be made to use a wide variety of measuring devices on the students: attitude tests, personality inventories, tests of critical thinking, and tests of specific skills. Further, methods suggested by the Evaluative Criteria, or the CASSA questionnaire, should be employed to appraise all aspects of the school.

For a specific evaluation of the curriculum itself we suggest the collection of data by the following means:

a. An analysis of schedules of classes along with enrollments. This analysis will provide evidence of the extent to which appropriate subjects are available for those electing to take them.
b. A study of individual timetables of representative students. If comparisons show that a majority of the brighter students are not taking academic subjects, poor guidance procedures may be the reason.

c. An examination of the written courses of study. These should be up to date and give evidence of over-all planning.
d. Questionnaires to students and teachers to measure satisfaction with the school program, understanding of broad curriculum planning, extent of effort and general morale.
e. Brief questionnaires to a representative sample of parents and adults in the community to measure awareness of school offerings and general concern with the curriculum.
f. An assessment of curriculum development activity. The existence of large numbers of committees may indicate that a good deal of careful work is in progress, or it may merely indicate that the principle is whipping up a frenzy of activity.
g. Anecdotal records of classroom visits by supervisors recording the nature of classroom techniques in use by teachers.
h. Availability and quality of teaching aids: books, filmstrips, films, television, teaching machines, charts, and other apparatus.

A well-planned program of evaluation not only provides the safest and best road to a good educational program, but also ensures needed cooperation between the school and the community it serves.

Whether there are a number of schools in the district or only one, a single committee of fifteen to twenty citizens and school people is selected especially to work on evaluation. As the committee pays attention to the several principles of evaluation stated earlier in this chapter, the community comes to know and understand what the schools are doing and the school knows what the community desires. A balanced program is maintained in the schools as a whole, and each sector is comfortably articulated. Every employee of the school system is aware of a clearly defined area within which he must accept responsibility for making choices, and he is part of a well-integrated system, the purposes and methods of which he clearly understands.

The section on evaluation should leave the reader wondering about his own educational philosophy and the best method of achieving his purposes. The first chapter in this book described,

vaguely perhaps, a new kind of school. Such flights of the imagination are by no means easy. Perhaps they are most difficult when the imagination has been schooled. It should prove interesting, at this point, to return to the theme of our initial chapter, "A New Kind of School." Three levels of criticism are possible: rejection of certain details, rejection of certain of the major ideas, and rejection of the entire concept. Reasons in each case should be given. Freedom to criticize and reject is accompanied by a responsibility to invent. What kind of school would you like to see?

EXERCISES

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1. Describe the academic inventory of the Conant report.
2. Describe an accreditation system of schools by colleges and universities.
3. What is a Carnegie Unit?
4. Choose one method of establishing a scale for the measurement of some aspect of the personality. Describe the method.
5. Describe, in detail, one way in which data-processing machines may be used to relieve teachers of a heavy burden.
6. Describe, briefly, the Illinois Curriculum Program.
7. Choose one of the new national programs in science or mathematics instruction and tell about it.
8. Criticize the list of findings of the Commission on the Relation of School and College. This is the commission that was associated with the eight-year study.
9. How might representatives from local industry be chosen to serve on a school evaluation committee?
10. Give an example of a jurisdictional dispute between state and local educational authorities.
11. Provide evidence that teachers are taking other than education courses during the summer months.
12. Criticize a form you have examined that is used for the rating of teachers.
13. Give an illustration of a school curriculum that is out of balance.

14. List various precautions that must be taken locally to ensure fair reporting of school news.

15. Provide an illustration to show that the noisiest rather than the most deserving parts of the educational community receive relief first. What does this single illustration prove, if anything?

16. Show how the competitive rivalry between two teachers in a school system could be beneficial. Could such rivalry ever be harmful?

17. Provide an example whereby a tentative finding of educational research was used to modify school practice but was afterward found to be not true.

18. List several routine activities which might take the time of the research department of a city school system and show how machines might be used to facilitate this task.

19. Describe a narrow-scope, simple problem that the research department of a county school system might be called upon to solve. What would be the best way to solve this problem?

