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ABSTRACT

The thesis is a theoretical approach to curriculum development for occupational preparation. Following a brief introduction (which reviews the problems currently associated with allied health services job preparation), the first of the essay's two main sections considers theoretical questions dealing with the nature and scope of curriculum development. After reviewing the appropriate literature, section 1 also discusses theoretical and practical models for curriculum development and presents a four-stage model of educational design activities containing the following components: selection of overall education objectives, curriculum development, program design, and instructional planning. Section 2 deals with the determination of an appropriate form for the curriculum, surveying the literature with respect to the use of objectives in education for their applicability to occupational preparation curriculum development. In addition, section 2 discusses educational terminology with respect to curriculum objectives. A five-page bibliography is included. (JR)

Definitions and a Model for Four Design Processes in Education Based on Statement of Objectives

by

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of the Requirements for the Degree of Master of Arts
in the Faculty of the Teachers College, Columbia University
under the title
A Model of Curriculum Design
for Educational Ladders in
the Health Services Occupations

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Contents

Preface

This essay is presented as a contribution to the theoretical literature dealing with curriculum development, in general, and with curriculum development for occupational preparation in particular.

The body of the essay consists of two sections. Preceding the first section is a brief introduction which reviews the problems currently associated with allied health services job preparation in this country and presents a set of objectives for curriculum development in this area which are derived from these problems. This material is paraphrased from Chapter One of The Design of Curriculum Guidelines for Educational Ladders Using Task Data.[1]

The introduction is in no way intended as an original contribution of this author. Instead, it serves as background for the work which was done by this author and which is reported in sections I and II of this essay.

Each of the two main sections of this essay deals with a distinct set of theoretical questions which required solution prior to the attempt to actually develop a curriculum.

The first set of questions focusses on the nature and scope of the activities which are called curriculum development. The author embarked on a literature review seeking the answers to the questions--

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[1]Christina Gullion and Eleanor Gilpatrick, The Design of Curriculum Guidelines for Educational Ladders Using Task Data, Working Paper No. 11 (New York: Health Services Mobility Study, 1973). Used by permission of the authors.

1. What is a curriculum?
2. What is curriculum development?

The second focus of this paper is the formulation of an appropriate form for the curriculum. This section examines the literature on the use of objectives in education for their applicability to curriculum development for occupational preparation.

Each section presents a review of the relevant literature and an exploration of useful concepts or insights gleaned from the literature. Each concludes with an attempt to synthesize the insights gained from the literature and the requirements of curriculum development for occupational preparation into a useful theoretical model. It is the hope of the author that the two models presented here will be heuristic not only to those working in the specialized field of occupational preparation, but to curriculum development in all areas of education.

A comprehensive Bibliography is appended at the end of the essay. It includes most of the literature reviewed by the author. The text refers only to those sources in the Bibliography which were most instructive or useful.

This essay does not include material regarding the specific application of the models presented here and the utilization of the Health Services Mobility Study (HSMS) task analysis data for curriculum development. This methodological material is covered in The Design of

Curriculum Guidelines for Educational Ladders using Task Data.[1] Because such material would require an understanding of the HSMS task analysis methodology, it would require a major expansion of the scope of this essay into areas not strictly within the purview of an essay submitted as partial fulfillment of the requirements for a degree in the specialized area of curriculum and teaching.

I would like to thank Dr. Eleanor Gilpatrick, who encouraged me to embark on the extensive study reported here and who has provided a rigorous critique of every stage of my research and model building. My thanks also go to Raye Rush, who typed the manuscript.

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[1] Ibid.

Introduction

The health services industry has suffered for many years from severe shortages of skilled manpower at the intermediate and upper job levels. The bottlenecks which create these shortages are the result, in part, of increasing amounts of academic and supervised clinical training required at each higher job level, and in part of the barriers of credentialling, such as degrees, licensure, and registration requirements. In addition, the organization of jobs within health services institutions and the extensive overlaps in content and clinical training between programs which prepare for jobs at different levels (for example, L.P.N. and R.N. programs) result in inefficient use of the manpower and other resources (such as schools) which are available.

The greatest social investment in health services lies in the education and training of health manpower; yet one finds workers in health service occupations locked into dead-end jobs while shortages exist for properly trained professional and skilled personnel. One finds shortages of educational facilities while educators continue to require redundant training.

As new health care functions and occupational titles have been developed, and as professional associations have moved to represent the new titles, entry into new titles and functions has been incressingly hedged with credential barriers such as licensure or certification requirements. These credential requirements have been developed in isolation from, and without consideration of, the relationships of the new functions to existing occupational titles and functions.

It has become increasingly necessary for health manpower to be trained in educational programs accredited by the professional organizations in order to be employed. The developments in education have seen a proliferation of credentialed health care curricula which overlap. They duplicate requirements just as the jobs and titles duplicate functions. When employment in health care titles requires formal, accredited training, one finds that the programs, in most cases, assume no prior experience or training in health care. Therefore, one finds extensive overlap across educational programs with no allowance for prior training. Individuals rarely receive transferable academic credits for relevant job experience or training when moving from one program or occupation to another.

When an individual decides to undergo all that is required in order to move from one credentialed job to another, the burden falls on him or her to obtain the required, often redundant, accredited training and credentialing needed for the new job. The irony is that, once an individual has obtained the credentials, there is no guarantee that the newly acquired training will be relevant or fully utilized in the new institution or job. This is because the proliferation of credential barriers has been concurrent with adaptations of actual job functions to internal needs in the institutions employing health manpower.

When health care delivery institutions provide internal training for their manpower needs, the training is often so specific to the needs of the institution that the trainee finds it of little use for upward mobility or even lateral movement in the open job market. This

is particularly true in the so-called "new career" titles. Since the institutions themselves are not permitted to provide academic credits, the training is of no help in the attainment of the degrees which are a part of the credential system.

In the face of rising costs and the demand for quality patient care, the greatest wastes lie in the improper allocation of functions to personnel, in the redundancy of training requirements, and in the non-transferability of much lower-level training.

Job Ladders and Educational Ladders

The Health Services Mobility Study (HSMS) has been involved in the design and application of a method of job analysis which would help to fill health manpower shortages by minimizing the need for educational resources. The goal has been to design job ladders which could result in upgrading for existing health manpower and, by drawing in a systematic way on skills and knowledges already learned, could provide for efficient educational sequences.

The HSMS job analysis method is based on the premise that, if the jobs in a ladder (upgrading sequence) are arranged to reflect rising levels of related skills and knowledges, the educational costs and training time between each step on a ladder can be kept to the minimum needed to bridge the gaps between the jobs. This would be far less than that required to train for each job "from scratch" or for job sequences unrelated in skills or knowledge.

Traditionally, job ladders in the blue-collar industries exist where no additional formal education is needed to move up a particular job ladder. In health services, however, there are educational barriers to upward movement because experience in a lower-level job may not be sufficient for performance in the next higher job. Therefore, the ladders cannot be promotional unless the required additional education is provided to trainees while they are in the lower-level jobs.

Job ladders in health services cannot be implemented without the existence of educational ladders. This is because the higher-level jobs are usually reachable only through attainment of degrees, licensure, or other credential requirements. At present, curricula for most health occupations are terminal. Movement from one job level to another requires "starting from scratch" in each course of study regardless of prior training, with the burden resting with the student to obtain the needed credentials.

An educational ladder would have to be a related, sequential series of educational courses or programs which would provide for continuous educational movement to parallel a job ladder from its entry level to the professional level; it would have to provide exit credentials for each of the int. rmediary jobs that are rungs on the ladder. Ideally, such programs would not require repetition of course work when an individual reentered the educational process to continue up the ladder (aside from the necessary reinforcement or refresher work needed to bring the student up to date in competence).

Program is defined here as a distinguishable set of courses or series of educational experiences which have in common that they provide education or training of a particular type (e.g., liberal arts, pre-med) or that they lead to a particular type of credential or competency (e.g., job-training program, Ph.D. program). One type of program is often combined with another type; for example, a program in radiologic technology at the baccalaureate level, which combines occupational preparation with a liberal arts component.

