EDUCATIONAL OBJECTIVES: THE BLUEPRINT FOR INSTRUCTION AND EVALUATION

GEORGE F. MADAUS
New England Catholic Education Center
Boston College

It is the teacher's aim to effect some change in the learner. A clear state-
ment of desired changes should be the first step in planning curricula,
courses and evaluation procedures. Many teachers, however, do not state
their objectives at all, or state them unclearly. Objectives, if they are to be
unambiguous, are best stated in terms of directly observable behaviour
which describe what a student is doing when he is demonstrating that he
has achieved the objective in question. Since the statement of educational
objectives is not easy, teachers should collaborate in the task. Discussions
among teachers and the observation of changes actually taking place in
the classroom are useful.

The impact of the technological revolution which society is at present
undergoing forces those concerned with educational planning to rethink
the question of just what the purposes of education should be. It is highly
probable that within ten years the completion of secondary school will be
a necessity for the youths of many countries around the world. In addition
it is already apparent that in our technological age many skills rapidly
become obsolete, thus requiring adults to acquire new skills during their
working careers. If, therefore, education is to serve an increasingly larger
percentage of the population each year, it becomes important that the
goals of education be made explicit. Sterling M. McMurrin's comment
on the changing direction in American education is becoming increasingly
applicable to education throughout the world. He writes: 'Certainly
without clear purposes—large and small, direct and indirect—the schools
cannot successfully plot their course amid the present revolution of
numbers, dollars, and computers' (6).

As McMurrin points out, there are 'large' and 'small' educational goals.
The 'large' or long-range goals are those of the educational institution or
system. These are essentially statements of 'philosophy' or basic purpose.
The 'small' or immediate goals are those of an individual teacher or group
of teachers. These proximate objectives are expressed in terms of the
intended outcomes of instruction. The concern of this paper is with these
immediate or instructional objectives of the teacher. We shall discuss
the necessity, value and characteristics of explicity formulated teacher
objectives.

BACKGROUND AND ASSUMPTIONS

The basic orientation of this paper follows the evaluation approach of Ralph W. Tyler. Thirty years ago Tyler, then a university examiner, emphasized the need for clear definitions of the changes that any instructional unit was trying to effect in the students so that valid procedures for evaluating the effectiveness of the instruction could be developed. For Tyler, education is a process of changing the way people think, feel and act (7). From this definition it follows that each course, sequence or unit of instruction can be expected to modify the student in some way. Students should be different at the end of a unit of instruction from what they were at its beginning. Further, they should be different from students who have not had the unit. The change sought for in the learner might be a change in direction when, for example, the instruction is trying to change a person's attitudes toward a minority group, or it might be cumulative in nature as when instruction seeks to deepen or broaden already existing modes of thinking, feeling or acting.

These changes in the learner are the teacher's objectives and once they are decided upon, the teacher must proceed to select materials and learning experiences that will help attain these objectives. These experiences in turn must have continuity and sequence to help the student amalgamate what might appear to be disparate experiences. Finally, the teacher must measure or evaluate the student's performance in relation to the objectives originally decided upon.

THE NECESSITY AND VALUE OF EDUCATIONAL OBJECTIVES

Many teachers never take the time explicitly to set down their objectives of instruction. Jackson (3), in interviewing highly respected elementary school teachers, found that they did not pay much attention to the precise definition of their objectives or to formal procedures of evaluation. However, as Tyler points out:

> No doubt, some excellent educational work is being done by artistic teachers who do not have a clear conception of goals but do have an intuitive sense of what is good teaching, what materials are significant, what topics are worth dealing with and how to present materials and develop topics effectively. ... Nevertheless, if an educational programme is to be planned and if efforts for continued improvement are to be made, it is very necessary to have some conception of the goals that are being aimed at (7, p. 3).

