WHY TEACHERS FAIL

Many contemporary experimental psychologist-s of the first mnk are *unwilling or* unable to *translate their discoveries into language that will make them useful to teachers who must apply the principles of learning* in *the classroom. B. F. Skinner, Edgar Pierce Professor of Psychology at Harvard, is one notable exception; much that k has to say about the processes of learning bears directly upon classroom practice. The paper that follows is based upon investigations supported by a grant from the National Institute* of *Mental Health and by the Human Ecology Fund.* Zt *is adapted from an address given to the Philosophy of Education Society.*

By B. F. SKINNER

THE most widely publicized efforts to improve education show an extraordinary neglect of *method.* Learning and teaching are not analyzed, and almost no effort is made to improve teaching as such. The aid which education is to receive usually means money, and the proposals for spending it follow a few, familiar lincs. We should build more and better schools. We should recruit more and better teachers. We should search for better students and *make sure that all competent* students can go to school or college. We sbould multiply teacher-student contacts with films and television. We should design new curricula. All this can be done without looking at teaching itself. We need not ask how those better teachers are to teach those better students in those better schools, what kinds of contact are to be multiplied through mass media, or how new curricula are to be made effective.

Perhaps we should not expect questions of this sort to be asked in what is essentially a consumer's revolt. Earlier *educational* reforms were proposed by teachers—a Comenius, a Rousseau, a John Dewey-who were familiar with teaching methods, knew their shortcomings, and thought they saw a chance to improve them. Today the disaffected are the parents, employers, and others who are unhappy about the products of education. When teachers complain, it is as consumers of education at lower levels —graduate school authorities want better wllege teaching, wllege teachers work to improve high-school curricula, and so on. It is perhaps natural that consumers should turn to the wnspicuous shortcomings of plant, personnel, and equipment rather than to method.

It is also true that educational method has not been brought to their attention in a favorable light. Pedagogy is not a prestigious word. Its low estate may be traced in part to the fact that under the blandishments of statistical methods, which promised a new kind of rigor, educational psychologists spent half a century measuring the results of teaching while neglecting teaching itself. They wmpared different methods of teaching in matched groups and wuld often say that one method was clearly better than another, but the methods they wmpared were usually not drawn from their own research or even their own theories, and their results seldom generated new *methods.* Psychological studies of learning were equally sterile—concentrating on relatively unimportant details of a few typical learning situations such as the memory drum, the maze, the discrimination box, and verbal "problems." The learning and forgetting curves that emerged from these studies were never useful in the classroom and came to occupy a less and less important place in textbooks on educational psychology. Even today many distinguished learning theorists insist that their work has no practical relevance.

For these and doubtless other reasons, what has been taught as pedagogy has not been a true technology of teaching. College teaching, indeed, has not been taught at all. The beginning teacher receives no professional preparation. He usually begins to teach simply as he himself has been taught, and if he improve-s, it is only in the light of his own unaided experience. High-school and grade school teaching is taught primarily through apprenticeships, in which students receive the advice and counsel of experienced teachers. Certain trade skills and rules of thumb are passed along, but the young teacher's own experience is to be the major source of improvement. Even this modest venture in teacher training is under attack. It is argued that a good teacher is simply one who knows his subject matter and is interested in it. Any special knowledge of pedagogy as a basic science of teaching is felt to be unnecessary.

The attitude is regrettable. No enterprise can improve itself to the fullest extent without examining its basic processes. A really effective educational system cannot be set up until we understand the processes of learning and teaching. Human behavior is far too wmplex to be left to casual experience, or even to organized experience in the restricted environment of the classroom. Teachers need help. In particular they need the kind of help offered by a scientific analysis of behavior.

Escape from school—"The dropout is a legal truant."

FORTUNATELY such an analysis is now available. Principles derived from it have already wntributed to the design of schools, equipment, texts, and classroom practices. Programmed instruction is, perhaps, its best known achievement. Some acquaintance with its basic *formulation is* beginning to be regarded as important in tbe training of teachers and administrators. These positive contributions, however, are no more important than the light which the analysis

throws on current practices. There is something wrung with teaching. From the point of view of an experimental analysis of behavior, what is it?