Objectives of Curriculum Development

In order to facilitate the implementation of educational ladders, the HSMS set itself the task of developing curriculum guidelines. These guidelines would have to provide the appropriate basis for a series of occupational programs which meet the following requirements:

1. Provide complete and adequate occupational preparation for the job at each level
2. Recognize the contribution of earlier preparation and work experience toward meeting the educational requirements at that level through provision for transfer of credits and/or advanced standing (i.e., eliminate redundancy)
3. Provide occupational preparation and the related academic training in such a way that the learning would be usable by the individual in a variety of work situations (laterally transferable) and that it could be built upon by the individual at the next educational level (vertically transferable)

In order to make the curriculum guidelines acceptable to the institutions (both educational and employing) and professional associations which would most likely be users of the guidelines, they must be based on accurate, objective data regarding the necessary content for

acceptable occupational preparation. They must also be stated in a form which will both allow the reliable identification of overlapping areas of content between educational levels and make clear the relevance of content to job performance requirements.

I. The Scope of Curriculum Development

With the objective of developing curriculum guidelines for educational ladders in mind, the author embarked on a review of the literature on curriculum development and related questions. In turning to the literature, we sought to set our work in curriculum development on a solid theoretical basis. We recognize that a basic requirement for valid methodological work is a foundation of clearly defined terms and an understanding of the processes involved. In addition, we sought to avoid the wasted effort of repeating accomplished work in this area, if this could be utilized directly.

Review of the Literature

The author turned first to the literature on curriculum development produced by professionals in the field. It soon became clear that the terms used in these sources were often undefined or used in inconsistent ways by different authors. The most common problem was a failure to distinguish among different types of educational activities.

For example, there is a tendency to pair the terms curriculum and instruction. A booklet entitled The Unit in Curriculum Development and Instruction[1] is actually concerned with aiding teachers in planning instructional units and had virtually nothing to say about curriculum development. In another book, a figure purporting to show the "Interrelationship of subject matter with other selected aspects of curriculum

[1]Bureau of Research, Board of Education of the City of New York, The Unit in Curriculum Development and Instruction (New York, 1962).

and instruction" actually refers only to instruction, and not to curriculum, in the body of the figure.[1]

The same text provides this definition of curriculum:

> The curriculum is considered to encompass the instructional activities planned and provided for pupils by the school or school system. The curriculum, therefore, is the planned interaction of pupils with instructional content, instructional resources, and instructional processes for the attainment of educational objectives.[2]

Dr. Mauritz Johnson, then Dean of the School of Education at Cornell, noted in 1967 that:

> Accepted usage identifies curriculum with "planned learning experiences." This definition is unsatisfactory, however, if "curriculum" is to be distinguished from "instruction." Whether experiences are viewed subjectively in terms of the sensibility of the experiencing individual or objectively in terms of his actions in a particular setting, there is in either case no experience until an interaction between the individual and his environment actually occurs. Clearly, such interaction characterizes instruction, not curriculum.[3]

The two terms are paired in the title Curriculum and Instruction (or, Curriculum and Teaching), which is the name of a recognized area of concentration in graduate schools of education. It covers curriculum research and development, educational materials, and teacher education.

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[1]John F. Putnam and W. Dale Chismore, Standard Terminology for Curriculum and Instruction in Local and State School Systems (Washington, D.C.: National Center for Educational Statistics, U.S. Office of Education, 1970), p. 13.

[2]Ibid., p. 3.

[3]"Definitions and Models in Curriculum Theory," Educational Theory 17 (April 1967),pp. 129-30.

Jerome Bruner seems to equate curriculum development with "the preparation of textbooks and laboratory demonstrations, [and] the construction of films and television programs."[1] In this context, curriculum development is used to refer to the design of instructional materials. This was typical of a whole school of educationists, referred to as the "curriculum reform" movement. As Dr. Johnson points out:

> It seems evident that many, if not most, of the so-called "curriculum reform" projects of the past decade have been concerned with instruction far more than with curriculum. Indeed, some of them have never made their curriculum explicit, whereas they have trespassed heavily in the instructional planning domain, going as far as to specify not only the learning activities to be provided but the instructional materials to be used, as well. These suggestions may well be excellent ones, so long as it is not assumed that alternative activities and materials could not possibly be devised to carry out the same curriculum as well or better. It seems probable that some of these projects have encroached upon instructional planning in a deliberate, if cynical, effort to make the curriculum "teacher proof." On the other hand, syllabuses, courses of study, and curriculum guides have for years been freighted with lengthy compilations of suggested activities, materials, evaluation procedures and other instructional advice, whereas, aside from an extensive list of vague objectives and an expository outline of so-called "content," they have seldom presented any curriculum at all, in the sense the term has been used in this paper.[2]

A similar lack of distinction between the processes of curriculum development and other activities exists in Ralph Tyler's influential book, Basic Principles of Curriculum and Instruction.[3] His text focusses on "four fundamental questions which must be answered in developing any curriculum and plan of instruction." These are:

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[1] The Process of Education (Cambridge: Harvard University Press, 1962), p. 4.

[2] "Definitions and Models," pp. 134-35.

[3] (Chicago: University of Chicago Press, 1949).

" 1. What educational purposes should the school seek to attain?
" 2. What educational experiences can be provided that are likely to attain these purposes?
" 3. How can these educational experiences be effectively organized?
" 4. How can we determine whether these purposes are being attained? "[1]

It is impossible to know from his text which of these questions are relevant to curriculum development and which to instructional planning.

If all of Tyler's questions must be answered in order to develop a curriculum, then the curriculum designer must become involved in activities related to the planning of specific educational activities, the selection of appropriate materials and teaching methods, the sequencing of activities, and finally, the design and validation of test instruments to evaluate instructional results.

These activities would require familiarity with the psychology of learning, with methods of instruction, with the range and applicability of educational materials available, and with the area of test design, not to mention the expertise required for the fundamental process of determining the purpose the school should seek to attain. Furthermore, for the results to be appropriate and effective, these activities should ideally be carried out with reference to the actual needs and abilities of a particular student body.

Analysis of the usage of terminology in these sources led to the realization that the authors view curriculum development as occurring within the institutional setting, so that the same persons are in-

[1]Ibid., p. 1.

volved in (or concerned with) every stage of activity from the formulation of "educational purposes" through the actual carrying out of instruction in the classroom. Only when an organization, such as the Health Services Mobility Study, becomes involved in curriculum development outside the educational institution, does it become necessary to clarify concepts and to establish the scope of various types of educational activities.

Another type of confusion which we encountered in the literature involves the question of an appropriate theoretical basis for curriculum development. For example, the school of thought which grew out of the American reaction to Sputnik and coalesced around Bruner's Process of Education developed theories about curriculum design based on their theoretical understanding of the structure of academic disciplines. Their fundamental tenet was that learning could be most exciting and effective if the basic structure of a discipline formed the organizing principles for curriculum and instruction, and if its basic principles were the content of instruction. This was taken to its logical conclusion by scholars such as Philip Phenix,[1] who attempted to develop a taxonomic structure for all knowledge which would serve as the organizing framework for curricula.[2]

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[1] Realms of Meaning (New York: McGraw-Hill Book Co., 1964).

[2] Others using the same approach to the disciplines and curriculum development are O. R. Anderson, Structure in Teaching (New York: Teachers College Press, 1969); A. R. King and J. A. Brownell, The Curriculum and the Disciplines of Knowledge (New York: John Wiley & Sons, Inc., 1966); Israel Scheffler, Conditions of Knowledge: An Introduction to Epistemology and Education (Glenview, Ill.: Scott, Foresman and Company, 1965); and Daniel Tanner, "Curriculum Theory: Knowledge and Content," Review of Educational Research: Curriculum Planning and Development XXXVI (June, 1966), pp. 362-72.