The reasons for Tyler's insistence on the importance of teachers having clearly formulated objectives are two-fold. If an instructor has a set of clearly-stated objectives he has first of all the basic specification of his teaching activities and secondly he has the means of making his examinations serve the purpose, not only of ranking students, but of checking on the effectiveness of these teaching activities. In other words, clearly-formulated objectives not only serve to emphasize the necessity of effective means-end relationships in the educational process, but also the relationship of the objectives to the validity of evaluation and testing. Mager offers an excellent example of the interrelationships existing between objectives, means, and evaluation:

> The objective of the course was simply stated 'To be able to operate and maintain the XYZ Electronic System'. . . . During the classroom trouble-shooting exercises the instructor would pose various problems for his students to solve. He would point out a component on one of the many schematic diagrams of the equipment and ask: 'What would happen if this tube were bad?' Students would then trace through the circuitry (on paper) in an effort to divine the symptoms which would appear as a result of the instructor's hypothetical trouble. The students were given a trouble and asked to induce symptoms.
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> This procedure, however, was exactly opposite to that which was expected of the learner on the final examination or on the job. There he was typically shown a symptom and asked to locate the trouble (5, p. 3).

While the objective in the previous example was simply stated, it was not clearly stated. Since a statement of an objective is in fact an attempt to communicate verbally the sought for changes in the learner, it is of paramount importance that the words used convey the same meaning to all intended readers. The teacher in this case had not clearly described the behaviours expected of one who can 'maintain' the XYZ equipment. As a result, the means chosen to attain the end resulted in behaviours diametrically opposed to those required of the student in the evaluation. That is, the direction of behaviour sought for in the means was from trouble to symptom, while in the examination it was from symptom to trouble. Clear statements of the educational objectives can obviate such contradictions.

Statements of objectives that can be interpreted differently by different readers give no directions to the teacher in selecting materials, organizing content and describing obtained outcomes. How does one go about

stating educational objectives so that the desired changes are clear to all those who read them?

COMMON PITFALLS IN DEFINING EDUCATIONAL OBJECTIVES

Obviously, many teachers have been writing statements of educational objectives for many years. However, the form these statements often take negate their value in contributing to the educational process. An examination of the pitfalls involved in defining educational objectives can, however, offer insight into the characteristics of useful statements of goals.

The first pitfall involves stating educational objectives in very broad terms. Statements of purpose like 'Worthy use of leisure time', 'Responsible citizenship', 'Maturity of outlook', while commendable as statements of long-range goals, give no indication of the kinds of change to look for in students who have reached such goals. Consequently, statements such as these are too amorphous and generic in nature to give direction to the classroom teacher for choosing materials, sequencing learning experiences or building evaluation instruments.

Another pitfall in stating educational objectives arises when teachers lose sight of the fact that the objectives of instruction are to change the pupil in some intended way. For example, some statements of objectives give emphasis, not to the changes in a pupil, but to what the teacher intends to do to bring about the changes. Statements such as 'to demonstrate the distributive properties of multiplication' or 'to prove the pythagorean theorem', are examples of such teacher-centred definitions. The reason a teacher performs any instructional activity should be to change the students in some way, to equip the students with some new ability or to improve upon an existing ability. These are the reasons teachers prove, plan, demonstrate, read, lecture, etc. Since the changes in the student are the teacher's objectives, a description of these desired changes, and not one of the teacher's activities, is needed. Only then will the teacher have some guide as to what activities he should in fact pursue.

Another example of neglect of the centrality of the desired changes in the student occurs when objectives are stated in terms of the subject matter to be covered. Statements such as 'the laws of motion' or 'the causes of World War I' or 'chapter 3' or 'pages 25 to 32', are sometimes put forward as statements of the objectives of instruction. The teacher who states objectives in this fashion tends to feel the objectives have been realized if the content area in question has been covered. But given the end of education is to change the learner in some intended way, then statements of content to be covered do not convey the ways in which the learner is expected to be different after the instructional sequence. That

is, such statements fail to communicate to the reader what the student is expected to be able to do with the content in question.

While overemphasis on content, exclusive of behaviour, gives the teacher no direction for the management of instruction, the final pitfall in defining educational objectives occurs when there is overemphasis on the desired pupil behaviour divorced from content. Statements such as 'the development of critical thinking', 'the development of problem solving skills', or 'the improvement of the student's facility in interpreting data' are sometimes put forward as educational objectives.

Statements such as these raise two different kinds of question. The first question is, 'what do you want the student to think critically about, or what kind of data do you want him to be able to interpret?' Critical thinking or interpretative skills may differ from discipline to discipline. It therefore becomes important to delineate content area, for until this is done, planning, selection of materials, and determining methods of presentation become impossible.