Corporal punishment, which has always played an important role in education, provides one clue. As H. I. Marrou says in *A History of Education in Antiquity*: Education and corporal punishment appeared as inseparable to a Hellenistic Creek as they had to a Jewish or an Egyptian scribe in the time of the Pharoahs. ... When the men of antiquity thought back to their schooldays they immediately remembered the beatings." The cane is still with us, and efforts to abolish it are vigorously opposed. In Great Britain a split leather strap for whipping students called a taws can be obtained from suppliers who advertise in educational journals, one of whom is said to sell 3,000 annually. (The taws has the advantage, shared by the rubber truncheon, of leaving no incriminating *marks.)*

The brutality of corporal punishment and the viciousness it breeds in both teacher and student have, of course, led to reform. Usually this has meant little more than shifting to noncorporal measures, of which education can boast an astonishing list. Ridicule (now largely verbalized, but once symbolized by the dunce cap or by forcing the student to sit facing a wall), scolding, sarcasm, criticism, incarceration (being "kept after school"), extra school or home work, the withdrawal of privileges, forced labor, ostracism, being put on silence, and fines—these are some of the devices that have permitted the teacher to spare the rod without spoiling the child. In some respects they are less objectionable than corporal punishment, but the pattern remains: the student spends a great part of his day doing things he does not want to do. If a teacher is in any doubt about his own methods, he should ask himself a few questions. Do *my* students stop work immediately when I dismiss the class? (If so, dismissal is obviously a release from a threat.) Do they welcome rather than regret vacations and unscheduled days of no school? Do I reward them for good behavior by excusing them from other assignments? Do I punish them by giving them additional assignments? Do I frequently say, "Pay attention," "Now remember," or otherwise gently "admonish" them? Do I find it necessary from time to time to "get tough" and threaten some form of punishment?

The teacher can use aversive control because he is either bigger and stronger than his students or able to invoke the authority of parents or police who are. He can coerce students into reading texts, listening to lectures, *taking* part in discussions, recalling as much as possible of what they have read or heard, writing papers, and so on. This is perhaps an achievement, but it is offset by an extraordinary list of unwanted by-products traceable to the basic practice.

The student who works mainly to escape aversive stimulation discovers other ways of escaping. He is tardy—"creeping like snail unwilling to school." He stays away from school altogether. Education has its own word for this—"truancy"—from an old Celt word meaning wretched. A special policeman, the truant officer, deals with offenders hy threatening still more aversive consequences. The dropout is a legal truant. Children who commit suicide are often found to have had trouble in school.

There are subtler forms of escape. Though physically present and looking at teacher or text, the student does not pay attention. He is hysterically deaf. His mind wanders. He daydreams. "Mental fatigue" is usually not a state of exhaustion but an uncontrollable disposition to escape, and schools deal with it by permitting escape toother activities that, it is hoped, will also be profitable. The periods into which the school day is broken measure the limits of successful aversive control rather than the capacity for sustained attention. A child will spend hours absorbed in play or in watching movies or television who cannot sit still in school for more than a few minutes before escape becomes too strong to be denied, One of the easiest forms of escape is simply to forget all one has learned, and no one has discovered a form of control to prevent this ultimate break for freedom.

An equally serious result which an experimental analysis of behavior leads us to expect is that students counter-

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ESSAY OF SCHOOL RULES

Read and agreed to at a meeting of the School Committee the First Day of the Ninth *Month: 1798*

1st *Mind to have your Hands and faces washed and Heads Combed every morning before you come to school and be careful to be there by the time appointed.*

2nd *Come into School quietly and Soberly, and when there be Quiet and still al your proper business; and mind the instructions of the Teacher. moue nd from seat to seat, or go out unnessecerily, and but one at a time.*

3rd *Do not scribble in your own, w one anothers Speling, reading, writing w Cuphering Books; nor use one anothers pens etc without leave.*

4th *In coming to w going from School, behave with decency and sobriely, nd differing with w purposly hurting or offending each other: mock nat nw insult any person, neither stop on the road to play, nor make a great and unbecoming noise.*

5th *Tell no untruths, or miscall one another, nor use the corrupt or unscriptural Language of you to a single person; also be Careful to Call the months and days of the week by their proper names as 1st 2nd 3rd etc and date your Books accordingly.*

