How can we assay the progress that students are making, not only in control of content, but in their ability to think . . .

The Credentials Mill in a Technological Age

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TODAY both young people and adults in diverse walks of life seem to be at the mercy of individuals, institutions, and organizations which have the power to issue or withhold the credentials necessary for one kind of advancement or another.

The familiar letter of recommendation from a teacher or previous employer is recognized as a doubtful blessing and hardly as an objective prognosis of future success. So this letter is supplemented by test results and reports on school progress, regardless of whether these have any particular bearing on the activities in which the individual is expected to engage. Letters and transcripts sometimes advance a student toward his goal with the speed of a police escort, and they sometimes inhibit progress as effectively as a ball and chain.

Credentials Lack Credibility

Dropouts are urged to go back to school and finish the eighth grade, high school, college, or the work on a graduate degree in order to obtain the all-important credentials that will open the doors of opportunity. Yet few inquire what added competencies an individual gains from the credits or credit hours he receives for the extra time spent in sitting in classes.

Is it only that he is a little more mature and so can work more consistently, or as in the case of teachers, is it that those who do graduate work thus reveal a superior professional interest and dedication? Is the evidence really reliable, or are the required courses actually considered quite useless except as they are necessary to obtain the credential, the "union card"?

The word *credential,* like credit and creed, derives from the Latin *credere,* to believe or trust. To accredit a person (or an institution), as in the case of financial credit, implies that some responsible agent believes in and trusts him. To a certain extent this is true, but in the case of educational accreditation, the basis for such belief and trust is often unsound, and the trust is misplaced; otherwise there would not be so many incompetent teachers. Further-

more, in the case of credentials in other fields as well, there is rarely any evidence that the work required to obtain such credentials will increase an individual's competence. In short, it is a patchwork, mechanical system that has expanded over the years for administrative convenience and has been applied wholesale with little or no regard for the individuals most concerned, the student and the prospective employer.

Critics who have objected to the use of mechanical teaching devices, chiefly teaching machines and television, and also programmed instruction, would do well to observe the mechanical operation of the credentials mill, an anomaly in this technological age. Is there not a less shaky way to testify one's belief and faith in a student's general competence? Could not schools and colleges and the accrediting agencies as well even go a step further and actually guarantee their product?

Credits No Guarantee

The place to start would seem to be with the familiar proposition that school subjects are *means* to a diversity of educational ends. But we should not assume that any student, merely by taking the subjects, will secure the ends and attain the objectives sought by the instruction. Those who supported the doctrine of formal discipline made this assumption, but the experiments during the first half of the century showed it to be false, and transfer proves too uncertain to be counted on to back the guarantee.

However, if in each subject or curricular activity from K through 12 and beyond, the student has specific practice in ways to use his mind in the various required tasks, he will presumably form satisfactory working habits. Such habits should stand him in good stead not only in academic pursuits but also in the many diversified occupations in which people engage although, of course, special training in any one occupation is also desirable and usually necessary.

Such practice cannot depend on the requirements of the subject alone, but must also derive from the ends for which the subjects are means. It calls for a clear and specific determination of objectives, which is basic to modern educational technology in general and to programmed instruction in particular.

High school and college teachers have consistently shied away from formulating specific objectives. Perhaps this is because there has been too much emphasis on knowledge of content to the exclusion of an emphasis on psychological processes. If some kind of psychological pattern were incorporated into the instruction in the several school subjects, and if appropriate measuring instruments yet to be devised were employed, one could be assured of knowing the nature of the progress that students are making not only in their control of content, but also in their ability to use their minds, to think. Credentials would then be based not on credit hours for the time spent, but on progress along a continuum, both in content they have studied and in other situations as well.

Credentials Based on Competencies

As a tentative approach, nine imperatives are listed below, each of which

is an injunction to engage in an activity that can be practiced in different contexts. The activities are listed in the order of their approximate complexity. There is no sharp line separating them, but each is basically different from the next. Each will be commented on briefly in order to clarify what is meant or implied by the term used. Each may be seen to apply to some item, event, pattern, structure, formula, proposition, or other situation perhaps as simple as a stone or as complex as a system of philosophy.

In this presentation I am obviously indebted to Mager [1] whose work is invaluable but a little too restricted, and to Bloom *et al.*,[2] whose *Taxonomy* becomes overly complicated for our present purposes. It seems highly probable that students can be taught in ways which will enable them to generalize these activities, and that the improvement in their ability to do this, in different contexts, could be measured. Such improvement would be the objective of the training provided for obtaining the credential sought.

1. *Observe.* Observation is the basic activity of sensing. Students of all ages can be encouraged to see and hear what is around them—flowers, trees, buildings, furniture, animals, birds, people, signs and symbols including word endings, musical tones or notation, and also facial expressions, errors, attitudes and social groupings. Louis Agassiz, the noted Swiss-American naturalist, had his biology students at Harvard spend three or four successive class periods describing a fish, so important did he consider observation to be. Some of the greatest discoveries have come about because the scientist noted something unusual, some incongruity in what was going on in his laboratory.

2. *Identify.* In communicating an observation one needs only to point, draw, or describe in his own words. To identify, one must *perceive* some recurring phenomenon for what it is, attach a name tag to it, recognize it when he sees it in other patterns of relationships, and so give some kind of meaning to the sensory object.