Tyler, on the other hand, focusses on the determination of the educational purposes which a school should seek to attain.[1] While this seemed to be a relevant question initially, it soon became clear that the bulk of his book is concerned with difficult philosophical and social issues. This seems to imply that the primary activity in curriculum development is the determination of the objectives of education. This type of concern, which is typical of many others in the field,[2] is not emphasized to the same degree outside the sphere of liberal arts or childhood education, where purposes are usually already clear to the educational institution.

The review of the literature gradually made it clear that the fundamental problem was the lack of an appropriate theoretical basis for curriculum development. As Dr. Johnson points out:

> . . . The non-educationist scholars who have of late interested themselves in curriculum reform projects . . . are more concerned with improving school programs than with gaining increased insight into the nature of curriculum. As scholars, all of them are, of course, interested in some kind of theory, but not in curriculum theory.[3]

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[1] Basic Principles, pp. 3-82.

[2] See, e.g., Margaret Ammons, "Objectives and Outcomes," Encyclopedia of Educational Research, 4th ed. (New York: Crowell Collier & Macmillan, 1969); G. A. Beauchamp, Curriculum Theory (Wilmette, Mich.: Kagg Press, 1961); Benjamin S. Bloom et al., Taxonomy of Educational Objectives, Handbook I: Cognitive Domain (New York: David McKay, 1956); Dwayne Huebner, "Curriculum as a Field of Study," Concepts of Teaching: Philosophical Essays, ed. C. J. B. Macmillan and Thomas W. Nelson (Chicago: Rand McNally and Co., 1968), pp. 99-118; G. M. Inlow, The Emergent in Curriculum (New York: John Wiley & Sons, Inc., 1966); C. M. Lindvall, ed., Defining Educational Objectives (Pittsburgh: University of Pittsburgh Press, 1964); R. S. Peters, "Must an Educator Have an Aim?" Concepts of Teaching: Philosophical Essays, pp. 89-98; B. O. Smith, W. O. Stanley, and J. H. Shores, Fundamentals of Curriculum Development (Yonkers-on-Hudson, N.Y.: World Book Co., 1957).

[3] "Definitions and Models," p. 127.

The realization gradually emerged that the relevance, clarity, and value of work in curriculum development rests very heavily on the writer's theoretical foundations. For example, a writer such as Tyler, focussing on his four fundamental questions, never deals with the underlying problem of what questions should be asked as one designs curriculum.

A Theoretical Model for Curriculum Development

Dr. Johnson's paper, "Definitions and Models in Curriculum Theory," contains a theoretical model of curriculum development which provided the "underpinnings" we were seeking for our work in curriculum development.

Johnson poses and answers the fundamental question, "What is a curriculum?" with the statement that a "curriculum is a structured series of intended learning outcomes." He goes on to elaborate:

> Curriculum prescribes (or at least anticipates) the results of instruction. It does not prescribe the means, i.e., the activities, materials, or even the instructional content, to be used in achieving the results. In specifying outcomes to be sought, curriculum is concerned with ends, but at the level of attainable learning products, not at the more remote level at which these ends are justified. In other words, curriculum indicates what is to be learned, not why it be learned. . . .
>
> . . . The central thesis of the present paper is that curriculum has reference to what it is intended that students learn, not what it is intended that they do [in the classroom],[1]

Johnson also distinguishes between the process of curriculum development and the product or output, the curriculum.

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[1]Ibid., p. 130.

Johnson's curriculum theory involves a conceptualization of a system of curriculum development and of the nature of the output of this system. According to his theory, a system of curriculum development includes the following components:

I. The Source of the Curriculum

> In most discussions . . . the sources of the curriculum are regarded to be (1) the needs and interests of the learners, (2) the values and problems of the society and (3) the disciplines or organized subject matter. All three of these may indeed impose criteria for the selection of curriculum items,[1] but only the third can be considered a source of them.

Johnson goes on to say that the "source of curriculum--the only possible source--is the total available culture."[2] He limits this by pointing out that "only that which is teachable" is actually relevant for curriculum.

II. Selection Criteria

What is actually included in a curriculum depends on the "selection criteria":

> It is obvious that all that is available and teachable in the culture cannot be included in a given curriculum. Selection is essential. Although who does the selecting is an important educational policy question, it is not a concern of curriculum theory. What is of concern, however, is that whatever criteria are used be made explicit.[3]

III. Structure

Johnson stresses several times that the curriculum is structured:

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[1]Ibid., p. 132. [2]Ibid. [3]Ibid.

> A curriculum is not a random series of items, but a structured one, even if only to the extent of indicating that the order in which certain outcomes are achieved is immaterial. . . . structure is not merely a matter of temporal sequence. It also refers to hierarchical relation among items. . . .
>
> . . . The curriculum does not specify what organizational units are to be used in instruction, but it does indicate organizational relationships among the intended outcomes. In this sense, curriculum is a structured series of intended learning outcomes.[1]

He indicates that the source of this structure for curriculum content drawn from the recognized disciplines is the structure of these disciplines. This sets the approach of Bruner, Phenix, and others of the same school of thought in their proper context:

> That curriculum implies such ordering is obviously the assumption underlying the widespread current attention to the structure of knowledge, especially of that knowledge derived from inquiry which constitutes the disciplines. It is implicit in the analysis of Phenix . . . that disciplines are structured both conceptually and syntactically (methodologically). Presumably, therefore, curriculum items assume their significance and meaning from their relationship to one another and to the mode of inquiry on the basis of which this relationship was derived or verified.[2]

In summary, Johnson has developed a theory of curriculum development which can be applied to any kind of curriculum. He points out that the "sources" of the curriculum, or the raw data, are the available teachable cultural content. The processes of curriculum development are the derivation and validation of selection criteria, the selection of the appropriate content, and the structuring of the content. The output of the "curriculum development system" is a curriculum--a structured series of intended learning outcomes.

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[1]Ibid., p. 131. [2]Ibid.

The curriculum is then an input into an "instructional system," which Johnson says "has three components: planning, execution (instruction), and evaluation."[1]

Instructional planning is concerned with what students will do (in the classroom) rather than determining what they should learn. It is concerned with the selection and organization of the appropriate content (both curriculum content and the necessary "instrumental" content):

> No curriculum item fully defines instructional content. Instructional content includes not only that which is implied or specified in the curriculum, but also a large body of instrumental content selected by the teacher, not to be learned [per se], but to facilitate the desired learning. . . .[2]

It must deal with the appropriate teaching methods and instructional materials. Instructional plans are made on the basis of the needs and interests of the students and teacher, in the context of the classroom, and within the constraints imposed by the curriculum:

> The nature of a particular intended learning outcome limits the range of possible appropriate learning experiences and thus guides instructional planning. . . .[3]

Apparently, what makes these systems is that each has an evaluation component, which provides the feedback necessary to guide the activities in each system. The results of the curriculum development system are evaluated using one set of criteria, while the outputs of the instructional system (student learnings) must be evaluated using different criteria.

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[1]Ibid., p. 133. [2]Ibid., p. 131. [3]Ibid., p. 130.

Johnson points out that a curriculum can be evaluated only in terms of the validity of its content vis-à-vis the overall objectives of the curriculum.[1] This can be done by evaluating the selection criteria, which are based on the overall objectives and determine what is and is not included in the curriculum. He also notes that evaluation of student learnings is inappropriate for validating curriculum content, through it may be relevant to determining whether it is structured properly.

Testing students for what they have learned cannot indicate directly the value of the curriculum because there are several variables which intervene to affect test results: the skill of the teacher, the teaching methods employed, the quality of instructional materials, the adequacy of instrumental content selected by the teacher, the amount of time spent on the subject matter, and the aptitudes and motivation of the students themselves. Instead, these variables must be taken into account in any attempt to evaluate the results of instructional planning and execution.

A Model for Curriculum Development from Military Training

A second model which contributed theoretical insights is presented by Harry L. Ammerman and William H. Melching in The Derivation, Analysis, and Classification of Instructional Objectives.[2] While this book is concerned primarily with developing a model for analyzing and classifying objectives, it provides, as a framework, a five-step se-

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[1] Ibid., p. 135.