6th *Let none make bargains, Sell, swop, w exchange on any account at school.*

7th *Let there bt no Quarrels, fighting w chalanging lo fight, no wrestleing w wilfully prooking one another to anger in w out of school, no throwing dirt, sticks, stones w snowballs.*

8th *and Lastly let these rules be observed by all, and if any wilfully trample and despise the good order of the school, after being cooly admonished without manifest signs of amendment with the approbation of two or more of the Committee they are to be discharged.*

—Regulations governing student conduct in an eighteenth century common school in Pennsylvania.

was under attack by reactionary plutocrats, a fellow professor told him, "Bob, if the trustees fire Robert Lovett, you'll get twenty resignations from the faculty in twenty-four hours." Hutchins replied, "No, I won't. My successor will."

Hutchins's central belief was that "Every student should obtain a liberal education before being permitted to specialize." At the same time he wanted to speed up education so that work in the professions could get under way more quickly. What he sought was "more educated A.B.'s and fewer uneducated Ph.D.'s." He even looked forward, as somebody put it, to the time when Ph.D.'s would really be Doctors of Philosophy. What interested him was ideas, and he stood for culture and the human tradition. Some of his innovations were remarkable-also unworkable. He wanted to do away with rank among professors, forbid them to earn money by their publications, and abolish examinations and required class attendance for students. He felt that education should be something bigger than a mere piling up of credits, and he let more air into American higher education than any university president in fifty years. Brave man, he even abolished football.

The two men who have followed Hutchins as heads of state at Chicago came from different molds and have shown quite different styles.

Lawrence A. Kimpton, an energetic professor of philosophy and a practical man as well, who had become vice president of the university, took over when Hutchins resigned in 1951 and served as chief executive until 1980.

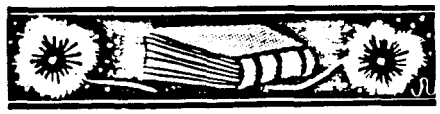
George Beadle, who succeeded Kimpton in 1961 to become the seventh president of the Chicago principality, is a biologist, a specialist in genetics. Beadle, together with Joshua Lederberg and Edward L. Tatum, received the Nobel Prize in physiology and medicine in 1958.

Behind Beadle in the power structure are three major elements: trustees, faculty, and alumni. There have been only seven chairmen of the Chicago Board of Trustees in the entire history of the university, the same number as presidents. The board has always represented the cream of Chicago civic leadership, and never has this been truer than today.

The faculty has considerable autonomous power at Chicago, probably more than in any comparable American university. Beadle is faculty-minded, and so is Provost Edward H. Levi, the former Law School dean. (Provosts of universities are by no means always faculty-minded.) Harper laid it down back in the 1890s that educational jurisdiction is the exclusive domain of the faculty, and this tradition has been pretty well kept up to this day. The trustees do not supervise on the academic level. Money follows policy, not the reverse. The faculty is unshakable. Even Hutchins had to bow to it, although his bow was angular. Mr. Beadle is fond of saying that he, as president, does not even have tenure, which every senior faculty member has, and one of his favorite anecdotes concerns the newly appointed president of another university who, on arrival, summoned the senior professors and addressed them as "my faculty." The reply came quickly, "Mr. President, faculties have presidents, but presidents do not have faculties."

In terms of endowment Chicago is the fourth richest among private universities in the country; the total endowment is around $275,000,000, which produces a revenue of something between $8,000,000 and $9,000,000 a year. But this is a drop in the bucket, since annual expenditures amount to $75,000,000, 68 per cent of which goes for instruction and research. Another $75,000,000 is required to operate the Argonne National Laboratory, and this sum is contributed by the Atomic Energy Commission. These are large sums and the University, like most other universities, is hard put to it these days to make ends meet, let alone find money for new purposes. And, as its fiscal authorities say, "The last million dollars in the budget is often the difference that *makes* possible exciting new developments."