3. *Discriminate.* Building *concepts* involves classifying things into categories and recognizing larger and smaller differences that make a difference in their categorization. The student learns to discriminate between different kinds of birds, wood, machines, music, paintings, triangles, language usage, processes, performance and behavior. He comes to recognize the criteria and principles on which the distinctions are made and learns what is involved in the rules of exclusion and inclusion of generalizations and abstractions that form concepts.

4. *Report.* A person is expected to be able to *state* what he has learned, his knowledge of things (percepts and concepts) and their relationships as facts, events, propositions, and the influences they have on each other, which is understanding. It is one of the tasks of the school to impart such knowledge, often referred to as "transmitting the social heritage," for which lectures, textbooks,

[1] Robert F. Mager. *Preparing Objectives for Programmed Instruction.* San Francisco: Fearon Publishers, 1962.

[2] Benjamin S. Bloom, editor, *et al. Taxonomy of Educational Objectives. I: Cognitive Domain.* New York: Longmans, Green and Co., 1956.

and examinations are the common instruments admirably suited to this purpose. Whether in the form of inert ideas or vital information, facts are "in," in all school subjects (and in life generally), with perhaps less attention than would be desirable given to selecting the facts and considering how they may best be taught.

5. *Apply.* While some knowledge is desirable for its own sake, much of it has an instrumental value: it is to be used for some purpose—to solve problems of a theoretical or practical sort, for example. But theory tends to get itself separated from practice; when students do not know how to use what they have learned, application is the appropriate instructional objective. An effective approach is by way of the principles of (a) stimulus generalization—learning to do something in one situation and also in situations that are somewhat different, and (b) response generalization—learning to modify one's response in view of the changed nature of the situation.

Application usually involves a common condition or principle in situations which otherwise may be totally different. Hence in vocational training, a certain skill may be taught as if it were a separate item, not an example of an underlying principle. The *what* drowns out the *why*. The situation presents the teacher with a quandary—whether to teach the principle or rule first and then the examples deductively ("RULEG") or, inductively, to teach the examples and so establish the rule ("EGRULE").

6. *Solve.* One may apply what he has learned almost automatically without giving particular thought to the matter. But when transfer and application do not thus occur, when there is the familiar "felt difficulty," the situation becomes a problem to be solved. Students are frequently required to solve problems within the boundaries of a particular subject, e.g., in arithmetic, geometry, or chemistry, but the procedures are not always explained. And how the experience can be applied more generally in other situations is rarely mentioned.

7. *Reflect.* Reflective thinking might well be coupled with problem solving except that a great deal of thinking goes on which is not dealing with a specific difficulty, and is neither fantasy nor reverie, but a kind of inquiry or wondering about things. Seemingly there should be practice in formulating criteria to evaluate the quality of thinking —ethical, aesthetic, or more narrowly, cognitive. Or following Guilford, it might be worth while to provide opportunities for divergent as well as convergent thinking, to give time for students to ponder, to consider "all the angles," to think up possibilities, to be critical or creative, to restructure their experiences leading to the educational goal of individual fulfillment, in short, to meditate.

8. *Improve.* A pattern of activities or motor skills is repeated with variations intended to improve it. Among these are the narrower trade or vocational skills for which applicants may need credentials, though the training is usually provided within the industry or on the job. Progressive approximation to the required degree of excellence through repetition and reinforcement is seemingly

the most useful formula. And to save time, directions are given instead of waiting for the correct response to be made and then reinforcing it.

Perhaps the most important teaching task is to give competent guidance and direction to the ensuing practice and so ensure the needed improvement. However, it is usually left to the teachers to exercise their ingenuity in devising effective verbal and other stimuli for improved responses, whereas a larger number might well be prepared and made available, especially to beginning teachers. Similar attention could well be given in instructing teachers in the performance of a number of teaching skills.

9. *Remember.* The importance of remembering, which is stressed in all the previous eight stages, suggests that repetition and drill have tended to be overemphasized at the expense of other values—what is significant and why. Repetition can take the form of considering things from different points of view, and some of the lists of facts to be remembered might be replaced by experiences with variations on a few important themes.

The abilities here enumerated are what is involved in thinking, the activity primarily required of those seeking credentials of one kind or another. In particular, the act of thinking is required of teachers as professional people who presumably will relate these abilities both to the content and to the learners they are expected to teach. Yet there is no evidence whatsoever that these abilities are in any way developed or improved by the usual courses required for certification. And further, there is no evidence that the certified teachers have acquired the skill to develop these abilities in their students. Certainly we have no reason for complacency with respect to the traditional adding-machine method now employed to determine and certify professional competence.

It is beyond the scope of this paper to indicate ways in which these abilities can be developed and measured. Suffice it to say that promising results have been obtained in preliminary experiments in developing three-dimensional visual perception, and there is every reason to suppose that other processes are amenable to a similar direct approach when the techniques are developed and employed in relation to the several subjects. With anything like the attention to detail given to operator skills that is characteristic of other professions, and with an appreciation of modern technological methods, it should be possible to develop proficiencies and to identify them in a far more effective manner than that employed by the credential mills as they now operate. And even for teachers, in a few years, we should be able to guarantee the product.