[2] Technical Report 66-4 (Alexandria, Va.: Human Resources Research Organization, May, 1966).

quence for the "development of instruction." This model is apparently one in use in general by the Human Resources Research Organization,[1] rather than one developed exclusively by Ammerman and Melching.

The five-step sequence is as follows:

1. The determination of "instructional aim or scope"

   As in all educational institutions, the establishment of curricular aims and scopes involves abstract philosophical factors and values as well as the direct utility of the overall learning need.[2]

2. The determination of the "relevant work performance situations of interest"

   The purpose of this is to place appropriate constraints on instruction, limiting and defining what is considered to be relevant. . . . the term "work situation" refers to that performance situation for which the student is to be prepared, and in which he will be expected to perform effectively after instruction.[3]

3. The specification of "terminal student performance objectives"

   Having defined the work performance situations of interest, it is then necessary to determine what meaningful units of performance are relevant to these situations and are critical to instruction. This might be accomplished by job and task description.[4]

4. The specification of "enabling objectives"

   These, in general, consist of the component actions, knowledges, skills, and so forth, the student must learn if he is to attain the terminal objectives.[5]

5. The "design of the learning experience": This includes determining the actual content of instruction, the instructional activities, and the instructional materials to be used, and writing the lesson plans [6]

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[1] A non-profit organization doing research and development in education and training. The bulk of their contracts have been with branches of the military.

[2] Ibid., p. 18. [3] Ibid., p. 13. [4] Ibid., p. 14.

[5] Ibid. [6] Ibid., p. 11.

Applying the insights gained from the analysis of Johnson, it seems clear that steps 3 and 4 are actually curriculum development, as defined by Johnson. Step 5 of their model appears to be the planning component of an instructional system.

Ammerman and Melching point out that:

> Terminal student performance objectives are derived initially from the requirements of the work situation, independently of any consideration of their instructional feasibility.[1]

This idea that criteria for the derivation or selection of objectives do not depend on instructional considerations accords with Johnson's concept that the curriculum items (intended learning outcomes) must be selected with reference to clearly specified selection criteria, prior to consideration of instructional problems.

Elaboration of the Model for Curriculum Development

Analysis of these two models reveals that there are steps or processes referred to by both which are nowhere explicitly included in their models. The author views these as making up two additional stages to the model provided by Johnson.

First, it was apparent that the first two steps in the sequence provided by Ammerman and Melching do not fit into the curriculum development system as it has been defined in this paper. Instead, they seem to constitute a prior stage, the specification of the purposes the curriculum must provide for. We found this concept implicit in two statements made by Johnson. The first states:

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[1]Ibid., p. 18.

> In specifying outcomes to be sought, curriculum is concerned with ends, but at the level of attainable learning products, not at the more remote level at which these ends are justified.[1]

The "more remote level" referred to here, and not included as a stage in Johnson's model, is also implicit with reference to the specification of selection criteria:

> "2.31 The only necessary, albeit insufficient, criterion for curriculum selection is that the content be teachable.
>
> . . . . . .
>
> "2.32 Ideology determines what additional criteria are imposed in curriculum selection.
>
> "2.321 A given society may demand that curriculum be selected in conformity with a specified set of political, social, economic, or moral values.
>
> "2.322 Curriculum content may be selected with regard to its utility in the social order or in the present or anticipated life situations of learners.
>
> . . . . . .
>
> "2.33 The basis of curriculum selection differs for training and for education."[2]

It seems clear that Johnson has in mind a stage in which the "values" or "utility" are consciously specified for their relevance to selection of a particular curriculum.

These comments also clarify the relevance of Tyler's first question: "What educational purposes should the school seek to attain?" It seems clear that all of these quotations (Tyler, Johnson, and Ammerman and Melching) refer to a single type of activity, which involves the selection or formulation of the broad educational objectives which are to be met by instruction.

In a systematic approach to design, the curriculum would be developed in accordance with these overall educational objectives, and

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[1] "Definitions and Models," p. 130. [2] Ibid., pp. 137-38.

These passages indicate a process of selection and organization of curriculum objectives which is not part of curriculum development, and yet cannot really be considered part of instructional planning.

In addition to these references, we were aware of a variety of complex procedures related to the approval and accreditation of new or revised occupational programs in educational institutions. These processes,also, seem to belong in a stage intermediate between curriculum development and instructional planning. This stage we have chosen to call program design.

In many educational institutions, program design is done concurrently with curriculum development and/or instructional design, and thus is often viewed as part of one or the other. It actually involves a distinct set of data, is guided by quite different objectives and "rules," and has a distinguishable result (i.e., distinguishable from the curriculum, on one hand, and instructional plans, on the other). Program design must be done within a specific educational setting, and is usually done by an administrative office or by a committee of the faculty, rather than by the individual teacher, as is the case with most instructional planning.

Synthesis: The Four-Stage Model of Educational Design Activities

The author synthesized the insights gained from the above analysis into a four-stage model of the systematic design activities which are gone through between the initial determination that a curric-

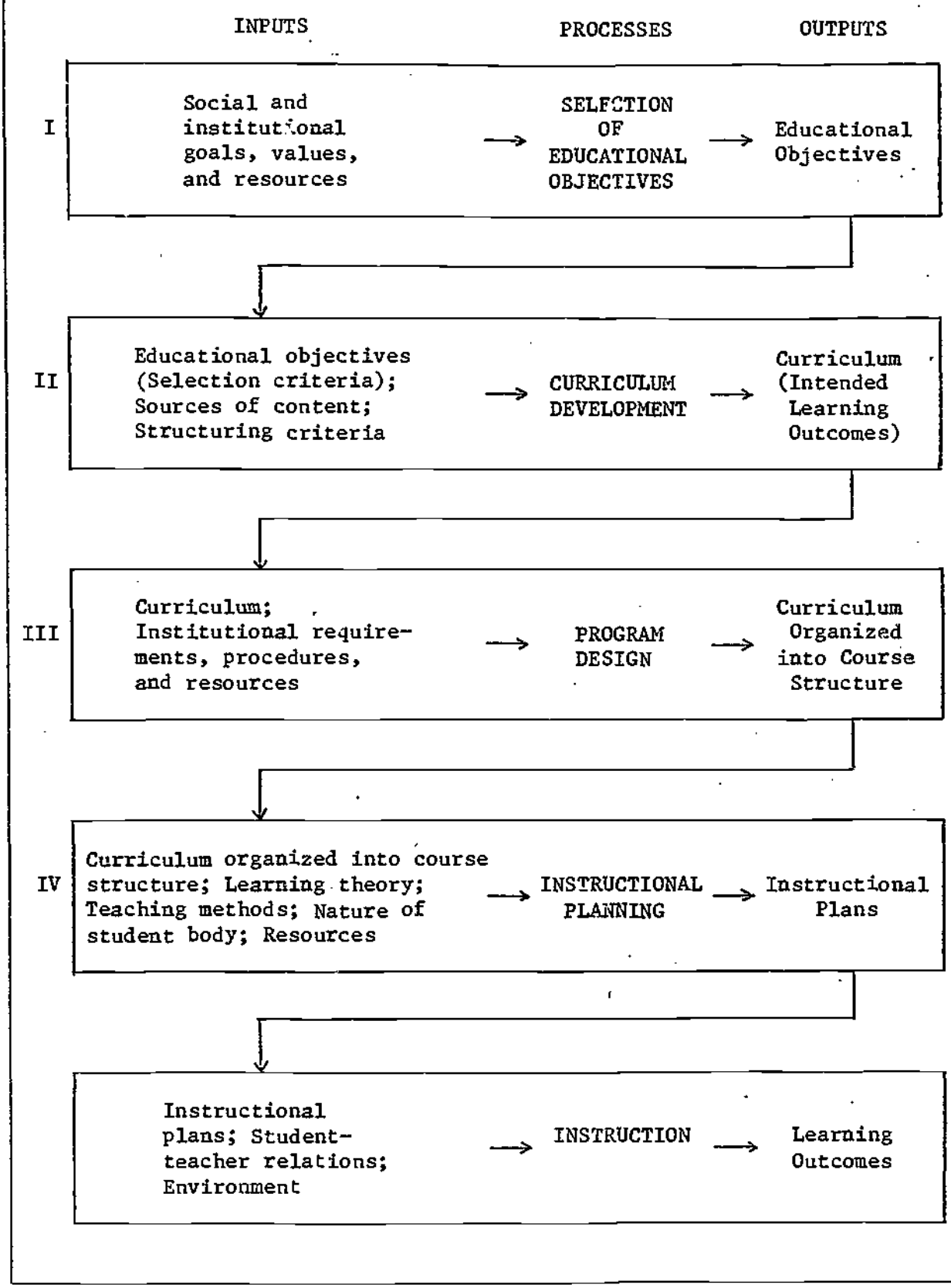
ulum is needed and the final process of actual classroom instruction. This model is presented as Figure 1.