AFTER ten days in the remarkable Chicago principality I said good-bye to its towers and meadows and tried to analyze my dominating thoughts. Perhaps the single element that best characterizes the university is its incessant search for quality, which goes back all the way to Harper. Between the Atlantic and the Pacific it towers like a lonely colossus, symbolizing the aspirations and achievements of one of the most fruitful areas of our country, the Middle West. Quality aside, this is a school that stands for freedom of expression, freedom to speculate and experiment, freedom for spacious inquiry, freedom to be a gadfly if necessary, and freedom not only to be right but to take a chance on being wrong. It has unlimited reserves of energy and creative talent for dealing with the true business of a university, the pursuit and communication of knowledge, and, having survived a passionate ordeal, it has risen again to become newly typical of what a university should be, an unfrightened and pertinacious community of scholars. It still has its unique atmosphere of vitality and gives forth a sense of endurance as well as youth. My own feeling is that it is still the most exciting university in the world.



Why Teachers Fail

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attack. If the teacher is weak, the student may attack openly. Physical attacks on teachers are now common. Verbal attacks in the teacher's absence are legendary. When the teacher is present, attacks may take the form of annoyance, and students escape punishment by annoying surreptitiously -- by groaning, shuffling the feet, or snapping the fingers. A *tormenter" was a surreptitious noise maker especially designed for classroom use.

Counter-attack escalates. Slightly aversive action by the teacher evokes reactions that demand severer measures, to which in turn the student reacts still more violently. Escalation may continue until one party withdraws (the student leaves school or the teacher resigns) or dominates completely (the students establish anarchy or the teacher Imposes a despotic discipline.)

Vandalism is another form of counter-attack that is growing steadily more serious. Many cities maintain special police forces to guard school buildings on weekends, Schools are now being designed so that windows cannot be easily broken from the street. A more sweeping counter-attack comes later when, as taxpayers or alumni, former students refuse to support educational institutions. Anti-intellectualism is often a general attack on all that education represents.

A much less obvious but equally serious effect of aversive control is plain inaction. The student is sullen and unresponsive. He "blocks." Inaction is sometimes a form of escape. Rather than can-y out an assignment, the student simply takes punishment as the lesser evil. It is sometimes a form of attack, the object of which is to enrage the teacher. But it is also in its own right a predictable effect of aversive control.

All these reactions have emotional accompaniments. Fear and anxiety are characteristic of escape and avoidance, anger of counter-attack, and resentment of sullen inaction. These are the classical features of juvenile delinquency, of psychosomatic illness, and of other maladjustments familiar to the administrations and health services of educational institutions.

In allege and graduate schools the aversive pattern survives in the now almost universal system of "assign and test." The teacher does not teach, he simply holds the student responsible for learning. The student must read books, study texts, perform experiments, and attend lectures, and he is responsible for doing so in the sense that, if he does not correctly report what he has seen, heard, or read, he will suffer aversive

consequences. Questions and answers are so staple a feature of education that their connection with teaching almost never occasions surprise. As a demand for a response that will meet certain specifications, a question is almost always slightly aversive. An examination, as a collection of questions, characteristically generates tbe anxiety and panic appropriate to avoidance and escape. Reading a student's paper is still likely tc be called "correcting" it. Examinations are designed to show principally what the student does not know. A test that proves to be too easy is made harder before being given again, ostensibly because an easy test does not discriminate, but more probably because the teacher is afraid of weakening the threat under which his students are working. A teacher is judged by his employers and colleagues by the severity of the threat he imposes: he is a good teacher if he makes his students work hard, regardless of how he does so or of how much he teaches them by doing so. He eventually evaluates himself in the same way; if he tries to shift to nonaversive methods, he may discover that he resists making things easy as if this necessarily meant teaching less.

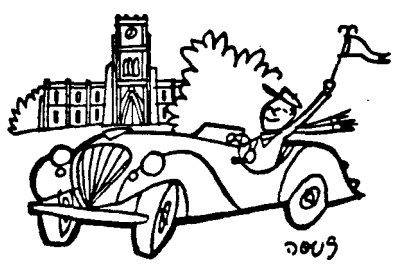
Proposals to add requirements and raise standards are usually part of an aversive pattern. A well known educator has written: We must stiffen the work ofourschools.. . we have every reason to concentrate on [certain subjects] and be unflagging in our insistence that they be really learned . . . Senior year [in high school] ought to be the hardest. . . [We should give] students work that is both difficult and important, and [insist] that it be well done. . . . We should demand more of our students." These expressions were probably intended to be synonymous with "students should learn more" or possibly "teachers should teach more." There may be good reasons why students should take more mathematics or learn a modem language more thoroughly or be better prepared for college or graduate school, but they are not reasons for intensifying aversive pressures. A standard is a level of achievement; only under a particular philosophy of education is it a criterion upon which some form of punishment is contingent.

