Chapter 7

CURRICULUM ENGINEERING

The phrase "Curriculum Engineering" as title for this chapter demands explanation. A large portion of curriculum literature has dealt with the problems with curriculum planning, development, or improvement, thus, focusing upon the production of curriculums or curriculum materials. Only a small portion of the literature has reflected thinking about curriculum implementation, and until recently, the subject of curriculum evaluation has largely been ignored. The processes of planning, implementing, and evaluating a curriculum may be spoken of as the essential processes of a curriculum system. A curriculum system is a system for both decision making and action with respect to curriculum functions regarded as a part of the total operations of schooling. As indicated, the system has three primary functions: (1) to produce a curriculum, (2) to implement the curriculum, and (3) to appraise the effectiveness of the curriculum and the curriculum system. The primary ingredient in effectuating these functions is decision making by the persons involved, and the decision-making tasks are complicated both by the nature of the tasks and the number of persons involved. The complications call for intelligent human engineering if the functions are to be carried out effectively. Hence, the title of curriculum engineering is used to represent both the system and its internal dynamics.

Curriculum engineering consists of all of the processes necessary to make a curriculum system functional in schools. The chief engineers in the curriculum system are the superintendent of schools, principals, and curriculum directors, and they may be assisted by consultative personnel from outside the school system.

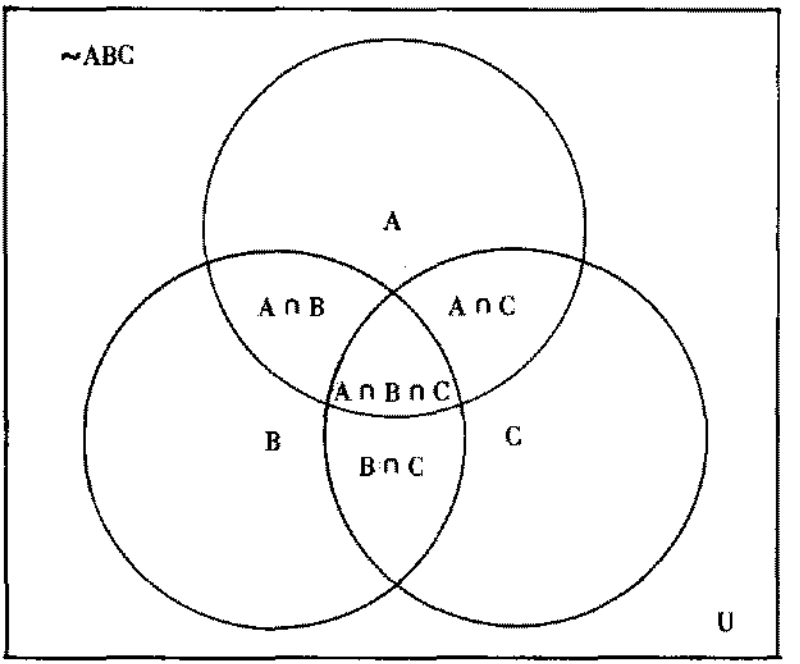
They, the engineers, organize and direct the manipulation of the various tasks and operations that must go on in order for a curriculum to be planned, implemented in classrooms through the instructional program, evaluated, and revised in light of the data accumulated through evaluation. Thus, curriculum engineering encompasses the set of activities necessary to keep the curriculum of a school in a dynamic state.

In this chapter, the scope of curriculum engineering activities will be identified by pointing up the critical areas of concern in any curriculum system and by noting how alternative choices would be related to different theoretical positions. Before turning to these critical choices, it is necessary for us to describe more carefully than we have done so far the precise character of the more important systems of schooling, and the characteristics of a curriculum system.

SYSTEMS OF SCHOOLING

A convenient way for theorists and practitioners to identify a curriculum system and its prescribed roles is to observe its place among other systems of schooling. By schooling is meant all those activities essential to the purposeful maintenance and operation of schools. The systems of schooling are operational constructs that explain the character of schooling, and that have identifiable internal characteristics. These can be represented diagrammatically, one such diagram being included here as Figure 10. In it, the language of set relationships is used to explain the interrelationships among the various systems of schooling. The symbol U designates the universal set, or universe of discourse, which represents schooling. Subset A represents the curriculum system. Subset B represents the instructional system, and subset C represents the evaluation system. The remaining space within U represents all subsets, or systems, of schooling not included in A, B, and C. These might be the administrative system, the personnel services system, the guidance system and so forth. Our major concern here is with the three systems curriculum, instruction, and evaluation because they more nearly characterize the fundamental nature of schooling than any others.

The set intersections shown in Figure 10 are very interesting.



Legend:

U	=	the universe of discourse (the systems of schooling)
~ABC	=	all systems of schooling except systems A, B, and C
A	=	the curriculum system
B	=	the instruction system
C	=	the evaluation system
A ∩ B	=	the intersection of system A and system B
B ∩ C	=	the intersection of system B and system C
A ∩ C	=	the intersection of system A and system C
A ∩ B ∩ C	=	the intersection of system A, system B, and system C

Figure 10. *A diagram representing the systems of schooling.*

They represent the interactions of two or more of the three systems. This interaction, or overlay, of the systems graphically portrays the continuity among curriculum, instruction, and evaluation. It helps to establish that there are no discrete boundaries among systems, and that systems have purposes in common. For example, the intersection of curriculum and instruction might represent such functions as planning for implementation, lesson planning, and teacher-pupil planning. These functions bridge the gap between decisions about what to teach and decisions about how to teach. The intersection of curriculum and evaluation might represent the evaluation of the degree of curriculum implementation, evaluation of teacher use of the curriculum, evaluation of curriculum organization, or feedback of information from evaluation for curriculum revision. These functions bridge the gap between the decisions made about what to teach and the judgments made about the predictability and the worth of those decisions. The intersection of instruction and evaluation represents the functions that bridge the gap between activities associated with the execution of decisions about how to teach and appraisal of those activities via such means as diagnostic testing by the teacher, pupil self-evaluations, appraisal of teaching performances, or the evaluation of instructional materials. The intersection of all three systems is the payoff area of schooling. This intersection represents those pupil learnings intended by the curriculum system, sought through the instructional system, and observed in the evaluation system. All systems point toward pupil learnings. All systems make some contribution to pupil learnings. We can amplify distinctions among the three systems indicated in Figure 10 by indicating some of the characteristics of each in greater detail.

The Curriculum System

The general purpose of a curriculum system as one of the several systems of schooling is to provide a framework for deciding what ought to be taught in the schools and for employing those decisions as points of departure for developing instructional strategies. Every school and/or school district does some planning for schooling, carries out instruction, and appraises outcomes.

However, in many schools and districts, organization for curriculum decisions is invisible rather than visible, unconscious rather than conscious, and random rather than rational. When this condition prevails, we cannot say that a curriculum system is present. But when a deliberate and constant organization is used to plan the curriculum, implement it, and appraise its effectiveness, we may say that a curriculum system is present.

The language of systems analysis is useful in describing the basic characteristics of a curriculum system. Figure 11 is a diagram of a model of a curriculum system using that language. The system is composed of three essential components: (1) a body of input data, (2) the necessary content and processes for the maintenance of the system, and (3) the output of the system. In Figure 11, the entries under each of the three components are brief and generalized to avoid contamination by any specific position with respect to curriculum engineering. The purpose here is to illustrate what a system is and how it works regardless of specific choices any individual or group might make within the general system framework. We will return to specific choices with respect to the curriculum processes later in this discussion.

Input data. The function of input data is to provide energy for the content and processes that maintain the steady state of the system. Energy in this case is the intellectual and personal driving power engendered by such forces as educational foundations, relevant community characteristics, human personalities involved, experience of schools with curriculum affairs, the large body of human knowledge stored and categorized in the disciplines and other school subjects, and relevant social and cultural values. Many other specific classes of input data could be added to the list shown in Figure 11 such as commercial materials, projections from research, technological feasibility data, and identified needs and interests of learners, to mention just a few. Input data constitutes sources of authority, sources of new ideas, and general ways of behaving in carrying out the curriculum functions. Curriculum functions are carried out at the level of system maintenance. During the system maintenance processes, relevant information, procedures, and values have to be selected from the input sources. This selection process is one of the reasons why working in a full curriculum system is educative for the participants.