The first stage of the model involves the selection of overall educational objectives. The inputs into this process are the goals and values of the society and of the institution which will provide the education. It is at this stage that the general nature of the student body is specified (e.g., adult, child, physically handicapped, exceptional), the level of education is stated (e.g., early childhood, post-secondary, post-graduate), and the type of education to be provided is stated (e.g., liberal arts, professional, technological).

In addition, those selecting the educational objectives usually find it desirable to specify goals which embody the values of the institution or society, such as providing education which will produce a certain type of individual, or will result in certain standards for performance being met by graduates in professional or occupational performance. The output of this stage of activity is a set of clearly stated educational objectives. These serve, in general, as a framework or criterion for evaluating the outputs of each subsequent stage, and also, specifically, as inputs into the second stage of the model, curriculum development. The educational objectives themselves can only be evaluated in terms of the social, educational and/or occupational functioning of those who have been educated to meet the objectives.

The second stage of the model is curriculum development. Two activities occur during curriculum development. First, the intended learning outcomes (or curriculum objectives) are selected from the

Figure 1. A Model of Educational Design Activities



source of the available, teachable cultural content. The criteria for selection depend on the educational objectives selected in the first stage. In addition, the curriculum objectives are structured. Content which is drawn from a recognized discipline would be structured in accordance with the structure of that discipline. Additional content, such as skills or non-disciplinary knowledge, may have no particular structure (this would be indicated) or they may be structured by whatever criteria lend the most meaningful context to the content. For example, in the case of occupational preparation, the way that items of content are organized and applied in job performance may serve as a criterion for structuring that content in a curriculum.

The significance of structure in a curriculum is that it provides information to the program designer and instructional planner about the ways that the small bits (or items) of content which make up a curriculum are interrelated in the discipline from which they are drawn, or, alternatively, in the "real world" activities in which they are applied, and thus, about the most meaningful organization for teaching.

The output of curriculum development is a curriculum--a structured set of intended learning outcomes. The selection of curriculum items, according to Johnson, can be evaluated only in terms of the validity of the educational objectives on which the selection criteria are based. The structure of the curriculum, on the other hand, can be evaluated through tests of student learning which shed light on the value of teaching content in particular sequences or clusters.

The curriculum is a major input into the third stage of the model, program design. Program design is the process of selecting and grouping curricu m items into a course or program structure. Along with the curriculum, which specifies the outcomes or results, the program designer must take into account where entering students will begin. This is determined through the establishment of admission requirements. Depending on these requirements, the program designer may have to specify that remedial courses or introductory courses which would not otherwise be included would have to be offered as preparation for the coursework more directly specified in the curriculum. In addition, the program designer must take into consideration (1) the facilities and faculty available to carry out a program (this may limit such things as laboratory courses) and (2) the accreditation requirements which have reference to credit-hour distributions for various content areas and, possibly, recommendations for combining certain areas of content. For example, the AMA guidelines for the two-year program in radiation therapy technology states that "Treatment Planning content may also be included in Oncology, Radiation Physics, and Technical Radiation Therapy."[1] This indicates to the program designer one possible way of organizing curriculum items, beyond the structure indicated in the curriculum itself.

The program designer must also take into account the philosophy of education which the school has established for itself. For example, one institution may decide to create a modularized curriculum, in which

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[1] Essentials of an Approved Educational Program for the Radiation Therapy Technologist. Approved by the AMA House of Delegates (Chicago: Council on Medical Education, American Medical Association, 1972), p. 3.

content is organized and taught in short courses, using pretests and posttests of competencies as a method for determining individual student progress. Another may stress a humanistic orientation, or insist on bilingual education for an ethnically mixed student body, with implications for the way curriculum content is organized and for any additional, special courses which might have to be added.

The result of these processes is a program, a set of courses or modules to which all of the items in the curriculum have been allocated in appropriate combinations.

The program (which is usually viewed as including the curriculum content) is normally evaluated through formal examination and approval by those in the educational institution who are responsible for the quality of new or revised programs. In addition, programs subject to accreditation are evaluated for such things as content covered and course hours, with reference to established standards, by the appropriate accrediting organization. However, the quality of a program (like the quality or validity of a curriculum and of educational objectives) is ultimately tested by the functioning of graduates of the program.

The fourth stage of the model is instructional planning. At this stage, the teacher takes as his parameters the curriculum items which have been selected and grouped during program design to form the course which is his responsibility. In addition, the teacher utilizes the following inputs:

1. Learning theory and research, which provide him with substantial information about the most effective teaching methods, the most effective way to sequence instruction, how to introduce new ideas, what to expect of students at various stages of intellectual development, and so forth

2. Teaching methods, which he must select using a combination of his knowledge of learning research and his personal capacity to utilize any of a number of "behavioral patterns." He may also take into consideration such things as the amount of time he has and the level of study skills of his students (which might allow for independent work rather than lectures, for example)

3. The available facilities, time, and materials (e.g., textbooks, maps, plastic materials, or lab equipment)

The teacher's responsibility is to plan learning experiences, to select the appropriate specific content as a vehicle for the experience, and to select materials or arrange the environment so that the planned experiences can take place. In order to do this, he must continually balance practical resources and limitations with his own teaching skills, the nature of the student body, and his grasp of learning theory.

The result of instructional planning is a set of unit and/or lesson plans. These are the "planned learning experiences" which some writers view as curriculum.

Lesson plans can be evaluated only after they have been used in actual instruction, which is the final activity shown in the model. This stage is not numbered because it is not viewed as a design activity, as the four numbered stages are. Instead, it is the execution phase, the results of which are the ultimate test of the validity of the cumulative outputs of the four prior stages.

We concur with Johnson's description of instruction:

> Instruction consists of two sets of interaction. One is Dewey's "transaction" between the student and the environment manipulated by the teacher. . . . The second interaction is the interpersonal one between the teacher and students.[1]

The output of instruction should be the "learning outcomes" specified in the curriculum. The success of instruction (and of the intervening design stages) may be evaluated by testing students to determine whether or to what degree they have achieved these learnings.

The difficulty of evaluating the results of each of these stages of design activities is that the nature of the inputs varies at each stage, and the results are thus varied in frequently unpredictable ways. Two different curricula can conceivably be viewed as meeting the criteria implicit in the general educational objectives. These curricula may in turn be organized into any of a variety of course structures, depending on the philosophy and resources of a given institution. As Ammerman and Melching point out, it may even be necessary to omit or revise some items of the curriculum if they are not feasible for utilization at a particular time or in a particular situation.

From a given set of curriculum items for a course, a great variety of learning experiences may be planned, with different materials and using a variety of teaching methods. Finally, instruction is always mediated by the skills and personal strengths and weaknesses of both teacher and student.

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[1] "Definitions and Models," p. 134.

Thus, while clear objectives may be stated at every stage in a theoretical model, the complexity and unpredictably of actual outcomes must not be overlooked.