Most teachers are humane and well disposed. They do not want to threaten their students, yet they find themselves doing so. They want to help, but their offers to help are often declined. Most students are well-disposed. They want an education, yet they cannot force themselves to study, and they know they are wasting time. For reasons which they have probably not correctly identified, many are in revolt. Wby should *education* continue to use the aversive techniques to which all this is so obviously due? Evidently because effective alternatives have not been found. It is not enough simply to abandon aversive measures. A Summerhill is therapeutic not educational. By withholding punishment teachers may help students who have been badly treated elsewhere and prepare them to be taught, hut something else is needed if they are to teach. What is that something else, and why has it not yet solved the problem?

A child sees things and talks about tbem accurately afterward. He listens to news and gossip and passes it along. He recounts in great detail the plot of a movie he has seen or a book he has read. He seems to have a "natural curiosity," a "love of knowledge," an -inherent wish to learn." Why not take advantage of these natural endowments and simply bring the student into contact with the world he is to learn about? There are practical problems, of course. Only a small part of the real world can be brought into the classroom even with the aid of films, tape recorders, and television, and only a small part of wbat remains can be visited outside. Words are easily imported, but the verbal excesses of classical education have shown how easily this fact may lead to a dangerous overemphasis. Within reasonable limits, however, is it not possible to teach simply by giving the student an opportunity to learn in a natural way?

Unfortunately, a student does not learn simply when he is shown or told. Something essential to his natural curiosity or wish to learn is missing from the classmom. What is missing, technically speaking, is "positive reinforcement." In daily life the student looks, listens, and remembers because certain consequences then follow. He learns to look and listen in those special ways that encourage remembering because he is reinforced for recalling what he has seen and heard, just as a newspaper reporter notes and remembers things be sees because he is paid for reporting them. Consequences of this sort are lacking when a teacher simply shows a student something or tells him something.

Rousseau was the great advocate of natural learning. Emile was to be taught by the world of things. His teacher was to draw his attention to that world; but otherwise his education was to be negative. There were to be no arranged consequences. But Emile was an imaginary student with imaginary learning processes. When Rousseau's disciple, Pestalozzi, tried the methods on his own flesh-and-blood son, he ran into trouble. His diary is one of the most pathetic documents in the history of education. As he walked with his young son beside a stream, Pestalozzi would repeat several times, Water flows downhill." He would show the boy that "wood swims in water and . . . stones sink." Whether the child was learning *anything or not,* he was not unhappy, and Pestalozzi could believe that at least be was using the right method. But when the world of things had to be left behind, failure could no longer be concealed. "I could only get him to read with difficulty; he has a thousand ways of getting out of it., and never loses an opportunity of doing something else." He could make the boy sit still at his lessons by first making him "run and play out of doors in the cold," but Pestalozzi himself was then exhausted. Inevitably, of course, he retumed to aversive measures: "He was soon tired of learning to read, but as I had decided that he should work at it regularly every day, whether he liked it or not, I determined to make him feel the necessity of doing so, from the very first, by showing him there was no choice between this work and my displeasure, which I made him feel by keeping him in."



The failure of "showing and telling" is sometimes attributed to lack of attention. We are often aware that we ourselves are not listening or looking carefully. If we are not to punish the student for not looking and not listening, how can we make him concentrate? One possibility is to make sure that there is nothing else to be seen or heard. The schoolroom is isolated and freed of distractions. Silence is often the rule. Physical constraints are helpful. Earphones reassure the teacher that only what is to be heard is going into the student's ears. The TV screen is praised for its isolation and hypnotic effect. A piece of equipment has been proposed that achieves concentration in the following desperate way: the student faces a brightly lighted text, framed by walls which operate on the principle of the blinders once worn by carriage horses. His ears are between earphones. He reads part of the text aloud and then listens to his recorded voice as he reads it again. If he does not learn what he reads, it is certainly not because he has not seen it!