Input	Content and Processes for System Maintenance	Output
Educational foundations Community characteristics Personalities of persons involved Curriculum experience The subject matters from disciplines and other subjects Social and cultural values	Choice of arena for curriculum processes Selection of personnel Selection and execution of working procedures for: determining curricular goals selection of curriculum design planning and writing Establishing implementation procedures Establishing procedures for appraising and revising the curriculum	A curriculum Increased knowledge by participants Changed attitudes Commitment to act

Figure 11. *A model of a curriculum system.*

Content and processes for system maintenance. Any system is characterized by a known body of activities that make the system work and maintain itself. Figure 11 lists the basic functions that must go on for a curriculum system to be maintained. We shall mention them only briefly here because they are the areas of substantial issue and controversy in curriculum. The principal choices among them will be discussed in detail later. There is sequential order to the way these functions are listed in Figure 11. A first choice that must be made by those in authority for schooling is the arena in which curriculum activities are to take place. The arena is where curriculum planning is to be done and where implementation functions are to be directed. Once the arena choice has been made, the persons who are to be involved in curriculum decision making may be chosen. Once the persons to be involved have been identified, working procedures may be planned to determine the curricular goals, to select a curriculum design, to develop details of the design, and to write the curriculum. Procedures will have to be planned to move from the curriculum system to the instructional system; these constitute the implementation plans. Finally, plans need to be made to appraise the output of the curriculum system and the data used to revise both curriculum and the activities of the curriculum system. All of these are warranted ingredients of what may be called a curriculum system.

Output. The most obvious and necessary output of a curriculum system is a planned curriculum, and is the major visible output. Other outputs such as changed attitudes of teachers and other participants in the system, increased knowledge by the participants because the planning process has been educative, and a commitment by teachers and school leaders to implement and to appraise the curriculum are just as real as the planned curriculum, but they are not immediately visible.

Schools have a long history of curriculum planning, but not many have examined the outputs of those efforts. Even more important, curriculum practitioners have had little experience in using the results of examining curriculum outputs as feedback data to improve further curriculum efforts. To appraise the magnitude of these outputs, measures that will identify the traits involved and the magnitude of them will have to be constructed. The

development of instruments that would give us these measures needs to be among the next steps of curriculum research.

Conran has made a substantial effort in this direction by studying the relationship among several variables in a curriculum engineering system in such a way that the effects of various performers in the curriculum system were identified.[1] The degree of relationship was determined among such variables as principal leadership, teacher attitudes, teacher experience and training, teacher performance, student sex and intelligence quotient, and student achievement. Still, more precise measurement of variables needs to be accomplished, more representative ways of modeling relationships need to be explored, and further study of additional relationships that would observe the effects of such variables as school climate and student motivation, among others, needs to be undertaken.

The Instructional System

To indicate differences and relationships among the input data, the system maintenance content and processes, and outputs for an instructional system as contrasted with a curriculum system, Figure 12 is included. It should be noted that the curriculum which was the principal output of the curriculum system is a principal input to the instructional system. Other inputs also vary according to the character of the system. It is most important, however, to note the differences between the content and processes for system maintenance included in the instructional system as compared with those in the curriculum system. This comparison virtually spells out in rather concrete terms the environmental and functional differences between the instructional system and the curriculum system. The primary output of the operation of the instructional system should be pupil learnings.

The Appraisal System

Some examples of what an appraisal system would be like are shown in Figure 13. The appraisal system is designed to provide a

[1] Patricia C. Conran, "A Study of Causal and Other Relationships among Leadership, Teacher, and Student Variables in Curriculum Engineering" (unpublished Doctoral dissertation, Northwestern University, 1974).

Input	Content and Processes for System Maintenance	Output
The curriculum Teacher characteristics Pupil characteristics Community resources Available instructional materials Building facilities Financial resources Library resources Leadership	Development of teaching strategies including specific behavior of outcomes Development of pupil-teacher strategies Selection of instructional materials, and devices, and other resources Organization of pupils Execution of strategies through such activities as individual study, group investigation, discussion, projects, reports, programed learning, excursions, etc. Use of appraisal strategies such as testing, observing, recording Use of appraisal strategies such as testing,.observing, recording anecdotes, case studies, conferring, etc. Teacher appraisal (by self and others)	Pupil learnings Identified need for curriculum change Identified need for change in instructional practices Data for interpretation

Figure 12. *A model of an instructional system.*

Input	Content and Processes for System Maintenance	Output
The curriculum	Achievement testing	Data for curriculum change
Data from instructional system	Anecdotal record system	Data for improvement of instruction
Known techniques	Collection of data on curriculum implementation	Data for social interpretation
Established pupil progress reporting procedures	Collection of data on needed curriculum change	
Available research skill	Collection of data on teacher proficiency	
Commercial testing materials	Reporting of pupil progress	
	Research on specific problems	
	Interpretation of schooling operations	

Figure 13. *A model of an appraisal system.*

trunk line of feedback data for the products and processes of the curriculum system and the instructional system. To be sure, the appraisal system would also similarly serve any other system such as the administrative system or the pupil-services system, but those are not of our primary concern here. Again, one should note particularly in the systems maintenance content and processes, a distinctly different group of functions than those listed in either the curriculum or the instructional system. Inputs to the system come from both the curriculum system and the instructional system as well as techniques and knowledge peculiar to the processes of evaluation. Outputs immediately lead back to the curriculum system and the instructional system thus providing a dynamic cycle of feedback and correction to the fundamental processes of schooling.

Conran's study of relationships among variables in a curriculum engineering system is an initial attempt to provide some of the intended feedback. She used mathematics in the form of reduced-form structural equations and the technique of path analysis to determine the strength of assumed relationships and to model relationships. Differences were observed among principals in leadership effectiveness; differences were noted between the ways principals rated teachers' performances compared with the way teachers perceived their own performances; and relationships among principal, teacher, and student variables were observed. This kind of information and future analyses of perhaps a more complex and precise nature can begin to give school personnel the kind of feedback necessary for planning individualized in-service programs, for improving employment practices, and for clarifying and revising policies and practices in the curriculum and the instructional systems.

Theoretical Issues

No doubt it is apparent to the reader that a grossly different theoretical position would be taken by an individual in the field of curriculum who would accept the notion that a curriculum system and an instructional system are all one. Nonetheless, the illustration of the two systems in terms of their content and processes for system maintenance do illustrate the total complexity

of involving both systems in one's thinking about curriculum. Regardless of posture taken, the curriculum theorist finds more immediate food for his efforts in systems of curriculum engineering than in any other area of the total field of curriculum. The most plausible reason for this is the vast experience we have had in this country with curriculum planning. It is true that our experience with the task and method variables of curriculum implementation and curriculum evaluation has been limited; the reason is that we have not worked hard at these dimensions. But we have worked hard at the tasks and methods of curriculum planning. The alternative ways of accomplishing the various tasks of curriculum engineering provide the theorist with a basic classification scheme from which the beginning elements of curriculum theories may be deduced, and from which further research may be launched to develop additional generalizations. Most, if not all, of the general areas of curriculum engineering that serve as a basic structure to this kind of classification have been indicated in Figure 11 under the content and processes for system maintenance. Briefly the issues are found in: (1) the arena, or arenas in which the various processes of curriculum engineering are to take place, (2) the involvement of people in the curriculum processes, (3) tasks and procedures for curriculum planning, (4) the tasks and procedures for curriculum implementation, and (5) tasks and procedures for curriculum evaluation.

THE ARENA FOR CURRICULUM ENGINEERING

The first decision that has to be reached in establishing a system for curriculum engineering is the arena, or arenas, in which the various curriculum activities are to take place and to be directed. Most subsequent choices are to some degree dependent upon the choice of arena; therefore, it is not a choice to be taken lightly.

Moving from smaller to larger, the most obvious arena choices are the individual school, the school district, the state, and the nation. In the United States, education legally has been a function of the several states. In turn, most state governments have delegated operational control to the various school districts. It has been this act that has resulted in so much autonomy being vested in

the hands of local school district officials, including the development of curriculums for the schools. There are, of course, some cases in which state legislatures have passed laws insisting that certain culture content be taught in schools of the state such as teaching about the state constitution, instruction about drug abuse, or a given number of minutes per week to be devoted to physical education. In some states, state departments of education have created suggestive curriculum guides, and they have initiated accountability schemes. But in the main, curriculum decisions have been left to authorities of local school districts. This phenomenon probably accounts for the fact that the most commonly used arena for curriculum planning in the United States is the school district. Occasionally, the authorities of a school district assign curriculum decision making to individual schools. However, the quest for similarity, or uniformity, encourages district authorities to retain responsibility for, and control over, the functions. Until recent years writers and planners have given little thought to the nation as an arena for curriculum decision making, but perhaps the situation is in the act of reversing itself today. As the federal government has invested more heavily in schooling and has expanded its services, individuals have proposed the nation as an arena.