Conclusion: The Scope of Curriculum Development

The conclusion of this paper is that curriculum development, as delineated here, is within the capability of a project, such as the HSMS, which operates independent of any specific institutional affiliation.

Curriculum development per se requires competence primarily in the area of specifying the nature of learnings which are necessary to meet a set of educational objectives. In the area of occupational preparation, such competence is closely tied to expert knowledge about the knowledges and skills required for competent performance of the occupation in question. This is true whether the occupational field is in the allied health professions, or in another area, such as teaching or social work or sales.

Curriculum development does not require the establishment of entry requirements for students, because it deals with <u>outcomes</u> rather than the entire content of a program of instruction. Likewise, it does not require expertise in the creation of materials (texts, films, etc.) or the selection of teaching methods or the sequencing of instruction. All of these types of activities, it is now clear, are the province of other stages of design activity, and therefore may be considered the

responsibility of those whose expertise is greatest in each particular process.

It is true that in many institutions these activities may occur concurrently and may even be done by the same persons or office. However, this author contends that a basic understanding of the nature and scope of each process cannot help but clarify the kinds of problems which are actually faced at each stage, and the kinds of research and evaluation which would be appropriate as guidance for each process.

In the case of a project wishing to engage in curriculum development outside of a particular educational institution, the following activities and outputs would be appropriate:

I. Educational Objectives

It seems clear that curriculum development cannot proceed without a clear statement of educational objectives. In the case of the hypothetical project, the statement of objectives would have to be in terms which would represent the general interests of the society and the profession for which a curriculum would be developed. These would then have to be subject to, and capable of, revision to meet the particular objectives of an institution desiring to utilize the curriculum.

For example, the HSMS is currently involved in analyzing jobs in diagnostic and therapeutic radiology, nuclear medicine, and ultrasonics. The general educational objectives which would guide curriculum development in these areas would have to include preparing individuals

to perform competently, and in such a way that they would be aware of and account for the health, safety, and dignity of patients on whom they would perform diagnostic or therapeutic procedures. In addition, since the HSMS has the objective of building educational ladders, the curriculum would have to be developed in such a way that programs and instruction could be planned, based on the curriculum, which would facilitate occupational and educational mobility for individuals in these job areas.

II. Curriculum Development

Once the statement of educational objectives is complete, the hypothetical project is in a position to select curriculum content which will best meet these objectives. If a project is working in the area of occupational preparation, the curriculum content is that which is specifically relevant to preparation for technically competent and socially acceptable performance in the occupation in question. Thus, the content of the curriculum will cover the relevant disciplinary knowledges and a variety of skills, including communications, human interaction, intellectual and psychomotor skills, which are necessary for job performance. In addition, the actual procedures and related, non-disciplinary procedural information must also be covered in the curriculum. For example, in the case of teaching, this would include classroom practice in a repertory of teaching methods.

The disciplinary knowledge covered by the curriculum can be structured to reflect the organization of the parent disciplines. This will set this content in meaningful contexts for the purposes of effective teaching.

Nondisciplinary content, such as skills, procedural information, and procedures, may logically be organized or grouped to reflect their application in procedures in the job situation. In this way, they are also set in meaningful contexts.

III. Output: Curriculum Guidelines

The result of this activity would be sets of curriculum guidelines, one for each job covered by the project. These guidelines would consist of the educational objectives and the more specific curriculum objectives, which are the "intended learning outcomes."

In addition, it seems appropriate for the project to formulate a set of recommendations for the utilization of the curriculum guidelines in program design and/or instructional planning. The limits on this kind of activity are indicated by the following:

> The nature of a particular intended learning outcome limits the range of possible appropriate learning experiences and thus guides instructional planning. A learning experience has an activity component and a content component, i.e., it involves some kind of activity with some kind of content. A curriculum item that deals with a skill-type outcome restricts the range of appropriate activities, but may or may not impose any limitations on the content. On the other hand, an item which concerns facts, concepts or generalizations specifies content, but leaves considerable option with respect to activity. When an affective outcome is specified, neither content nor activity may be greatly restricted, although most affects have fairly definite referents (implying content) and schools are concerned that most affective outcomes be intellectually grounded (implying activity).[1]

It seems clear that it would be within the province of the curriculum developer to make explicit implications of this sort which relate to the outcomes specified in the curriculum in question. In addition, the

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[1] Johnson, "Definitions and Models," pp. 130-31.

curriculum developers may generate a similar set of recommendations regarding the most effective organization of curriculum items into courses and/or instructional units, reflecting the structure of the curriculum itself. These insights on the part of the curriculum developer should be no more than recommendations, however, and should be made only when the nature of the curriculum implies them. They should not include the selection of instructional materials or of teaching methods, nor the specification of appropriate learning experiences or evaluation modes. The resources, objectives, and interests of a particular institution remain the overriding considerations in utilization of a curriculum prepared by an outside organization or project.

II. The Form of the Curriculum Objectives

Once the scope of curriculum development activities had been established, the major remaining theoretical question was the appropriate form for the "intended learning outcomes" specified in the resulting curriculum. Five criteria were set for the selection of this form:

1. It would have to fit the definition of "a structured series of intended learning outcomes." In other words, the form would have to be a description of intended "results" which would serve as a framework and guide for those involved in program design and instructional planning.

2. The form would also have to be amenable to structuring and to the manipulation involved in program design. In other words, the curriculum items would have to be stated as discrete, movable "building blocks."

3. The form would have to communicate the curriculum content in an accurate, clear, and reliable manner, so that the curriculum would be understandable to all potential users, they would agree on what it covered, and it would be accepted as objective. This would also provide the basis for identifying overlapping areas of content between programs.[1]

4. The form would have to state the curriculum content in such a way that the relevance of each item to the overall objectives of the curriculum could be objectively determined.

5. The form would have to allow for the specification of the level of competence to be attained with regard to the content referred to in each item.[2]

Review of the Literature

The author began with an awareness of the concept of behavioral objectives; these on first examination seemed to fit the requirements

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[1]This was one of the objectives posed by the HSMS.

[2]This was necessary in order to indicate the rising levels of skill and knowledge in ascending levels on an educational ladder, but it also has relevance for all kinds of education and training.

for a form specified above. Therefore, the review of the literature represents both a comprehensive examination of the concept and an attempt to evaluate the suitability of behavioral objectives as the form for statement of a curriculum.

The specification of objectives in education originates in two general areas of endeavor. One was the result of a movement toward specifying the objectives of education in order to develop appropriate evaluation instruments (most notably at the University of Chicago in the 1940's). Ralph Tyler's Basic Principles of Curriculum and Instruction has been an influential text in this area. Another well known result of the same movement is The Taxonomy of Educational Objectives, which was conceived of in three parts, cognitive, affective, and psychomotor. To the best of our knowledge, two of these taxonomies have been developed and published, as Handbook I: Cognitive Domain[1] and Handbook II: Affective Domain.[2] The Taxonomy represents an attempt to classify and place in hierarchical sequence the types of learnings which would be of interest to constructors of instruction. Presumably, the hierarchies represented in the Taxonomy could be used to appropriately sequence learning experiences.

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[1]Benjamin S. Bloom et al., Taxonomy of Educational Objectives, Handbook I: Cognitive Domain (New York: David McKay Co., Inc., 1956).

[2]David R. Krathwohl, Benjamin S. Bloom, and Bertram B. Masia, Taxonomy of Educational Objectives, Handbook II: Affective Domain (New York: David McKay Co., Inc., 1964).

Robert M. Gagné[1] has been influential in a parallel development in the field of specifying objectives. This second area has been founded on the work of B. F. Skinner and the cybernetics movement in education, on one hand, and on the research toward more effective and efficient training done by the various branches of the military on the other. This field is involved with the specification of specifically behavioral objectives and the related work in designing effective learning programs.[2]

Robert F. Mager wrote one of the first, and most valuable, texts on the writing of behavioral objectives. His definition is as follows:

> An objective is an intent communicated by a statement describing a proposed change in a learner--a statement of what the learner is to be like when he has successfully completed a learning experience.[3]

Mager states that a behavioral objective has three parts. The most important is a statement of the kind of performance, or behavior, that is to result. The second is a definition of the conditions under which the behavior is to be exhibited. This refers to the givens (e.g., "Given a list of ten French words"), and/or the situation (e.g.,

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[1]Ed., Psychological Principles in System Development (New York: Holt, Rinehart and Winston, 1962).