The second question that statements of objectives like the foregoing pose is, 'what is critical thinking?' The term 'critical thinking', like many words teachers sometimes use when stating objectives, is open to as many interpretations as there are readers. The following list contains examples of such ambiguous words or terms often used by teachers in defining their objectives:

1. Comprehension
2. Knowledge
3. Understanding
4. Appreciation
5. Have an interest in
6. Fully appreciate
7. Grasp the significance of
8. Learns
9. Respects
10. Uses basic skills

The fact that any one of these terms is open to a wide range of interpretation can be easily demonstrated by asking a group of teachers independently to describe the meaning of any term. Often there will be as many meanings attached to the term as there are persons doing the defining. The difficulty with the above words is that they cannot be directly sensed. One cannot see understanding or observe critical thinking, nor hear or feel appreciation. The presence or absence of such things can only be inferred from some overt, observable performance of the student,

or from some manifest product from the student. In effect, one says: 'If I observe the student doing a certain thing after instruction, that he could not do before, I will call this action knowledge, appreciation, understanding, etc. . . . .'. Similarly, one might say: 'I will accept this product of the student as evidence of the existence of interest, comprehension or critical thinking'. It is these behaviours, or products, that must be explicitly described in the statement of objectives. Such explicit formulations help to insure a proper means-ends relationship and valid evaluation procedures.

CHARACTERISTICS OF USEFULLY-STATED EDUCATIONAL OBJECTIVES

An educational objective that is useful in giving direction to choosing educational experiences, sequencing these experiences and building valid tests to measure outcomes, must be stated in terms of desired student behaviour and content area. More importantly, the statement must succeed in communicating to the reader the teacher's intent. A teacher has been successful in communicating his objective when any knowledgeable person in the same discipline can look at a student's performance and decide whether or not the performance is evidence of the attainment of the objective.

The trick in defining objectives so that they are unambiguous, thereby serving as guides for instructional procedures and evaluative practices, is to translate verbs that require inferential interpretation into directly observable action verbs. The overt behaviour, or procedures used to observe the behaviour, must be described so that all who read them can agree whether or not a given student's performance or product is acceptable as evidence of the presence or absence of the objective in question.* Thus while inferential verbs like understands, appreciates, learns, etc., are perfectly good words, and might be used in an initial statement of an objective, they must be further delineated by the use of actual or operational verbs not open to misinterpretation. The following are examples of such action, or 'point-at-able' type verbs:

1. To recall
2. To recognize
3. To distinguish true statements from false
4. To match dates with battles
5. To translate
6. To interpret

*The reader will note that the description and previous discussion relate very closely to the concept of 'operationalism' and operational definitions used in psychological research.

7. To predict
8. To volunteer answers
9. To use conventional grammatical forms
10. To punctuate according to conventional rules
11. To compute
12. To select correct answers from several alternatives
13. To withdraw library books about the American Civil War
14. To name the instruments in a band
15. To state relationships existing between data
16. To list the consequences of a course of action

These verbs describe what the student is doing when he is demonstrating that he has achieved the objective in question. Any intelligent person, given the opportunity to observe a student's performance, can decide whether or not what the student is doing, or what he has produced is acceptable as evidence that the objective has been realized. When there is reliable agreement among readers as to the terminal behaviour that is acceptable, then the objective has been satisfactorily communicated. Operative or action verbs help to insure such communication.

The following are some examples of reliably-stated educational objectives:

1. To translate data into graphs, tables or charts.
2. To read a clock and be able to tell time by saying aloud the time to an accuracy of one-minute intervals.
3. To write two examples of verse in iambic pentameter.
4. Given a problem new to the student, to solve it correctly by applying previously-learned principles of Newton's Laws of Motion in one class period.
5. To correctly print one's name, keeping all the letters between the given lines on the paper.
6. To disassemble and assemble a carburetor correctly in one class period.
7. To match dates with events in Irish history.
8. Given various equations with one unknown, to successfully solve 85 per cent of the problems.
9. To support one's preference for a given poem by citing evidence of structural properties in the work itself.

In each of these objectives, the verb is of the active rather than the inferential type. An observer can directly observe someone translating, reading, or assembling. Likewise, one can directly observe the product

produced when a person solves or prints. The chance of misinterpreting the desired terminal behaviours the teacher is seeking is minimized in the above objectives.