It should be kept in mind that the choice of arena for curriculum engineering encompasses planning, implementation, and evaluation. Depending upon organizational and legal circumstances, it may be necessary to have more than one arena for the three fundamental curriculum engineering processes. For example, a problem of implementation ultimately must be solved at the level of the individual school where the actual persons are present who must develop teaching strategies in response to the curriculum regardless of where the curriculum is planned. In France, for example, the curriculum is planned at the national level under the direction of the Minister of Education, but the curriculum is implemented in the individual schools. In this case, the arena for curriculum planning is the nation; whereas, the arena for implementation is the individual school. On the other hand, if a curriculum is planned in an individual school and implemented in that school, the arena for planning and implementation are the same. It is important to note that the arena decision is very much a

prerequisite to other decisions in curriculum engineering. The involvement of people in various types of curriculum decision making and the organization of those people for their various tasks are dependent upon the previous identification of arena.

PERSONNEL INVOLVEMENT

A second group of theoretical issues lies in the selection and involvement of people in the various functions of curriculum engineering, namely, planning, implementation, and evaluation.

Levels of Involvement

Historically at least, four different kinds of persons have been involved in curriculum decision making but mostly in curriculum planning. They are: (1) specialized personnel, (2) representative groups composed of specialized personnel and some classroom teachers, (3) all professional personnel, and (4) all professional personnel plus representative lay citizens. In recent years, a fifth group has been added, namely, the students.

Specialized personnel, in the meaning of the term as used here, refers to at least two groups of people. One consists of persons employed by school districts, or other agencies, specifically to do curriculum work, with the work, in most cases, involving curriculum planning exclusively. These individuals customarily come from the ranks of teachers and supervisors, and they customarily are subject specialists, generalists, or trained curriculum specialists. What makes them specialized personnel is their involvement in curriculum decision-making activities. Schools and school districts have made use of such specialized personnel for many years. The second category, of more recent vintage, consists of persons who are specialized in a discipline and/or who have dominant interest in research in curriculum organization. These people have as their home bases universities or research centers. They rarely work on the total curriculum; instead they concentrate upon the development of a single discipline which may become part of a total curriculum. From time to time, school districts employ them as consultants to help with curriculum development, but they are not in-service curriculum workers in

schools. Involvement of specialized personnel in curriculum work was illustrated in the National Curriculum Projects such as the Biological Sciences Curriculum Study, the School Mathematics Study Group, and Project Social Studies. Projects of this type were conducted through the involvement of scholars from the disciplines normally affiliated with universities assisted by selected teachers from elementary and secondary schools.

The involvement of specialized personnel and representative classroom teachers constitutes an extension of the use of specialized personnel. Such involvement assumes that the combination of specialized personnel and representative teacher groups will improve the effectiveness of curriculum decision making. Presumably, it will be improved because of the recency of experience of the teachers in classrooms and because teachers will be able to exert leadership in implementation when the planning is completed. This level of involvement has been used most extensively in large city school systems; Chicago and Los Angeles are two examples. Such selective involvement capitalizes upon the expertise of specialized personnel; it takes advantage of the classroom teacher's point of view, and it is economically efficient in that only a small amount of released time is demanded.

The total involvement of professional personnel as a choice in curriculum engineering is more complicated than the first two. Total involvement means all classroom teachers, supervisors, special teachers, and administrators in a school or a school district. Advocates of this choice of involvement believe that the persons who make curriculum engineering decisions, who develop and execute instructional strategies, and who appraise the various school operations should participate in all three functions. In other words, if teachers and administrators are to participate in the systems of schooling that in this publication have been called the instructional system and the appraisal system, they should also participate in the curriculum system. In reality the only person who actually can participate in all three systems is the teacher; administrators participate by exerting leadership to maintain and improve the systems. The theorist or practitioner who debates and decides on this involvement should know beforehand the teacher-load problems that it carries in its wake. The conventional impression of the job of the teacher is that his sole responsibility is

to develop instructional strategies and carry them out with his class or classes. One realizes how strong this impression must be when one observes that teachers in elementary and secondary schools spend almost the entire day in a classroom with pupils trying to carry out predetermined instructional strategies. The development of the strategies must occur outside of the ordinary school day. To think of involving teachers additionally in anything as complicated as a curriculum system as it has been described in the preceding pages appears to be impossible. It is impossible unless ways and means for teachers to participate are found, and the principal ingredient in the ways and means is time unencumbered by teaching responsibility for work on curriculum tasks. Consequently, the two big questions about this choice of involvement are whether one believes that classroom teachers should be involved in curriculum engineering and whether one is willing to develop the ways and means for doing so, assuming the answer to the first question is in the affirmative.

Cooperative lay-professional involvement is an extension of the involvement of all professional personnel inasmuch as the latter are included along with representative lay citizens who have concern about the schools. There is much controversy over the inclusion of lay citizens in curriculum engineering, and many diverse interpretations about the proper role of citizens who are. Those opposed to the involvement claim that because curriculum engineering processes are technical, they should be the sole prerogative of professional groups. Advocates of this position, in contrast, make much of the fundamental authority and responsibility of school patron groups, the extension of the partnership concept in public education, and the improved opportunities that it affords to educate more people in educational concerns. Most of the argument is at the level of value judgment for there is little research on the subject, certainly no comparative research.

Much has been said about the involvement of students in curriculum decisions. The argument is based upon the assertion that if the students are to be affected by the curriculum, they have the right to be involved in deciding what that curriculum should be. Few raise the question of the qualifications of students to make curriculum decisions. For example, is a first-grade pupil equipped

to make curriculum decisions for an elementary school? Is a tenth-grade student equipped to make curriculum decisions for a secondary school? It is doubtful in both cases. Yet, one must have great sympathy for the notion that students have had too little involvement in decisions about what they do in schools. I think a distinction needs to be made here between the involvement of students in curriculum planning and the involvement of them in decisions at the level of instruction. Teacher-pupil planning at the level of classroom interaction and decision making has long been advocated. Unfortunately, too little of it has been done. As one result, students can claim that they have been deprived of any real voice in their exposure to schooling. Any posture a curriculum theorist might take on this issue probably depends upon his perception of the scope of curriculum. If he is inclined to think of curriculum strategies and instructional strategies as two related but yet different domains, he will tend to reject the notion of student involvement in curriculum planning. On the other hand, if the theorist is inclined to think of curriculum and instruction as one strategy, he will tend to insist upon student involvement.

Arena and Involvement

It is impossible for anyone to think about the involvement of people in curriculum planning without relating it to the choice, or choices made, or needed to be made, in the arena for curriculum engineering. Any choice of people impinges on the curriculum-engineering arena, and vice versa. Let us take each of the possible arenas and examine the consequences for involvement.

In the case of the national arena, the only possible choice in involvement of people in curriculum planning is that of specialized personnel. It would be possible to include representative teachers, but if the country as a whole were to be represented, a very large group would have to be assembled. To think of total involvement of professional personnel would be ridiculous. However, planning is only one aspect of curriculum engineering. At the level of implementation, all classroom teachers employ the curriculum as a point of departure for their teaching. It would take almost monolithic control at the national level to engineer the

implementation of a nationally planned curriculum in the national arena. The only reasonable alternative, in the case of those desiring to use the national arena for curriculum planning, is to split the curriculum engineering functions among two or more arenas. For example, it would be possible to use the national arena for curriculum planning and the individual school as the arena for implementation. We have only to look to France or Italy as illustrations of this type of split in curriculum engineering. In both of these countries, the arena for curriculum planning is the nation; curriculum planning is the responsibility of the national ministers of education. The responsibility for implementing the curriculum in both countries rests with the individual school. The link between the two arenas is the inspector who is the representative of the Minister of Education; it is his responsibility to insure that teachers do, in fact, implement the national curriculum.[1]

We have no similar situation in the United States. Yet individuals and groups at the national level and at regional levels do engage in curriculum activities of various kinds. For instance, scholars of national repute develop materials within their own disciplines. Contributors to curriculum outcomes also consist of scholarly groups such as the National Council for the Social Studies, the National Council of Teachers of English, the American Educational Research Association, the Association for Supervision and Curriculum Development, or the American Association for the Advancement of Science. These organizations prepare and publish materials that are curricular in nature, but they do not prepare total curriculums to be used in schools. They are not part of a curriculum engineering system. However, both the organizations and contributors to their publications influence decisions of those formally involved in the functions of a curriculum engineering system. Their work products actually are input data for a curriculum system.