[2]"Programs" is used here to refer to carefully sequenced sets of instructional materials or experiences which usually have feedback on progress built into the sequence.

[3]Preparing Instructional Objectives (Belmont, Cal.: Fearon Publishers, 1962), p. 3. Mager, like Ammerman and Melching, has done research on military training for the Human Resources Research Organization.

"Under standard testing conditions") in which the student will exhibit the intended behavior. The third component is the criterion or standard for determining whether the behavior is acceptable. Mager suggests standards of speed (e.g., "in 14 seconds") and/or accuracy (e.g., "with 80% accuracy," "within tolerances of .01 cm.") as possible criteria for acceptable performance.

Mager further defines objectives as having the following characteristic:

> Basically, a meaningfully stated objective is one that succeeds in communicating to the reader the writer's instructional intent. . . . For example, if you provide another teacher with an objective, and he then teaches his students to perform in a manner that you agree is consistent with what you had in mind, then you have communicated your objective in a meaningful manner.[1]

As Gagné summarizes it,

> . . . statements of instructional objectives [must] be complete . . . and unambiguous. The description must be internally consistent. . . . And above all, such objectives should be reliable, . . . : two readers should have no disagreement about the kind of performance expected of the learner."[2]

Other writers in the field have developed lists of components different from that of Mager. Robert G. Kibler et al. state that "Objectives should contain the following five elements:

> "1. Who is to perform the desired behavior. . . .
>
> "2. The actual behavior to be employed in demonstrating mastery of the objective . . .

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[1] Ibid., p. 10.

[2] "The Analysis of Instructional Objectives for the Design of Instruction," in Teaching Machines and Programmed Learning, II: Data and Directions, ed. Robert Glaser (Washington, D. C.: National Education Association, 1965), pp. 31-32.

"3. The result . . . of the behavior, which will be evaluated to determine whether the objective is mastered. . . .

"4. The relevant conditions under which the behavior is to be performed. . . .

"5. The standard which will be used to evaluate the success of the product or performance. . . ."[1]

Henry L. Walbesser lists the following six components:

"1. Who is to exhibit the behavior?

"2. What observable performance (action) is the learner expected to exhibit?

"3. What conditions, objects, and information is [sic] given?

"4. Who or what initiates the learners [sic] performance?

"5. What responses are acceptable?

"6. What special restrictions are there on the acceptable response?"[2]

There are essential similarities among all of these ways of defining objectives. Each is concerned with the nature of the situation in which the student finds himself, whether it is the "relevant conditions" or "what . . . is given." Second, each makes the behavior or performance the central component, whether they refer to it as "actual behavior" or "observable performance." Third, each is concerned with defining what would be an adequate performance in order to meet the objective, though they may phrase it as "special restrictions . . . on

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[1]Robert G. Kibler, Larry L. Barker, and David T. Miles, Behavioral Objectives and Instruction (Boston: Allyn and Bacon, 1970), p. 33.

[2]"Constructing Behavioral Objectives," (College Park, Md.: The Bureau of Educational Research and Field Services, College of Education, University of Maryland, 1970), p. 24.

the acceptable response" or, simply, "the standard." "Who" is to perform seems irrelevant in cases in which the population for whom the objective is intended has been specified, while "the result" or "the acceptable response" appear to be embroideries on "the performance." Therefore, we conclude that Mager's definition, with its three components of performance, conditions, and criteria, conveys the essence of what a behavioral objective must specify to be complete.

The concept of behavioral objective is attractive because it provides 1) a way of specifying "intended learning outcomes," 2) a statement which could work as an independent unit or building block, 3) a form which calls for the statement of the level of competence needed to meet the objective, and 4) if done properly, a unique statement which could be reliably distinguished from other objectives. These characteristics meet most of the requirements which were originally set for the form of the curriculum objectives.

However, behavioral objectives are used for <u>instruction</u>. While language varies a great deal on what this kind of objective is called (e.g., "behavioral," "performance," "instructional," "informational"), there is general agreement that they are used to specify the outcomes of instruction. Awareness of the lack of consistency in the use of this term led us to examine this usage very carefully. Our analysis of the kinds of concerns which these authors displayed relative to writing and using behavioral objectives confirmed that they were indeed instructional (as we define the term) and not appropriate to curriculum. This conclusion was based on the nature of the behaviors specified by the various sources as appropriate in statements of objectives.

There are two general classes of behaviors with which the literature are concerned. On the one hand, those who focus on elementary education and instructional planning are concerned with defining classroom behaviors. Walbesser, for example, goes to some length in deriving a series of verbs (such as "identifying," "constructing," "describing")[1] which he says are unambiguous words for describing behavioral outcomes. These are clearly meant to be used to define classroom activities. They could not be used to establish the relevance of content to job performance, which is one of the requirements posed for curriculum objectives.

In addition, while Walbesser and other writers in the same field[2] specify the nature of the content which is the object of the behavior in an objective, it seems clear that they are working on the assumption that a predetermined curriculum exists. They write as though the overall goals and content for the course or program have been specified and the immediate problem is planning a learning sequence in which the immediate goals (or teacher expectations) are specifically stated and organized in order to promote effective, efficient teaching. This concern is certainly appropriate at the stage of instructional planning, but leaves unsolved the problem of what a curriculum objective should look like or cover.

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[1]Ibid., pp. 30-53.

[2]Bloom et al., Educational Objectives, Handbook I; Kibler, Barker, and Miles, Objectives and Instruction; Krathwohl, Bloom, and Masia, Educational Objectives, Handbook II; Mager, Preparing Objectives; W. James Popham and Eva L. Baker, Planning an Instructional Sequence (Englewood Cliffs, N.Y.: Prentice-Hall, Inc., 1970); W. James Popham, ed., Instructional Objectives (Chicago: Rand McNally, 1969); and Paul D. Plowman, Behavioral Objectives: Teacher Success through Student Perfor-

The other school of thought in the field of behavioral objectives focuses on the specification and analysis of behaviors for job training. Gagné points out that this area has been the focus of much research on training done by the military,[1] and that Robert B. Miller[2] has been a major figure in this area.[3]

The focus in this area has been, first, on the accurate, reliable specification of training objectives, and, second, on the "behavioral" analysis of objectives to determine implications for "programming" instruction. They do this through processes they call "task description" and "task analysis." "Task description" is the process of exhaustively identifying all of the behaviors which a worker will perform in a given job. Each task is at the level of an individual step in a procedure (e.g., "pushes lever to the right until light comes on"; "after each step, writes down observation.") R. B. Miller describes "the essential elements in a task step" as:

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mance (Chicago: Science Research Associates, 1971).

[1]"Analysis of Objectives," p. 23.

[2]"Analysis and Specification of Behavior for Training," in Training Research and Education, ed. Robert Glaser (Pittsburgh: University of Pittsburgh Press, 1962), pp. 31-62; and "Task Description and Analysis," in Psychological Principles in System Development, ed. Robert M. Gagné (New York: Holt, Rinehart and Winston, 1962), pp. 187-228.

[3]Other research in the same area has been reported by Donald F. Haggard, The Feasibility of Developing a Task Classification Structure for Ordering Training Principles and Training Content, Study for the U.S. Army Human Research Unit (Alexandria, Va.: Human Resources Research Organization, January, 1963), and Robert G. Smith, Jr., The Engineering of Educational and Training Systems (Lexington, Mass.: Heath Lexington Books, 1971).