A less coercive practice is to make what is to be seen or heard attractive and attention-compelling. The advertiser faces the same problem as the teacher, and his techniques have been widely copied in the design of textbooks, films, and classroom practices. Bright colors, variety, sudden change, big type, animated sequences-all these have at

least a temporary effect in inducing the student to look and listen. They do not, however, *teach* the student to look and listen, because they occur at the wrong time. A similar weakness is seen in making school itself pleasant. Attractive architecture, colorful interiors, comfortable furniture, congenial social arrangements, naturally interesting subjects—these are all reinforcing, but they reinforce only the behaviors they are contingent upon. An attractive school building reinforces the behavior of coming in sight of it. A colorful and comfortable classroom reinforces the behavior of entering it. Roughly speaking, these things could be said to strengthen a positive attitude toward school But they provide merely the setting for instruction. They do not teach what students are in school to learn.

In the same way audiovisual aids usually come at the wrong time to strengthen the forms of behavior that are the principal concern of the teacher. An interesting page printed in four colors reinforces the student simply for o ning the book and looking at it. It does not reinforce reading the page or even examining it closely; certainly it does not reinforce those activities that result in effective recall of what is seen. An interesting lecturer holds his listeners in the sense that they look at and listen to him, just as an interesting demonstration film reinforces the behavior of watching it, but neither the lecture nor the film necessarily reinforces listening or listening in those special ways that further recall. In good instruction interesting things should happen *after* the student has read a page or listened or looked with care. The four-color picture should *become* interesting when the text that accompanies it has been read. One stage in a lecture or film should be interesting only if earlier stages have been carefully examined and remembered. In general, naturally attractive and interesting things further the primary goals of education only when they enter into much more subtle contingencies of reinforcement than are usually represented by audiovisual aids.

It is possible that students may be induced to learn by making material not only attractive but memorable. An obvious example is making material easy, The child first learns to write in manuscript because it resembles the text he is learning to read; he may learn to read material printed in a phonetic alphabet; be may learn to spell only words he will actually use; and so on. This sort of simplification shows a lack of confidence in methods of teaching and often merely postpones the teacher's task, but it is sometimes a useful strategy. Material which is well organized is also, of course, easier to learn.

Some current psychological theories suggest that material may be made memorable in another way. Various laws of perception imply that an observer cannot help seeing things in certain ways. The stimulus seems to force itself upon the organism. Optical illusions are often cited as examples. These laws suggest *the* possibility that material may be presented in the form in which it is irresistibly learned. Material is to be so "structured" that it is readily-and almost necessarily—"grasped." Instructional examples are, however, far less persuasive than the demonstration offered in support of them. In trying to assign an important *function to the material* to be learned, it is particularly easy to overlook other conditions under which learning actually occurs.

No matter how attractive, interesting, and well structured material may be, the discouraging fact is that it is often not learned. **Rather than continue to ask why, many educational theorists have concluded that the teacher cannot really teach at all but can only help the student learn. The dominant metaphor goes back to Plato. As Emile Bréhier states it in *The Hellenic Age*, "Socrates . . . possessed** no other art but maieutics, his mother Phaenarete's art of delivering; he drew out from souls what they have in them . . ." The student already knows the truth; the teacher simply shows him that he knows. The archetype is the famous episode in the *Meno* in which Socrates takes an uneducated slave boy through Pythagoras's theorem for doubling the square. In spite of the fact that this scene is still widely regarded as an educational triumph, there is no evidence that the child learned anything. He timidly agrees with various suggestions, and he answers leading questions, but it is inconceivable that he could have reconstructed the theorem by himself when Socrates had finished. Socrates says as much later in the dialogue: "If someone will keep asking him these same questions often and in various forms, you can be sure that in the end he will know about them as accurately as anybody." (Socrates was a frequency theorist!)