Because of the delegation of powers over education to school districts by the state governments in the United States, the state has not been extensively used as an arena for curriculum engineering. State departments of education frequently publish curriculum

[1] For a more complete analysis of this and other references that will be made to curriculum affairs in Europe, see George A. Beauchamp and Kathryn E. Beauchamp, *Comparative Analysis of Curriculum Systems* (2d ed., Wilmette, Ill.: The Kagg Press, 1972).

guides, but these generally are suggestive only rather than mandates for action in local school districts. In recent years, however, efforts have been made to strengthen the role of state departments of education in matters of leadership over affairs of schooling. The best illustration of these efforts is federal aid to education being administered through the state departments of education. It is not possible for anyone to predict at the moment whether the state actually will emerge as a functional arena for curriculum engineering. If it does, the same general pro and con statements applicable to the nation as an arena relatedly apply to the states. And the same problems of arena splitting and selection of personnel to be involved would persist. In a country such as West Germany, where the state plays the major role in curriculum making, the same problems of personnel involvement and arena choice characteristic of national systems are present.[2]

For all practical purposes, the involvement of personnel in large urban school districts poses the same fundamental problems as it does in a state or the national arena. All professional personnel cannot be involved unless very drastic changes are made in present practices. As indicated before, the most frequently used arena for curriculum planning is the school district, and this applies to large urban centers as it does to small school districts. In the smaller school districts, however, it is possible to totally involve the professional personnel in curriculum planning, and it is also possible to additionally use representative lay citizens. Again, theorists and practitioners have the option of splitting the arena for curriculum engineering by assigning curriculum planning functions to the district arena and the implementation functions to the individual school. Whatever the choice of arena, or arenas, the full range of choices for involvement are available for consideration at the school district level.

The interesting thing about the individual school as the arena for curriculum engineering is that it immediately provides an arena in which all of the curriculum engineering functions may be performed readily. This is particularly true since involvement of teachers in curriculum planning may be followed immediately by involving the same persons in the tasks of curriculum

[2] *Ibid.*, pp. 107-125.

implementation. The same persons also remain on the scene to participate in appraisal of the curriculum planning and implementation efforts. An attractive feature of the situation is that the individuals who develop the curriculum strategies are the same ones who develop and carry out the instructional strategies.

An almost immediate reaction from people who seek uniformity among curriculum practices in either the district arena or a larger social-geographic arena is that equal opportunity is denied pupils in schools where curriculum efforts are not "as good" as in others. Caswell, a number of years ago, made the following rejoinder to this argument:

> In brief, the "grass-roots" approach which views the individual school as the operational and planning unit does not mean that each school in a system should go its own way without regard for the others. It means, rather, that problems which are dealt with on a system-wide or partial-system basis should arise out of work done by individual school staffs and feed back into use through these staffs. The channel is from the individual school to the system and back to the individual school rather than from the top down, as under the traditional system-wide approach.[3]

Caswell's statement leads us to propose the ensuing principle: No arena should be completely autonomous in making decisions about curriculum affairs. For example, the individual school cannot be considered as having complete autonomy over its various functions; therefore, curriculum decisions made by higher authority for all schools under the jurisdiction of that authority must be accepted by the individual school unit. If a given state wishes to impose curriculum decisions on all schools and school districts within its borders, it may do so, and all are obliged to abide by those decisions. Nevertheless, the arena for incorporating all of these kinds of decisions into the functional curriculums of the schools remains with the individual school. A similar case could be made for the district as the arena choice. Similarly, the work of scholars in the disciplines and organized scholarly groups may be conceived as influences upon the decisions made in any arena, but the decisions are made only in the operational arena itself.

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[3]Hollis L. Caswell, *et al.*, *Curriculum Improvement in Public School Systems* (New York: Bureau of Publications, Teachers College, Columbia University, 1950), p. 78.

CURRICULUM PLANNING

The key function of curriculum engineering is planning. Volumes have been written on the subject of curriculum planning primarily from the point of view of practices in school environments. For the most part, they render advice to those who would become involved in the planning processes. On the other hand those who have addressed themselves to the subject of curriculum theory have not addressed themselves to any significant degree to the theoretical options present within the processes of curriculum planning. In this section, I will cite some exemplars of statements that have been made by curriculum theorists that have bearing upon the subject of curriculum planning. Those exemplars will be followed by a discussion of the theoretical arguments germane to curriculum planning.

Exemplar Statements

Probably the most frequently quoted curriculum rationale was that published by Ralph Tyler in 1950. Tyler proposed as his curriculum rationale four basic questions:

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?[4]

The Tyler rationale has been criticized by Kliebard.[5] The details of Kliebard's criticism need not be cited here for they should be read in complete form. Two points do need to be mentioned here, however, for they will have bearing on subsequent discussion. One is the use of the word *experiences* in establishing a rationale for curriculum planning or for purposes of describing curriculum content. As was indicated in Chapter 6, only an individual has an experience, and it is almost impossible for teachers or anyone else to select those experiences. The other point is that although the Tyler rationale does indicate some global movements essential to

[4]Ralph W. Tyler, *Basic Principles of Curriculum and Instruction* (Chicago: The University of Chicago Press, 1950) pp. 1-2.

[5]Herbert M. Kliebard, "The Tyler Rationale," *The School Review*, 68:259-272, February, 1970.

curriculum planning, the details of the involvement of people, the arena of decision, and the work procedures are not clarified.

In the development of their rationale for curriculum, Goodlad and Richter identified three levels of curriculum decision making: (1) the societal level, (2) the institutional level, and (3) the instructional level.[6] Presumably, dimensions of curriculum planning take place at all three of these levels. From their discussion, it is not completely clear as to what individuals are to participate at all three of these levels. At the societal level, Goodlad and Richter identify what they call man's funded knowledge and man's conventional wisdom as available for selection as potential curriculum content. The total value system of our society would similarly be available. At the institutional level, the authors indicate that the board of education has predominant control over curriculum decisions. Again, it is not made clear as to how the decisions are made by the board of education, or any other group, at the institutional level. Furthermore, they give virtually no discussion about the transfer from the societal level to the institutional level. It is very clear at the instructional level that teachers are involved in the decision making. By inference, teachers in curriculum decision making at the instructional level would take many of their cues from whatever decision making was made at the institutional level. Exactly when a product appears that is to be called a curriculum is not made clear by Goodlad and Richter, but it is clear that the final step is at the instructional level. It is interesting to note here that it is possible that Goodlad and Richter have conceived of groups of individuals involved in curriculum decision making who have no direct contact with one another. It is also clear that instructional planning, in their judgment, is a part of the total curriculum process. The techniques of curriculum planning were omitted. Presumably, they were not considered important for fulfilling the authors' avowed purpose to set forth a curriculum rationale.

Taba recognized and described most of the generally accepted procedures for curriculum development, namely, the process of determining objectives, selecting content expected to facilitate the

[6]John I. Goodlad and Maurice N. Richter, Jr., *The Development of a Conceptual System for Dealing with Problems of Curriculum and Instruction* (Los Angeles: Institute for Development of Educational Activities, University of California, 1966).

achievement of goals, and the development of an evaluation procedure. She did, however, reverse the more or less commonly accepted procedure by suggesting that instead of developing a general plan for the school program as an initial step, it would be more profitable to start with the planning of teaching-learning units. In such a scheme, units would provide a basis for the general design.[7] The steps that she proposed for development of a teaching-learning unit were: diagnosing needs, formulating specific objectives, selecting content, organizing content, selecting and organizing learning experiences, evaluating and checking for balance and sequence.[8] The procedures suggested by Taba seems to reverse the order of the two systems of schooling, curriculum and instruction. In other words, the curriculum would emerge from the instructional strategies. In their model of the process of curriculum planning, Saylor and Alexander included curriculum determinants which guide curriculum planners who make curriculum decisions which result in curriculum planning at several levels: the nation, the state, the school system, the school, the teaching group, and the individual teacher.[9] Purportedly, decisions made at each step affect subsequent decisions as the decision-making functions shift from state to individual teacher, with national efforts having influence along the line.