20. A population expert is asked to predict the school enrollment in a community for five years in advance. What information must he collect?

21. What is meant by analysis of variance?

22. Why should new ideas in the curriculum nearly always be tested, if they seem worth testing at all, on a small scale at first?

23. What is an induced variable?

24. How might the "group-rotation" technique be used to test the efficacy of science instruction with or without individual laboratory work?

25. How might a random sample of pupils be obtained from the population of a particular school?

TOPICS FOR DISCUSSION

1. The Conant report has been highly influential. Can you discern any ways in which this influence might be bad?

2. Final evaluation of a school system should not be performed by people outside that system.

3. To what extent should citizens committees control the curriculum of the school?

4. Why are the opinions of professors in the scholarly disciplines important in the development of the curriculum?

5. How might the process of curriculum development be speeded up?

6. The part played by teachers in the development of the curriculum.

7. Examine the problem of school integration in the South in light of principles of evaluation established in this chapter.

8. Teacher committees for teacher evaluation are too time-consuming.

9. The attitude of the public press to education.

10. The goal of all evaluation is the improvement of instruction.

11. The use of sophisticated statistical techniques in educational research.

ADDITIONAL READING

Ahmann, J. Stanley, Glock, Marvin D., and Wardeberg, Helen L., EVALUATING ELEMENTARY SCHOOL PUPILS (Boston: Allyn & Bacon, 1960). *A textbook for those preparing to be elementary-school teachers.*

Cantor, Nathaniel, THE TEACHING-LEARNING PROCESS (New York: The Dryden Press, 1953). *The author builds his case around tape recordings of discussions held in his graduate classes with experienced teachers. A justly famous book.*

Cooperative Study of Secondary School Standards, EVALUATIVE CRITERIA, second edition (744 Jackson Place, Washington 6, D.C.: The Association, 1950). *One of a number of publications by the Cooperative Study. It is the most recently published and probably one of the most useful.*

Dressel, Paul Leroy, EVALUATION IN GENERAL EDUCATION (Dubuque, Iowa: W. C. Brown, 1954). *In addition to providing information concerning standard methods of evaluation, the au-*

thor describes a number of new and interesting techniques for the evaluation of process.

Educational Policies Commission, NEA, THE CENTRAL PURPOSES OF AMERICAN EDUCATION (1201 Sixteenth St., N.W., Washington, D.C.: National Education Association, 1961). *The latest statement of aims from the Commission.*

Rothney, John Watson Murray, EVALUATING AND REPORTING PUPIL PROGRESS (Washington, D.C.: Department of Classroom Teachers, American Educational Research Association, National Education Association, 1955). *A useful volume on the subject. This is one of a list of pamphlets put out by the American Educational Research Association attempting to answer the question, "What does research say on the subject?" The level of discussion is elementary and no actual research is referred to in the summary.*

Russell, William F., HOW TO JUDGE A SCHOOL (New York: Harper & Brothers, 1954). *An interesting collection of methods. The book is said to be "a handbook for puzzled parents and tired taxpayers."*

The Fund for the Advancement of Education, THEY WENT TO COLLEGE EARLY (New York: The Fund, 1957). *An evaluation report on the experiences of 420 students who were admitted early to eleven different American colleges and universities.*

Tyler, Ralph W., "A Test of Skill in Using a Microscope," EDUCATIONAL RESEARCH BULLETIN, Vol. 9, Nov., 1930, pp. 493–496. *It seems entirely too bad that activities of this kind, initiated under the enthusiastic banner of Progressive Education, have almost entirely ceased. The modern substitute seems to be to ask Professor X of the biology department for his opinion.*

Wandt, Edwin, and Brown, Gerald W., ESSENTIALS OF EDUCATIONAL EVALUATION (New York: Henry Holt & Co., Inc., 1957). *A short statement designed as a unit for inclusion in other courses.*

Wrightstone, Jacob Wayne, Justman, Joseph, and Robbins, Irving, EVALUATION IN MODERN EDUCATION (New York: American Book Company, 1956). *Wrightstone achieved his reputation largely in connection with the eight-year study.*

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