It must be admitted that the assignment was difficult. The boy was starting from scratch. In his little book, *How to Solve It*, Polya uses the same technique in presiding at the birth of the formula for the diagonal of a parallelepiped. His students make a more positive contribution because they have already had some geometry. But any success due *to* previous teaching weakens the claim for maieutics. And Polya's promptings and questionings give more help than he wants to admit.

It is only because mathematical proofs seem to arise from the nature of things that they can be said in some sense to be "known by everyone" and simply

waiting to be drawn out. Even Socrates could not argue that the soul knows the facts of history or a second language. Impregnation must precede parturition. But is it not possible that a presentation that has not seemed to be learned is the seed from which knowledge grows to be delivered by the teacher? Perhaps the intellectual midwife is to show the student that he remembers what he has already been shown or told. In *The Idea of a University* Cardinal *Newman* gave an example of the maieutic method applied to acquired knowledge. It will stir painful memories in many teachers. A tutor is talking with a candidate about a bit of history-a bit of history, in fact, in which Plato's Menon lost his life.

"What is the meaning of the word *Anabasis*?" says the Tutor. The Car&-date is silent. "You know very well; take your time, and don't be alarmed, *Anabasis* means . . ."

"An assent." says the Candidate. Who ascended?"

The Greeks, Xenophon."

"Very well: Xenophon and the Greeks ascended. To w-bat did they ascend?"

"Against the Persian king: they ascended to fight the Persian king."

"That is right . . . an ascent; but I thought we called it a descent when *a* foreign army carried war into a country? . . . "Don't we talk of a descent of barbarians?"

"Yes."

Why then are the Creeks said to go up?"

"They went up to fight the Persian king."

"Yes; but why up . . . why not down?

"They came down afterwards, when they retreated back to Greece."

"Perfectly right; they did . . . but could you give no reason why they are said to go *up* to Persia, not down?"

"They went up to Persia."

"Why do you not say they went *down*?"

"They went *down* to Persia."

"You have misunderstood me...."

Newman warned his reader that the Candidate is "deficient to a great extent. . . not such as it is likely that a respectable school would turn out." He recognized a poor student, but not a poor method, Thousands of teachers have wasted years of their lives in exchanges which have been no more profitable—and all to the greater glory of maieutics and out of a wnviction that telling and showing are not only inadequate but wrong.

Although the soul has perhaps not always known the truth nor ever been confronted with it in a half-forgotten experience, it may still *seek* it. If the student can be taught to learn from the world of things, nothing else will ever have to be taught. This is the method of diswvery. It is designed to absolve the teacher from a sense of failure by making instruction unnecessary. The teacher arranges the environment in which diswvery is to take place, he suggests lines of inquiry, he keeps the student within bounds, and so on. The important thing is that he should tell him nothing.

The human organism doe-s, of course, learn without being taught. It is a good thing that this is so, and it would no doubt be a good thing if more wuld be learned in that way. Students are naturally interested in what they learn by themselves because they would not learn if they were not, and for the same reason they are more likely to remember what they learn in that way. There are reinforcing elements of surprise and acwmplishment in personal diswvery that are welwme alternatives to traditional aversive consequences. But discovery is no solution to the problems of education. The individual cannot be expected to rediswver more than a very small part of the facts and principles that have already been discovered by others. To stop teaching in order that the student may learn for himself is to abandon education as a medium for the transmission of the accumulated knowledge and wisdom of a culture,

There are other difficulties. The position of the teacher who enwurages diswvery is ambiguous. Is be to pretend that he himself does not know? (Socrates said Yes. In Socratic irony those who know enjoy a laugh at the expense of those who do not.) Or, for the sake of enwuraging a joint venture in diswvery, is the teacher to choose to teach only those things that he himself has not yet learned? Or is he frankly to say, "I know, but you must find out" and accept the wnsequences for his relations with his students?