Theoretical Issues

The foregoing examples of statements about curriculum planning and decision making are illustrative of different choices made by their authors with respect to the dimensions of curriculum planning. For example, they illustrate vividly the problems associated with the selection of an arena for curriculum planning and the involvement of people in the planning process. Raising the question about what the arena shall be for curriculum planning specifically points us toward a time from which there must emerge a product to be called a curriculum. The fact that authors indicate that curriculum planning is done at various levels such as the

[7] Hilda Taba, *Curriculum Development: Theory and Practice* (New York: Harcourt, Brace and World, Inc., 1962), pp. 441-442.

[8] *Ibid.*, pp. 347-379.

[9] J. Galen Saylor and William M. Alexander, *Planning Curriculum for Schools* (New York: Holt, Rinehart and Winston, Inc., 1974), p. 52.

societal level, the institutional level, the classroom level, the state level, the school level, or the teacher level, to cite examples, indicates that the authors simply do not expect anything resembling a curriculum to emerge from any one of those levels. If we are going to talk about curriculum planning, it would seem reasonable that a primary decision that must be made is the arena level from which it is expected that a curriculum will emerge. The dilemma that is posed by arguments suggesting that curriculum decisions are made at several levels perhaps may be resolved by deciding at which point decisions about what to teach in schools are transmitted to those who must make decisions about how to teach the results of the first decision. In that case, any decisions affecting the curriculum that would appear at a previous or a higher level of decision making would be considered as inputs to the process of curriculum planning. It seems ridiculous to assume that we can have a national curriculum, a state curriculum, a school curriculum, a classroom curriculum, or an individual curriculum, all at the same time. If we had all of these curricula, it would be extremely difficult to differentiate which of them was to be implemented in the classrooms.

Organization of people to carry out curriculum planning procedures is dependent upon both the arena chosen for doing the curriculum planning and the kind and number of people involved in the planning activity. The problems and choices available to the theorist are not extensive when specialists are involved in curriculum planning, because specialists tend to be very few in number. Furthermore, they tend to work as a whole, devising their own unique ways of working together. Organization for curriculum planning becomes critical, however, when large and diversified numbers of people are involved. The complexities thus created constitute the theme of the following paragraphs.

One of the choices in organizing personnel to engage in curriculum planning was associated in the previous discussion with large urban centers or cities. This choice is a central office staff of curriculum specialists who have the principal responsibility for action and leadership in curriculum planning. To this group may be added representatives of the classroom teacher group, administrators, outside consultants, and/or representative lay citizens. The most common practice is for cities or large districts to

organize the individuals involved into subject committees to prepare curriculum guides for the assigned subjects. Each committee tends to work independently, with the result that the total curriculum is an accumulation of separate-subject pamphlets. A schedule for revision of the guides is usually established so that they are revised every three, four, or five years. Committees are disbanded when the planning task is completed, and new ones created at the time of the next revision. Havighurst reported on a system of this type for the city of Chicago.[10]

In the small school district or the individual school arena, more possibilities for organizational schemes are apparent. In these arenas, it is feasible for curriculum engineers to involve all professional personnel and selected representative lay citizens if desired. The rule that must apply in this kind of circumstance is to create organization that will serve best the functions that have to be performed. It is common practice for curriculum planning groups to be headed by a curriculum council or a steering committee. Under such an arrangement, the council has the authority to organize groups and to reconstitute them as experience demands change.

Beauchamp reported studies of the effects of curriculum engineering in an elementary school district in Blue Island, Illinois.[11] For curriculum planning purposes, all teachers were organized into vertical and horizontal committees. The vertical committees were composed of teachers representing all grades, and each committee was assigned to a particular school subject. Horizontal committees were grade level committees. Their responsibility was to study the problems of horizontal articulation among subjects. The vertical and horizontal planning committees were headed by a curriculum council. The curriculum council consisted of the chairman of the vertical and horizontal committees. In this system, the curriculum is subject to revision each school year. It is an interesting example of curriculum planning being done on a school district level in a relatively small district.

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[10]Robert J. Havighurst, *The Public Schools of Chicago* (Chicago: The Board of Education of the City of Chicago, 1964), pp. 98-117.

[11]Mimeographed papers presented at annual meetings of the American Educational Research Association in 1972, 1973, and 1974.

It is extremely difficult to identify the use of the individual school arena as a base for curriculum planning in the United States. This would not be true in England, for example, where virtually all curriculum decisions are made at the individual school level even though other organizations may exist that would have some effect upon the decisions made at the individual school level.

The two major functions served by organization are to insure representation of all essential groups and to facilitate the tasks to be done. When the arena is the school district, all schools and all divisions in those schools may be represented on work committees or groups. Total involvement does not mean that all persons have to be involved in all specific tasks, but the organization must be such that all feel that they have been involved either through their own participation or through the participation of colleagues in whom they have faith to carry their share of the burden. No halo surrounds any particular organizing scheme because in tasks as complicated as those involved in curriculum planning no single scheme is consistently appropriate. Diverse curriculum groups and committees may be formed, including, for instance, study groups, discussion groups, consultant groups, leadership groups, subject committees, departmental committees, grade-level committees, system-wide committees, school committees, special committees, editing committees, coordinating committees, and so forth. Such groups and committees are constituted, disbanded, or reconstituted depending upon need.

From the point of view of theory building with respect to curriculum planning, organization is dependent to a large extent on the arena chosen for conducting the planning and the degree of involvement of people within the arena. Choices among the options must be consistent in order to adequately explain the necessary series of events. For example, to begin with the state as a chosen area for curriculum planning and to opt for total teacher involvement in the planning would be to create a situation in which organization and assignment of tasks would be impossible. On the other hand, to use a small district as the arena and to opt for total teacher involvement in the planning would be to create a situation in which organization and assignment of tasks would be highly feasible.

Procedures or techniques in curriculum planning are specifically related to the tasks involved. Most of the procedures in curriculum planning are relatively simple. They involve such processes as group discussion, study of relevant information, and writing. These procedures will vary somewhat according to the tasks involved. The principal tasks in curriculum planning vary according to whether the planning group is undertaking curriculum planning for the first time or whether the planning process is part of an ongoing curriculum engineering scheme. The basic tasks, however, are: to seek and receive information, to filter and organize the information, to create ideas for curriculum change, to select a curriculum design, to write the curriculum, to check for vertical and horizontal articulation, and to submit the curriculum to the appropriate authority for acceptance and approval. Some discussion of each of these is warranted.

It has often been said that teachers are not qualified or capable of participating in curriculum planning, and in many cases, teachers have expressed a similar feeling of inadequacy. Quips have been made that teacher involvement in curriculum planning is essentially a process of pooling of ignorance. Yet those very same teachers are expected to have the necessary insight to take a curriculum planned by someone else and implement it intelligently in their classrooms. One answer to this dilemma is to treat curriculum planning within a school district as a regular part of the in-service education of teachers by involving them in receiving and seeking out information so they can do a better job of the curriculum planning. In Figure 11, there were listed examples of input data for the curriculum system in a school. It is exactly this input information that curriculum planning groups need to receive as background data for making curriculum decisions.

An important subsequent task is to filter and organize the input information in such a way that it becomes useful to the planners. This is not a trite step and it is one that is frequently overlooked. For example, a consultant may be used for such purposes as suggesting new social studies content for the curriculum. If the receiving, or planning, group does nothing other than listen to those ideas as presented by a consultant, the planning group probably will not be greatly affected by the use of the consultant. If the members of a planning group receive

information by listening to a consultant, by reading, or by input from one another, they then should have the opportunity to discuss the character of the input information and to weigh the consequences of proferred suggestions for them. This is a task that should not be short circuited in terms of the amount of time spent on it. The combination of the receipt of information and the organization of that information for use is probably one of the most important steps of curriculum planning. One may think of the tasks of seeking and receiving information and the filtering and organizing of the information as composing the study phase of curriculum planning. Logically, the next task in curriculum planning would be to select a curriculum design. If a curriculum is already in existence, the planning group may be prone to maintain the same design. On the other hand, the ideas that had been created for inclusion as a result of the study phase may indicate a needed change in the existing design. The options with respect to curriculum design are relatively few. Most of them were described in the previous chapter focused upon the subject of curriculum design. We still find that the subject-centered organization of culture content in curriculums predominates. There are attempts at more integrated organization. Occasionally, a combination of those two may be indicated. Planners should keep in mind that one purpose of curriculum planning is to render advice to teachers as they proceed in the development of instructional strategies. If the curriculum cannot be used for this purpose, we should raise grave doubts about the need for creating one in the first place. The model of the processes of curriculum planning, followed by the processes of instructional planning, followed by the processes of teaching and learning, followed by evaluation in order to acquire information about how to improve various elements of that cycle the next time around are very important.