> (a) the signal or stimulus that initiates the step plus its display source, (b) the control and the control activation required, and (c) the feedback information to the operator of response adequacy.[1]

These elements are essentially similar to the three components specified for behavioral objectives (conditions, behavior, criteria).

"Task analysis" involves the analysis of the task description statements to determine the general nature of the behavior required, in order to classify it with other statements referring to the same class of behavior, and subsequently to design sequences of instruction with reference to these classes of behavior. Such analysis is usually done with reference to a predetermined taxonomy of behaviors. One of Miller's taxonomies includes "goal orientation and set," "reception of task information," "retention of task information," "interpretation and problem solving," and "motor response mechanisms."[2] Gagné has formulated several different taxonomies. One consists of six classifications of behavior: "association," "multiple discrimination," "behavior chains," "class concepts," "principles," and "strategies."[3] The analysis of task behaviors is relevant only at the level of instructional planning (or in the design of self-instructional materials).

In contrast to the specification of objectives for elementary education, objectives for job training contain no reference to content at all. One can only assume that Miller and Gagné and others in the

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[1] "Specification of Behavior," p. 53.

[2] "Task Description and Analysis," pp. 202-15.

[3] "Analysis of Objectives," p. 55.

same field are either dealing with such low-level tasks that no academic work is required to learn them, or that they assume the identification of knowledge and skills occurs in some other realm of activity and is handled separately from the analysis they describe.

The author concluded that neither school provided an appropriate model for objectives at the level of curriculum. Instructional objectives specified content, but only in terms of classroom behaviors, and seemingly with the assumption that a curriculum already exists. Task analysis deals with job-related behavior, but with the exclusion of any reference to academic content. A third model, implicit in Ammerman and Melching, provided an insight into the solution of our problem.

While they come from the background of research and development for military training which lies behind the work of Miller, and Gagne, Ammerman and Melching have been concerned with the training of officers, and therefore, had to account for academic content as well as specific job activities in the development of instructional programs. This is evidenced in the two steps in their model (presented above, p. 18) which call for the specification, first, of "terminal student performance objectives," which are "meaningful units of performance . . . [determined] by job and task description," and second, of "enabling objectives," which "consist of the component actions, knowledges, skills . . . that the student must learn if he is to attain the terminal objectives."[1]

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[1]Classification of Objectives, p. 14.

It became clear that objectives could be stated at the level of a curriculum which would have both a behavioral component--but with reference to job behaviors rather than classroom behaviors—and a reference to content--but units of content which accorded with the scope of job behaviors, rather than units of classroom instruction. These objectives we have dubbed curriculum objectives. In addition, it seemed clear that the statement of conditions and criteria would also be possible, again, with reference to the unit of job performance described in the objective.

Terminology: Types of Objectives

Analysis of the language used to discuss objectives revealed a vast confusion about terminology. We noted that, while Mager and Gagné and others discuss instructional objectives,[1] still others, referring to the same subject, call them behavioral objectives.[2] Tyler refers to educational objectives,[3] evidently referring to what Ammerman and Melching refer to as "instructional aim,"[4] while the latter add the terms, terminal student performance objectives and enabling objectives.[5]

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[1]Cf., Mager, Preparing Instructional Objectives; Gagne, "The Analysis of Instructional Objectives . . .; Ammerman and Melching, The Derivation, Analysis, and Classification of Instructional Objectives; and Popham, Instructional Objectives.

[2]Cf., Kibler, Barker, and Miles, Behavioral Objectives and Instruction; Plowman, Behavioral Objectives: Teacher Success Through Student Performance; and Walbesser, "Constructing Behavioral Objectives."

[3]Basic Principles.

[4]Classification of Objectives, p. 12.

[5]Ibid.

In addition, we find an awareness of different kinds of content covered by objectives. Johnson refers to "disciplinary" and "nondisciplinary"[1] content, and elsewhere recognizes skills.[2]

We found that it was possible to classify usage in four ways. One set of terms refers to the temporal or hierarchical sequence of objectives. A second set refers to the type of content covered by an objective. A third set could be developed referring to the stage of educational design at which the objectives are produced. Finally, it was possible to distinguish between types of objectives as "behavioral" or "non-behavioral."

When Ammerman and Melching use the terms "enabling" and "terminal," they refer to the relative position of an objective in a sequence, rather than to the type of content covered. When the authors use the term "terminal" they refer to the work activities which students are being prepared to perform. They use the term "enabling" to refer to the directly work-relevant knowledges and skills which "enable" the student to perform the "terminal" task behavior. However, Mager refers to the intended behavior specified in an instructional objective as the "terminal behavior,"[3] meaning a classroom behavior.

Robert G. Smith points out that a fully structured educational system might consist of several levels of "enabling" objectives, each

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[1] "Definitions and Models," p. 137

[2] Ibid., p. 130.

[3] Preparing Objectives, p. 11.

one consisting of the necessary prerequisite learnings for the next higher level of "enabling" objectives, and so on, until the "terminal" objective is reached.[1] This is the sort of hierarchy of objectives with which instructional planners are concerned when they seek to design the most effective sequences of instruction. If no definite starting point is specified, this hierarchy extends logically all the way back to the fundamental reading, writing, psychomotor, and intellectual skills taught to children (or picked up by them as they mature) from the first days of formal schooling.

In summary the terms "enabling" and "terminal" are useful only with reference to the relative positions of objectives in a planned sequence.

A different set of relative positions is established with reference to the stages of educational design (see Figure 1). Each stage results in outputs which may be stated in the form of objectives. These objectives would then be referred to, respectively, as educational objectives, curriculum objectives, course objectives, and instructional objectives. Each set would refer to a progressively smaller breadth of educational outcome, from the very broad general statement of an educational objective, to the specific outcomes of each lesson or unit covered by an instructional objective. The broader the scope of an objective is, the less likely that it can be stated in strictly behavioral terms. Probably, the broadest level at which this is possible is that of curriculum objectives, and then probably only with reference to the specific

[1] Engineering of Systems, p. 93.

job performance outcomes of occupational preparation. The objectives of education in the liberal arts or at the elementary and secondary levels seem less amenable to behavioral specification.

Finally, there is general recognition of different types of content covered by different types of objectives. The most common classification of content is cognitive, affective, and psychomotor. This classification is reflected in plans to develop three handbooks in the Taxonomy of Educational Objectives.

Conclusion: The HSMS Curriculum Objectives

The author concluded that the HSMS should develop objectives at two stages, educational and curriculum. At the level of curriculum objectives, three kinds of content should be covered: knowledge, skills, and procedures. These curriculum objectives would specify all of the necessary content which must be covered in a formal curriculum in order to achieve the dual goals of job competence and career mobility.

The knowledge and skills objectives will state in detail the content which must be learned in order to learn and perform task procedures (in this sense, these are "enabling" objectives). In order to assure (and communicate to users) the relevance of these objectives, they will be statements in the form of objectives which specify both the area of knowledge or type of skill to be learned, and the task activities in which this content must be demonstrated or applied. In addition, the task activities would imply the conditions and criteria which would be relevant in evaluating whether students had achieved a particular objective and could successfully apply the knowledge or skill.

Procedural objectives will be statements which describe the procedures which the student must learn in order to enter the job as a competent performer. Only those aspects of procedures which could be taught in a formal curriculum and in the general setting of a school would be described in procedural objectives.

We expect that these curriculum objectives will meet all of the requirements stated at the beginning of this section.

They will be in the form of statements of intended learning outcomes. Each statement will be a unique combination of a unit of content and the relevant task activities in which it is applied which can be used as a manipulable building block for purposes both of structuring the curriculum and of grouping objectives into courses during program design and units during instructional planning.

The combination of a unit of content with its application in specific task activities should result in statements which are clear and reliable and the relevance of which could be objectively determined. (The accuracy of the objectives would rest, of course, on the accuracy of the data base from which the objectives are developed.)

Finally, the task activities themselves could be used to determine the breadth and depth of knowledge needed, or the level of skill. In procedural objectives the standards for performance or for the quality of outputs established by the profession would serve as criteria.

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