Still another difficulty arises when it is necessary to teach a whole class. How are a few good students to be prevented from making all the discoveries? When that happens, other members of the class *not only miss the* excitement of diswvery

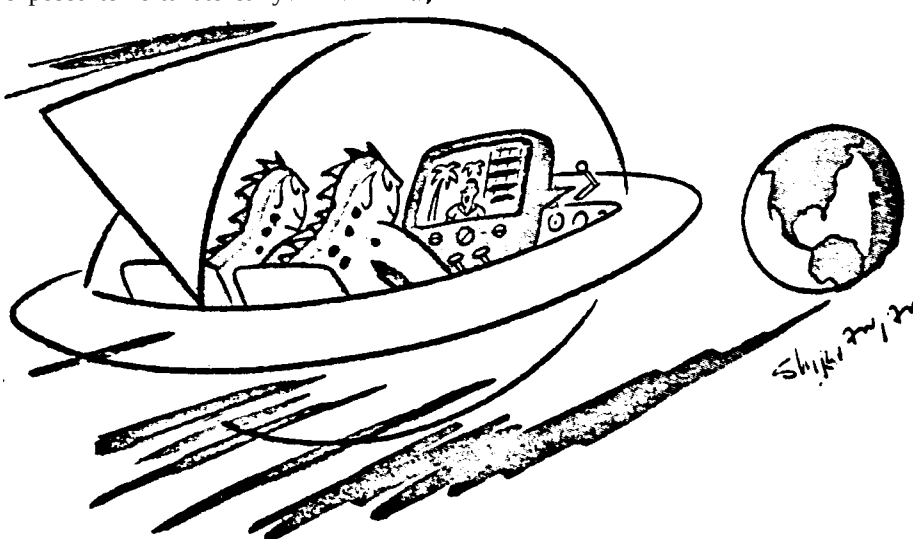
but are left to learn material presented in a slow and particularly confusing way. Students should, of course, be encouraged to explore+ to ask questions, to study by themselves, to be "creative." When properly analyzed, the kinds of behavior referred to in such expressions can be taught. It does not follow, however, that they must be taught by the method of discovery.

Effective instructional practices threaten the conception of teaching as a form of maieutics. If we suppose that the student is to "exercise his rational powers,- to "develop his mind," to learn through "intuition or insight," and so on, than it may indeed be true that the teacher cannot teach but can only help the student leam. But these goals can be restated in terms of explicit changes in behavior, and effective methods of instruction can then be designed.

In his famous four idols, Francis Baam formulated some of the reasons why men arrive at false ideas. He might have added two special Idols of the School that affect those who want to improve teaching. The Idol of the Good Teacher is the belief that what a good teacher can do, any teacher can do. Some teachers are, of course, unusually effective. They are naturally interesting people, who make things interesting to their students. They are skilful in handling students, as they are skilful in handling people in general. They can formulate facts and principles and communicate them to others in effective ways. Possibly their skills and talents will someday be batter understood and successfully imparted to new teachers. At the moment, however, they are true exceptions. The fact that a method proves successful in their hands does not mean that it will solve important problems in education.

The Idol of the Good Student is the belief that what a good student can leam, any student can learn. Because they have superior ability or have bean exposed to fortunate early environments, some students learn without being taught. It is quite possible that they learn more effectively when they are not taught. Possibly we shall someday produce more of them. At the moment however, the fact that a method works with good students does not mean that it will work with all. It is possible that we shall progress more rapidly toward effective education by leaving the good teacher and the good student out of accounaltog&. They will not suffer, because theydonotneedourhelp. We may then devote ourselves to the discovery of practices which are appropriate to the remaining-what?-ninety-five percent of teachers and students.

The Idols of the School explain some of the breathless excitement with which educational theorists return again and again to a few standard solutions. Perhaps we should regard them as merely two special cases of a more general source of error, the belief that personal experience in the classroom is the primary source of pedagogical wisdom. It is actually vary difficult for teachers to profit from experience. They ahnost never learn about their long-term successes or failures, and their short-term effects are not easily traced to the practices from which they presumably arose. Few teachers have time to reflect on such matters, and traditional educational research has given them little help. A much more effective kind of research is now becoming possible. Teaching may be defined as an arrangement of contingencies of reinforcement under which behavior changes. Relevant contingencies can be most successfully analyzed in studying the behavior of one student at a time under carefully controlled conditions. Few educators are aware of the extent to which human behavior is being examined in arrangements of this so* but a true technology of teaching is imminent. It is beginning to sugges effective alternatives to de average practices that have caused so much trouble.



Tome *on down!"*