When the design has been selected, the planning group or groups may then proceed to write the curriculum. The procedures for doing so may depend greatly upon the organization. Where committees have been used for purposes of receiving and analyzing information and for creating new ideas for curriculum change, those same committees may be used as writing groups at this step. On the other hand, special writing committees may have to be created because of the complexity of committee organization.

In any case, whatever is written needs to be approved by all participants in the planning process. The processes of creating ideas for curriculum change, selecting a curriculum design, and writing the curriculum may be spoken of as the creating phase of curriculum planning.

Once the curriculum has been written it needs to be very carefully checked for vertical and horizontal articulation of goals and culture content. It would include articulation between subjects if the culture content is so organized. It would include a search for opportunities to integrate various components of culture content for purposes of efficiency and learning on the part of the students. And it would involve any reworking or rewriting of the curriculum based upon the checking procedure. It should be kept in mind that change in curriculum may be instituted at any level or in any program within the curriculum so long as the planners recognize that a change in one place may have an effect on other places in the curriculum. This is the real reason for including an opportunity for checking for vertical and horizontal articulation within the total curriculum planning process.

Once the curriculum has been written and properly checked, it then needs to be submitted for approval and acceptance to whatever authority constituted the planning groups in the first place. Where special project groups may have been involved in curriculum planning, they are normally allowed the privilege of acceptance and approval by themselves, with the possible exception of the approval of some sponsoring group such as a supporting foundation. In the vast majority of cases in public schools, the curriculum is essential policy of the board of education. Hence, the board of education becomes the agency to approve and accept as their policy a new curriculum or any curriculum previously approved that has been modified. The acts of checking for vertical and horizontal articulation and for acceptance and approval may be spoken of as the checking phase of curriculum planning.

The foregoing tasks and procedures incorporate most of the tasks and functions proposed by curriculum authorities as well as those that have been used in projects reported by school systems. Variations will reflect unique ways of working within whatever frameworks groups have discovered to be effective for them. Most

groups who undertake a curriculum planning project need to search for and to develop their own unique ways of working together to achieve their mutually accepted goals. Unquestionably, it is difficult for anyone to transplant specific procedures from persons and curriculum situations detached in time and place. Yet the basic tasks remain the same.

Other than involvement of people, there are no great theoretical issues regarding curriculum planning. In other words, who shall do curriculum planning is more controversial than how they shall do it. What is needed is empirical research on task and method variables in curriculum planning to set the stage for concrete theoretical issues to be created.

CURRICULUM IMPLEMENTATION

Curriculum implementation means putting the curriculum to work. The two most justifiable reasons for a curriculum are as a point of departure for teaching and as an initial system for predicting outcomes. Curriculum implementation, in effect, consists of the processes necessary to accomplish these two purposes.

The first task in curriculum implementation is to arrange the school environment in such a way that the curriculum is used by teachers as a point of departure for their teaching. As indicated in Figure 10 at the beginning of this chapter, implementation takes place during the spacetime representing the merger of the curriculum system with the instructional system. At this point, the curriculum becomes a working tool for teachers as they develop their instructional strategies. This is the point where the message of the curriculum planner is communicated to and interpreted by the teacher for a specific group, or for groups, of pupils. For a school to accomplish these ends, an agreed upon course of action needs to be determined and accepted by those who are to implement the curriculum. Assessment of changes in pupil behavior cannot be made until instruction takes place, but the planning of instructional strategy is an extension of the planned curriculum strategy. Both strategies seek outcomes which can only be brought to light subsequent to the teaching-learning activities.

Our history of curriculum implementation is weak. Many curriculums have been planned, but few have been systematically implemented. We are all familiar with the circumstances in which the curriculum, once it is produced, collects dust on a shelf or is filed in the bottom right-hand drawer of the teacher's desk. In the meantime, the teacher reverts to the same pattern of teaching that he used prior to the planning of the curriculum. Curriculum planning under these circumstances is a tremendous waste of human effort except for the concomitant educational gains for the planners.

A necessary prerequisite for curriculum implementation is the commitment by teachers to use the curriculum as a point of departure for development of instructional strategies. The strength of the commitment may be enhanced by an implementation directive being part of the curriculum, teacher participation in the curriculum planning, and administrative leadership. This is why the proposal was made in Chapter 6 that one section of a curriculum should be a clear statement of the use to be made of it. The statement may register the commitment and provide suggested procedures for implementation. We have had little experience with similar modes of recording in the United States, so specific illustrations are difficult to find. The schools of Italy, however, offer a very concrete illustration. In the new Italian middle school, a very systematic procedure is used. The curriculum for the middle school is established by Parliament and the Minister of Public Instruction; all middle schools have the same curriculum. The curriculum is not an elaborate document, but it is clear as to what subjects are to be taught, the general range of each subject for each class, and the amount of time per week to be devoted to each subject. But along with the curriculum are instructions for implementation and adaptation. Each teacher is required to adapt the curriculum to his particular group of pupils, and furthermore, is required to demonstrate that he has done so. An elaborate system of forms and registers is provided for these purposes, and inspectors review these documents to determine if the curriculum has been followed and if the implementation procedures have been executed.[12] The implementation

[12]See Beauchamp and Beauchamp, *op. cit.*, Chapter IV.

procedures used in Italy would not mesh well with most practices in the United States, but they do illustrate how a planned curriculum may include provisions for implementation.

Curriculum implementation is facilitated if teachers who are to use the curriculum participate in its planning. Involvement, in effect, leads to follow through. This outcome was attested to by Johansen when he concluded that both individual teacher participation in curriculum planning activities and perception by teachers that they were influential in curriculum decision making increased the likelihood of curriculum implementation.[13] Duet used the same inventories that Johansen used and came to similar conclusions.[14] His results showed a significant relationship between teacher participation on curriculum committees and their implementation practices. In a study of teacher attitudes, Langenbach found a significant difference in attitude of teachers toward curriculum use and planning between those who had participated in curriculum planning and those who had not.[15] Somewhat similar conclusions were reached by Heusner[16] and Nault,[17] but they cautioned against assuming that participation in curriculum planning alone would insure implementation. Other conditions are needed to support implementation efforts. For example, Poll noted a significant relationship between teacher use of curriculums and the help they received in that use.[18] Like Johansen, Kardas found a significant relationship between implementation practices of teachers and their satisfaction with teaching as a profession.[19]

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[13]Johansen, John H., "An Investigation of the Relationships between Teachers' Perceptions of Authoritative Influences in Local Curriculum Decision-Making and Curriculum Implementation" (Doctoral dissertation, Northwestern University, Evanston, Illinois, 1965).

[14]Claude Paul Duet, Jr., "The Relationship of Teacher Participation on Curriculum Committees to Implementation of Curriculum Guides and Materials" (Doctoral dissertation, University of Georgia, 1972).

[15]Michael Langenbach, "The Development of an Instrument to Measure Teachers' Attitudes toward Curriculum Use and Planning" (Doctoral dissertation, Northwestern University, Evanston, Illinois, 1969).

[16]Henry C. Heusner, "A Study of the Utilization of Curriculum Guides as Related to Selection Factors in their Planning and Construction" (Doctoral dissertation, Wayne State University, Detroit, Michigan, 1963).

[17]William H. Nault, "Can Curriculum Guides be Effective?" *Educational Leadership*, 12:410-424, April, 1965.

[18]Diana Poll, "A Study of Selected Factors Related to the Implementation of Centrally Prepared Curriculum Guides" (Doctoral dissertation, Northwestern University, Evanston, Illinois, 1970).

[19]Barbara J. Kardas, "Characteristics of Teacher Participation in Curriculum Planning Activities and Reported Acts of Curriculum Implementation" (Doctoral dissertation, Northwestern University, Evanston, Illinois, 1969).

