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A need exists for a more clear-cut description of how the taxonomy of educational objectives can be implemented in the school setting. In answer to that need, a way is shown to formulate specific behavioral objectives within the hierarchy of the major levels and sublevels of the taxonomies as set forth by Bloom (1956) and Krathwohl (1964). To facilitate the formulation of statements of specific behavioral objectives within the framework of Bloom's taxonomy, two tables are constructed for classifying taxonomies in the cognitive and affective domains. Each table has three columns: (1) The taxonomic classification identified by code number and terminology, (2) appropriate infinitives which a teacher or curriculum worker might consult to achieve a precise or preferred wording of the behavior or activity desired, and (3) general terms relative to the subject matter properties. (HW)

INSTRUMENTATION OF BLOOM'S AND KRATHWOHL'S TAXONOMIES FOR THE WRITING OF EDUCATIONAL OBJECTIVES *

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During the past six or eight years an increased amount of attention has been given to the statement of educational objectives in behavioral terms both to facilitate the evaluation of educational programs and to improve the validity of the measures and scales utilized in the evaluation process (Metfessel and Michael, 1967; Michael and Metfessel, 1966). Although set up as a programmed learning text, Mager's (1962) Preparing Instructional Objectives has been one of the most useful guides to teachers and specialists in curriculum who have sought help in stating the desired outcomes of instruction in behavioral language--in describing the kinds of specific and relatively terminal behaviors which the learner will be capable of exhibiting subsequent to his exposure to a program of instruction. Another useful source has been the volume edited by Lindvall (1964) who, in collaboration with Nardozza and Felton (Lindvall, Nardozza, and Felton, 1964) not only prepared his own chapter concerned with the importance of specific objectives in curricular development, but also enlisted the aid of several distinguished educators (e.g., Krathwohl (1964) and Tyler (1964) with specialized interests in evaluation. Such efforts have essentially involved a fusion of curriculum design with the evaluation process in that curricular planning is described in terms of behavioral objectives that are necessary for the construction of valid tests and scales. The taxonomies provide the required model necessary to furnish meaningful

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evidence regarding the attainment of desired behavioral changes.

Although Krathwohl (1964) related the taxonomy of educational objectives in both the cognitive (Bloom, 1956) and the affective (Krathwohl, Bloom, and Masia, 1964) domains to curriculum building, he was able to present only a limited number of concrete illustrations, some of which Mager would probably challenge because of their relative lack of specificity. Admittedly, Krathwohl has made an important and helpful start in relating objectives to a meaningful and rather well-known conceptual framework. However, the writers believe that there exists a need for an instrumentation of the taxonomy of educational objectives within both the cognitive and affective domains--that is, a more clear-cut description of how the taxonomy can be implemented in the school setting. The approach utilized was the development of behaviorally oriented infinitives which, when combined with given objects, would form a basis for meaningful, cohesive, and operational statements.

Purpose

Thus the essential purpose of this paper was to show how specific behavioral objectives can be formulated within the hierarchy of the major levels and sublevels of the taxonomies of educational objectives as set forth by Bloom (1956) and Krathwohl (1964). Such a framework should furnish a helpful base around which behavioral statements of objectives can be formulated.

Definition

An educational objective consists of a description of the behaviors of an individual (the learner or examinee) in relation to his processing information embodied in subject matter--that is, what the learner must be

capable of doing with certain characteristics or properties of subject matter. The behavioral component, which may be described as a process involved at an appropriate level of the taxonomic classification, is usually expressed in the form of a noun "ability" or a verb of being "able" followed by an infinitive such as the "ability to do" or "able to do." The second component of the objective, which consists of the specific content often found in the formal learning experience (e.g., in the curricular or instructional unit), constitutes a direct object of the verb or infinitive form. The terms "subject matter" or "content" are used in a fairly broad sense, as their level of specificity is highly variable, depending upon the characteristics of the curricular unit.

Instrumentation

To facilitate the formulation of statements of specific behavioral objectives within the framework of Bloom's taxonomy, the writers have included a table made up of three columns. The first column contains the taxonomic classification identified by both code number and terminology employed in Bloom's (1956) taxonomy. The entries in the second column consist of appropriate infinitives which the teacher or curriculum worker may consult to achieve a precise or preferred wording of the behavior or activity desired. In the third column somewhat general terms relative to subject matter properties are stated. These direct objects, which may be expanded upon to furnish specificity at a desired level, may be permuted with one or more of the infinitive forms to yield the basic structure of an educational objective--activity (process) followed by content (subject matter property). At the discretion of the reader the words "ability" or "able" can be inserted in front of each of the infinitives.