It should be pointed out that success in communicating an objective does not mean that the object is necessarily desirable or that the reader agrees that it is important. A properly-stated objective merely insures reliable observation, not necessarily educational worth. Importance or value of an objective must be determined in the light of the needs of the individual, the needs of society, and the philosophy of education of the school. The relevance of the chosen objectives is, of course, a crucial question involving a value judgment on the part of those concerned. It is at this point that the long-range objectives of the school can serve as criteria in screening the more immediate teacher objectives.

SOME AIDS IN DEVELOPING COURSE OBJECTIVES

Stating educational objectives so that they will be useful in planning and evaluating instruction is not a particularly easy job. It takes a great deal of careful thought and analysis which in turn requires large amounts of time. For this reason the job can be made easier if teachers in the same department, or the same grade level within a school or system, co-operate in the development of objectives. An individual teacher seldom has the necessary time to write all the objectives for all his courses with clarity and reliability. A group of teachers can benefit, therefore, if they divide the labour. In this way, course objectives can be more meaningfully stated in a much shorter period of time.

A group of teachers beginning the job of formulating common course objectives might start with a discussion of the desired terminal behaviours and content areas. This will probably result in broadly stated goals that will have to be further specified as previously described. Such discussion might well begin with an analysis of the tests used by various teachers to evaluate course outcomes. By analyzing test items, in the light of the instructional experiences of the student, it is possible to make inferences about the kinds of behaviours required of the student in answering each question. It must be emphasized that the validity of such inferences depends on an accurate knowledge of the background the student brings to the item, as the same item may elicit entirely different behaviours from two different students. For example, a test question may involve simple recall of memorized facts for students who had previously discussed the specific material in class, while the same item may require high level analysis and application for students who had never seen the material

but who had covered in class principles that relate to the solution of the problem. Despite these differences in student backgrounds, however, this procedure can give insights into the actual behaviours intended by the teachers, thereby giving some guidelines for specifying objectives.

Another way to begin the formulation of objectives is by observing classes for the purpose of identifying student changes *actually* taking place in the courses in question. By observing actual student performance, objectives of instruction can be inferred. Often these may be quite different from the objectives stated at the outset of the course. In this procedure the observer not only looks for expected terminal behaviours but also for unexpected, unanticipated outcomes. In this way it is possible to identify *post hoc* some 'objectives' of the course. This procedure is based on the assumption that while the text or course materials have content validity, it is difficult to anticipate *all* terminal behaviours beforehand. Too often the unexpected negative and positive outcomes of the course are over-looked by concentrating all evaluation on the previously-formulated objectives. Course improvement can be obtained more readily when a complete picture of outcomes is obtained. The Illinois Elementary School Science Project utilizes such an approach in evaluating its strength and weaknesses. As J. Myron Atkin, Project Director, puts it:

> Project personnel are beginning a series of classroom observations in an attempt to identify unexpected behavioral changes in students. In the customary methods of course development and evaluation, such a procedure seems backwards. The standard practice is to identify the changes desired in the students, then see if the course is effective in producing the changes. Instead, we are observing classes for the purpose of identifying changes that are not predicted or recognized at the start (1, p. 132).

Another useful guide to assist teachers in developing objectives and designing items to measure these goals is *The Taxonomy of Educational Objectives*. The Taxonomy contains two parts. The first part to be developed was *Handbook I: Cognitive domain*, published in 1956 (2). This handbook classifies objectives which have presumably been learned, or which involve the solving of some intellectual task for which the individual has to determine the essential problem, and then reorder given material or combine it with ideas, methods, or procedures previously learned. The second part, *Handbook II: Affective domain*, was completed in 1964 (4) and categorizes objectives which emphasize a feeling line, an emotion, or a degree of acceptance or rejection. A third volume on the psychomotor domain has yet to be completed.

Each of the categories in both volumes is illustrated by: (1) examples of educational objectives taken from the literature; (2) a description of the behaviours involved at the particular level; and (3) sample test items designed to measure the described behaviours. With regard to the final category, one of the principal values of the Taxonomy has been that it calls to teachers' attention the fact that it is possible to measure more complex objectives than the recall of facts.

A teacher or group of teachers may utilize any or all of the above procedures as an aid in formulating course objectives. But whatever aids or techniques are followed in the final analysis, the formulation of clearly-stated objectives should be the first step in all instructional or curricula planning. These objectives are the touchstone to successful planning, sequencing, and evaluating instruction. When the effort is made to define objectives meaningfully, the first step on the road to improved instruction has been taken.

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