Since the principle of teacher involvement seems so self-evident, the question arises as to why teachers are not routinely required to participate in curriculum planning in most schools. The reasons offered by opponents of the principle generally carry considerable weight. One is that most teachers are not qualified to make curriculum decisions; that high caliber specialists in the various disciplines alone can do the job properly. Another is that teachers do not have time to devote to the time-consuming tasks of curriculum planning and development because their full work days are consumed with the execution of instructional strategies, and they should not be concerned with planning the curriculum. What is needed is more carefully designed research to provide valid and reliable data, such as that cited previously by Johansen and others, leading to generalizations that will permit choices about involvement as it affects both the outcomes of planning and the processes of implementation.

The degree to which teachers lack commitment to the curriculum that has been planned constitutes a potential barrier to curriculum implementation. Teachers may feel that the curriculum is inappropriate for their students, or they may claim that the curriculum is too rigid, or they may claim that materials of instruction, including textbooks, are not available to implement the curriculum properly. For such reasons, teachers are prone to fear the imposition of a curriculum as a point of departure for developing their teaching strategies. Peculiarly enough, the same fear has not been associated with the adopted textbooks even though they may be just as restrictive as any planned curriculum. The challenge here is for curriculum planners to create designs that are not rigid and to institute realistic implementation procedures.

Ability grouping practices in schools point to the question of need for separate curriculums for groups which differ on one or many dimensions. It was reported in the Havighurst survey of the Chicago public schools that many teachers claimed that the planned curriculum was not appropriate for pupils in their classes and schools.[20] In this connection, Larson did a carefully controlled study of acts of implementation by both inner-city and outer-city

[20] *Op. cit.*

primary teachers in an urban school district wherein a commonly prescribed curriculum was used. Among the factors observed were the number of omissions and the number of additions made to the prescribed curriculum by teachers in both types of schools. Larson concluded that inner-city teachers tend to make more omissions than outer-city teachers, that outer-city teachers tend to make more additions than inner-city teachers, and that inner-city teachers tend to give less overall coverage to the curriculum than do outer-city teachers.[21] In attempts to solve this problem of pupil differences, a number of school systems are planning curriculums for two or three pupil groups, such as a normal group, an upper ability group, and a low ability disadvantaged group. Is the need for multiple curriculums lessened if the curriculum planning arena is the individual school? Is the need increased if a larger arena than the individual school is used for curriculum planning? What effect does involvement of teachers in curriculum planning have upon the problem? Little hard-nosed research is available to provide answers to the above questions. At present they are being answered subjectively by those responsible for making curriculum decisions, and we cannot fault this practice in most situations. A well-organized system for curriculum engineering, however, would make the answers more valid.

A consideration that is omitted too frequently from a discussion of the problems of curriculum implementation is the role of administrative personnel. The prognosis for successful implementation of a curriculum is weak when administrators are indifferent to its importance. Conversely, the prognosis is strong when administrators share with teachers the importance of the curriculum being implemented systematically. Implementation is facilitated when administrative personnel accept the roles of chief engineers of the system and act accordingly.

Ultimately, the teacher is the person who must implement a curriculum, but collectively teachers will not implement the curriculum solely on their own initiative. The exercise of leadership is critical for a systematic implementation of any curriculum. In the United States the school principal is the most

[21] Richard G. Larson, "The Implementation of an Urban School Curriculum by Inner-city and Outer-city Primary Teachers: A Comparative Study of Deviations from Prescribed Curricula" (Doctoral dissertation, Northwestern University, Evanston, Illinois, 1968).

likely person to be charged with the leadership responsibility. In her previously cited study, Conran observed a strong relationship between a principal's leadership effectiveness and the perceptions of his teachers of their performance in a curriculum system. Similarly, a strong relationship was noted between a principal's leadership and his students' achievement in the various subject areas.

The principal, or anyone else charged with the leadership, is greatly assisted if there is provision in the curriculum itself for the curriculum implementation process. This need not be lengthy, but it should contain the generally accepted directions people are to follow with respect to implementation. Functionally, the processes of implementation set the stage for any subsequent efforts to improve instruction. Basically the implementation process is one of making a transition between the curriculum plan and the teaching plan.

There are few, if any, theoretical issues with regard to curriculum implementation. The processes of curriculum implementation are not materially affected by curriculum design. That is, it makes little difference whether a curriculum contains simply statements of goals and culture content selected to achieve those goals or whether those are also accompanied with entries having to do with instructional matters. In either case, the curriculum must be implemented. Any curriculum must be implemented, else we have justification for raising questions as to why it should have been planned in the first place. One might argue about the leadership responsibility because that may vary from system to system. In national systems such as France and Italy, for instance, the Minister of Education's inspectors are responsible for the implementation effort. For the most part in the United States, school principals are responsible. There also may be the special case of specially appointed supervisory personnel being delegated that responsibility.

CURRICULUM EVALUATION

Although curriculum evaluation is rightfully a part of the total appraisal system of schooling, the execution of the evaluative aspects of curriculum functionally must be part of the curriculum

system and therefore subject to curriculum engineering. There are at least four dimensions of curriculum evaluation: (1) evaluation of teacher use of curriculum, (2) evaluation of the design, (3) evaluation of pupil outcomes, and (4) evaluation of the curriculum system. Experience with these four dimensions is very limited; therefore, most of what can be said about them has to be logically inferred.

Evaluation of teacher use is logically a first step in curriculum evaluation, and it is a step that is almost universally overlooked in curriculum evaluation. The most simple data on teacher use are observations of the number of teachers who actually use the curriculum as a point of departure for developing their teaching strategies. When teachers do not use the curriculum from which to develop their teaching strategies, curriculum evaluation stops at that point. Any evaluation done under these circumstances cannot be termed curriculum evaluation. Among the more plausible reasons for non-use are that teachers are unable or unwilling to develop supporting teaching strategies; teachers do not feel that they can or should depart from an adopted textbook; or they feel that the curriculum is not an adequate one. Conversely, evidence showing use of the curriculum as a point of departure by all teachers for developing teaching strategies constitutes convincing evidence about the dynamic quality of the curriculum. Quality of the use made is another matter. Possible indications of this are the additions, omissions, and adaptations effected to meet the differing needs of learners. Another consists of the kind of feedback for replanning groups furnished by teachers because of their experiences with the curriculum. Another, but a very difficult one to measure in any sense, is the enthusiasm of teachers for participating in the curriculum system to the extent of making systematic use of the curriculum for developing instructional plans.

Evaluation of curriculum design is very difficult because of absence of criteria for doing so. Different designs are not available to be compared and matched against common criteria. To be sure, the success of teachers in the use of a curriculum, as described in the previous paragraph, would have evaluative implications for the adequacy of the design. So would the success of the predictions inherent in the curriculum for pupil learning outcomes. Other

criteria specifically related to design questions should direct the major aspects of the evaluation of curriculum design, but those criteria have yet to be formulated.

Although we have not learned much about how to compare curriculum design A with curriculum design B with adequate research controls, we can evaluate individual parts of a design. Goals and/or objectives are an example. When more general goals are stated in a curriculum, Grotelueschen and Gooler would argue for the establishment of priorities for goals as part of the curriculum evaluation.[22] Certainly the Delphi Technique, or some modification of it, should be helpful in this task. If a curriculum contains specific behavioral objectives, their clarity is an important criterion for evaluation, but the real test of behavioral objectives is as predictors of student learning. In fact, the greatest justification for specific behavioral objectives in preference for the more general goals statements may be that the predictive leap to measurement of learnings is easier to make. Another evaluation focus point is the relationship between goals and the culture content selected as means for achieving those goals. Curriculum students repeatedly report lack of clear relationships between goals and culture content in curriculum materials they have reviewed. If such observations are at all accurate, more careful evaluation of the relationship is needed during the curriculum planning process. Similarly, logical criteria may be used to make judgments about the culture content. Relevance is one. Psychological fit to the learners is another. Balance between substantive and syntactical content is a third. Many more could be added to these; thus, even though we have had little or no experience in evaluating curriculum design, we can begin with parts and work toward the whole.