Table I Instrumentation of the Taxonomy of Educational Objectives: Cognitive Domain

Taxonomy Classification		KEY WORDS: Examples of Infinitives	Examples of Direct Objects
1.00	Knowledge		
1.10	Knowledge of Specifics		
1.11	Knowledge of Terminology	to define, to distinguish, to acquire, to identify, to recall, to recognize	vocabularly, terms, terminology, meaning(s), definitions, referents, elements
1.12	Knowledge of Specific Facts	to recall, to recognize, to acquire, to identify	facts, factual information, (sources), (names), (dates), (events), (persons), (places), (time periods), properties, examples, phenomena
1.20	Knowledge of Ways and Means of Dealing with Specifics		
1.21	Knowledge of Conventions	to recall, to identify, to recognize, to acquire	form(s), conventions, uses, usage, rules, ways, devices, symbols, representations, style(s), format(s)
1.22	Knowledge of Trends, Sequences	to recall, to recognize, to acquire, to identify	action(s), processes, movement(s), continuity, development(s), trend(s), sequence(s), causes, relationship(s), forces, influences
1.23	Knowledge of Classifications and Categories	to recall, to recognize, to acquire, to identify	area(s), type(s), feature(s), class(es), set(s), division(s), arrangement(s), classification(s), category/ categories

Taxonomy Classification		KEY WORDS: Examples of Infinitives	Examples of Direct Objects
1.24	Knowledge of Criteria	to recall, to recognize, to acquire, to identify	criteria, basics, elements
1.25	Knowledge of Methodology	to recall, to recognize, to acquire, to identify	methods, techniques, approaches, uses, procedures, treatments
1.30	Knowledge of the Universals and Abstractions in a Field		
1.31	Knowledge of Principles, Generalizations	to recall, to recognize, to acquire, to identify	principle(s), generalization(s), proposition(s), fundamentals, laws, principal elements, implication(s)
1.32	Knowledge of Theories and Structures	to recall, to recognize, to acquire, to identify	theories, bases, interrelations, structure(s), organization(s), formulation(s)
2.00	Comprehension		
2.10	Translation	to translate, to transform, to give in own words, to illustrate, to prepare, to read, to represent, to change, to rephrase, to restate	meaning(s), sample(s), definitions, abstractions, representations, words, phrases
2.20	Interpretation	to interpret, to reorder, to rearrange, to differentiate, to distinguish, to make, to draw, to explain, to demonstrate	relevancies, relationships, essentials, aspects, new view(s), qualifications, conclusions, methods, theories, abstractions

Taxonomy Classification		KEY WORDS Examples of Infinitives	Examples of Direct Objects
2.30	Extrapolation	to estimate, to infer, to conclude, to predict, to differentiate, to determine, to extend, to interpolate, to extrapolate, to fill in, to draw	consequences, implications, conclusions, factors, ramifications, meanings, corollaries, effects, probabilities
3.00	Application	to apply, to generalize, to relate, to choose, to develop, to organize, to use, to employ, to transfer, to restructure, to classify	principles, laws, conclusions, effects, methods, theories, abstractions, situations, generalizations, processes, phenomena, procedures
4.00	Analysis		
4.10	Analysis of Elements	to distinguish, to detect, to identify, to classify, to discriminate, to recognize, to categorize, to deduce	elements, hypothesis/ hypotheses, conclusions, assumptions, statements (of fact), statements (of intent), arguments, particulars
4.20	Analysis of Relationships	to analyze, to contrast, to compare, to distinguish, to deduce	relationships, interrelations, relevance, relevancies, themes, evidence, fallacies, arguments, cause-effect(s), consistency/consistencies, parts, ideas, assumptions
4.30	Analysis of Organizational Principles	to analyze, to distinguish, to detect, to deduce	form(s), pattern(s), purpose(s), point(s) of view(s), techniques, bias(es), structure(s), theme(s), arrangement(s), organization(s)