Of the four approaches to curriculum evaluation, assessment of the curriculum as an instrument to predict pupil outcomes is the most difficult to attain. The reason is that the many variables of the entire instructional system of schooling intervene (necessarily so, of course) between the time of curriculum planning and the observance of pupil learnings. At the level of appraising student learnings, we should discriminate between intended learnings and learnings acquired outside the realms of curriculum and

[22] Arden D. Grotelueschen and Dennis D. Gooler, "Evaluation in Curriculum Development" *Curriculum Theory Network*, 8/9:7-21, 1971/72.

instruction. If the curriculum is a basic plan with intended goals and culture content selected that is expected to produce those goals, and if instructional planning has expanded them into specific objectives, those goals should be the bases for appraisal of the deliberate efforts of the school. The school may take credit for such learnings. On the other hand, school pupils have many learning opportunities both in and out of school that contribute to their total learning growth, but those learnings are not the product of deliberate thinking by curriculum planners and instructional strategists. This distinction is not to denigrate those learnings acquired outside the deliberate framework. They may be as worthwhile as the learnings deliberately fostered, and they may considerably affect the learnings fostered through instruction. Certainly, all learnings contribute to the total behavior of the individual, and the school should be as aware of the total mass as appraisal techniques will permit. Unless both categories are taken into account, the school has little basis for being credited with the production of pupil learning. This also helps to make the idea of measures of achievement as a sole criterion for judging the effectiveness of schools, or a curriculum, very faulty.

Every aspect of the curriculum system must be brought under the microscope of evaluation, or the system deteriorates from lack of vitality. Feedback from the evaluation of the system must be available to rejuvenate the system's parts. The choice of arena, the choices made for involvement, organization of people for work, work procedures, and roles played by leadership personnel are all subjects to be appraised for strengths and weaknesses. These are the functions that make a curriculum system work. The feedback from evaluation of them helps to improve the system and to provide for continuity and growth from year to year.

A full range of techniques of measurement and appraisal is called for in curriculum evaluation. However, not all evidence produced by curriculum evaluation will be in quantitative form. Substantial evidence will be the subjective opinions of teachers which are rival in any scheme of curriculum evaluation. The number and kind of recommendations for change is useful information for making judgments about the system. Our experience with curriculum evaluation is meager, and there is great need for curriculum workers to begin collecting all kinds of

evidence to judge the worth of planned curriculums and curriculum systems.

SUMMARY AND A POINT OF VIEW

Summary

A curriculum system is a system for decision making and action with respect to curriculum functions. A curriculum system has three primary functions: (1) to produce a curriculum, (2) to implement a curriculum, and (3) to appraise the effectiveness of a curriculum and a curriculum system. Curriculum engineering consists of all the processes and activities necessary to maintain and improve a curriculum system including leadership by such chief engineers as the superintendent, the principal, and the curriculum director.

In this chapter, the term schooling has been employed to cover those activities essential in the purposeful maintenance and operation of schools. Three of the more important systems of schooling were identified as the curriculum, the instructional, and the evaluation systems. Our major concern is with the curriculum system. However, the interrelationships among the various systems serve to explain curriculum theory.

The language of systems analysis is applicable for describing a curriculum system. Input data for a curriculum system are derived primarily from educational foundations and past experience in curriculum affairs. The primary functions to be served by the content and processes of the system are to get a curriculum planned, to get it implemented through an instructional system, and to get it modified as a result of evaluative feedback. The most tangible and the most important output of a curriculum system is a curriculum.

It is in the engineering of the various activities of the curriculum system that the most apparent theoretical issues emerge. The choice of arena for curriculum engineering from the nation, the state, the district, or the school is fundamental. Curriculum engineering can function in any one or in any combination of these arenas. It is possible to divide the total arena for curriculum engineering into two parts depending upon

function. For example, one arena may be used for curriculum planning, and another may be used for curriculum implementation. When the arena is thus split, curriculum evaluation may take place in either of the arenas or in both.

Exactly who is to be involved in curriculum decision making constitutes an important consideration of curriculum engineering. The most obvious choices are specialized personnel, representative specialists and teachers, all professional personnel, and all professional personnel plus representative lay citizens. There is very close relationship between choice of arena and choice of people to be involved.

Two basic considerations dictate organization and procedures for curriculum planning. One is the size of the group to be involved in the planning, and the other is the number of tasks or steps that are to be undertaken. The complexity of organization increases as groups become larger. Curriculum planning by large groups is too complex for there to be permanent task groups, with the possible exception of the curriculum council or the steering committee. Procedures tend to dictate organization, and, in turn, tasks tend to dictate many procedures.

Curriculum implementation consists of the processes necessary to get the curriculum used as a point of departure for developing teaching strategies. Regardless of choices made concerning arena or involvement for planning, the classroom teacher is the only person who can do the implementing. Consequently, teacher commitment to do so is fundamental to success in implementation. In this connection, teacher participation in curriculum planning is one of the most successful devices for eliciting the commitment. Barriers to implementation include lack of commitment, feelings by teachers that a curriculum is inappropriate for pupils, and lack of leadership by administrative personnel.

Curriculum evaluation involves evaluating teacher use of the curriculum, the design, pupil outcome predictions, and the curriculum system. Limited experience in this area points up the drastic need for case studies and research that will lead to suggested procedures and theoretical generalizations.

A Point of View

Again, I shall use my own position to illustrate how a theorist might select from the issues that have been summarized above so as to establish a consistent position with respect to curriculum engineering. As background for this position on curriculum engineering, several things need to be kept in mind. In the first place, I choose to use the word curriculum only in three ways: (1) to refer to a curriculum, (2) to refer to a curriculum system, or (3) to refer to curriculum as a field of study. Curriculum engineering is product-oriented in that the principal concern in curriculum engineering is the planning of the curriculum, its implementation, and its evaluation. I consider a curriculum as a plan for a school or a class of school such as an elementary school, a junior high school, or a senior high school. Optimally, a curriculum will contain at least four parts: (1) a statement describing how the curriculum is intended to be used, (2) a set of goal statements, (3) a body of culture content selected as means for achieving the previously stated goals, and (4) an evaluation scheme that sets the stage for continuous curriculum revision. With this background we can discuss my position with respect to the dimensions of curriculum engineering.

The first dimension is that of the arena within which curriculum functions are to take place. Among the choices available, I would select the individual school as the most desirable arena for both curriculum planning and implementation. The individual school is a group of professionals under the leadership of a prinicpal. These people are in a face-to-face relationship each day. This set of circumstances provides optimal conditions for developing consistent points of view for such functions as curriculum planning and implementation. The individual school is the place where curriculum implementation must ultimately take place regardless of where it is planned. There currently is sufficient research evidence to lead us to the generalization that for maximum curriculum implementation the curriculum should be planned by those who are to implement it. The choice of the individual school as an arena does not eliminate from consideration or influence any of the other arenas. The district or the state may lay down controls or minimum standards for what

individual schools may do with respect to curriculum planning, but the actual planning is done in the individual school. All information or requirements from other sources are then treated as input data for the curriculum planning process in the individual school.

With respect to involvement, I would insist that all professional personnel, that is teachers, supervisors, principals, should be involved in the curriculum planning along with representative lay citizens from the area of jurisdiction of the school. The presence of representative lay citizens would maintain a flow of communication between the school and its encompassing community. The Board of Education would remain as the policy-making authority for all schools. As a result, any curriculum that has been planned must be approved as policy by the Board of Education before it may be implemented in any school.

Since there are two major functions to be achieved by the curriculum engineering system, procedures and organizations should be related to those two functions. One of the functions is planning. The personnel involved should be organized in study and work groups so that the curriculum is covered both horizontally and vertically — horizontally for scope and interrelationships among the components of culture content, whether they be organized by conventional subjects or by areas for study otherwise designated, and vertically for scope and sequence within individual subjects or areas. Horizontal organization would be by grade or level and vertical organization by culture content component. In an initial planning effort, these groups would plan the entire curriculum for the school. Once a curriculum is operative the planning function becomes one of continuous improvement.

I would suggest that school principals be responsible for the leadership in the curriculum implementation function. Implementation involves the use of the curriculum by teachers to plan their teaching strategies. Hopefully, teachers will adapt curriculum content to specific student groups in intelligent manners. Teachers will, through the planning process, spot weaknesses in the curriculum as a guide for their planning efforts. Such information provides feedback to planning groups for subsequent curriculum revisions.

I have three concerns with respect to curriculum evaluation. The first concern has to do with whether teachers actually do use the curriculum as a guide for instructional planning. The second has to do with the predictive effect of the curriculum upon the achievement of students in accordance with stated aims or purposes, and the third has to do with the results of the evaluation upon the planning function. These concerns are unique to the persons and the situation of individual schools; consequently, every school will have to devise its own means for dealing with these important matters. There are no established procedures.

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