Taxonomy Classification		KEY WORDS Examples of Infinitives	Examples of Direct Objects
5.00	Synthesis		
5.10	Production of a Unique Communication	to write, to tell, to relate, to produce, to constitute, to transmit, to originate, to modify, to document	structure(s), pattern(s), product(s), performance(s), design(s), work(s), communications, effort(s), specifics, composition(s)
5.20	Production of a Plan, or Proposed Set of Operations	to propose, to plan, to produce, to design, to modify, to specify	plan(s), objectives, specification(s), schematic(s), operations, way(s), solution(s), means
5.30	Derivation of a Set of Abstract Relations	to produce, to derive, to develop, to combine, to organize, to synthesize, to classify, to deduce, to develop, to formulate, to modify	phenomena, taxonomies, concept(s), scheme(s), theories, relationships, abstractions, generalizations, hypothesis/hypotheses, perceptions, ways, discoveries
6.00	Evaluation		
6.10	Judgments in Terms of Internal Evidence	to judge, to argue, to validate, to assess, to decide	accuracy/accuracies, consistency/consistencies, fallacies, reliability, flaws, errors, precision, exactness
6.20	Judgments in Terms of External Criteria	to judge, to argue, to consider, to compare, to contrast, to standardize, to appraise	ends, means, efficiency, economy/economies, utility, alternatives, courses of action, standards, theories, generalizations

Although within a given major process level or sublevel of the taxonomy each infinitive cannot in all instances be meaningfully or idiomatically paired with every direct object listed, many useful permutations of infinitives and direct objects that furnish entirely readable statements are possible. Certainly use of these tables should lead to a substantial gain in the clarity and speed with which teachers and curriculum specialists, as well as those involved in construction of achievement tests, may state curricular objectives. The writers have found that these tables have been of considerable help to their students, as well as to personnel in public schools who are concerned with writing objectives prior to curriculum development, constructing test items, or to carrying out evaluation studies. Slight modifications can be made with the entries to meet the requirements of specific learning situations.

Instrumentation: Affective Domain

The instrumentation of the Affective Domain is the same as that of the Cognitive Domain, to wit, the selection of behaviorally oriented infinitives combined with selected direct objects. As in the case of the Cognitive Domain, these are to be conceptualized as examples for the stimulation of other infinitives and objects; and, more important, meaningful objectives in a total framework.

Table II Instrumentation of the Taxonomy of Educational Objectives: Affective Domain

Taxonomy Classification		KEY WORDS: Examples of Infinitives	Examples of Direct Objects
1.0	Receiving		
1.1	Awareness	to differentiate, to separate, to set apart, to share	sights, sounds, events, designs, arrangements
1.2	Willingness to Receive	to accumulate, to select, to combine, to accept	models, examples, shapes, sizes, meters, cadences
1.3	Controlled or Selected Attention	to select, to posturally respond to, to listen (for), to control	alternatives, answers, rhythms, nuances
2.0	Responding		
2.1	Acquiescence in Responding	to comply (with), to follow, to commend, to approve	directions, instructions, laws, policies, demonstrations
2.2	Willingness to Respond	to volunteer, to discuss, to practice, to play	instruments, games, dramatic works, charades, burlesques
2.3	Satisfaction in Response	to applaud, to acclaim, to spend leisure time in, to augment	speeches, plays, presentations, writings
3.0	Valuing		
3.1	Acceptance of a Value	to increase measured proficiency in, to increase numbers of, to relinquish, to specify	group membership(s), artistic production(s), musical productions, personal friendships
3.2	Preference for a Value	to assist, to subsidize, to help, to support	artists, projects, viewpoints, arguments
3.3	Commitment	to deny, to protest, to debate, to argue	deceptions, irrelevancies, abdications, irrationalities

Taxonomy Classification		Examples of Infinitives	KEY WORDS	Examples of Direct Objects
4.0	Organization			
4.1	Conceptualization of a Value	to discuss, to theorize (on), to abstract, to compare		parameters, codes, standards, goals
4.2	Organization of a Value System	to balance, to organize, to define, to formulate		systems, approaches, criteria, limits
5.0	Characterization by Value or Value Complex			
5.1	Generalized Set	to revise, to change, to complete, to require		plans, behavior, methods, effort(s)
5.2	Characterization	to be rated high by peers in, to be rated high by superiors in, to be rated high by subordinates in		humanitarianism, ethics, integrity, maturity
		and		
		to avoid, to manage, to resolve, to resist		extravagance(s), excesses, conflicts, exorbitancy/ exorbitancies

Epilogue

... They had been discussing didactics and transitions and the student asked his tutor, "Master, what is needed to change the world?" And the sage pondered, then replied, "A proper definition of things."

Attributed to Confucius
Fifth Century, B.C.

... And the Texan who claimed he has the best six-gun shot in the West would take those who challenged him to the side of an immense barn and fire aimlessly. He would find where his bullets had landed and then draw targets with his bullet in the bull's-eye every time!

Moral: He aimed at nothing so he couldn't miss!

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