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ABSTRACT

The present state of curriculum and instructional design skills in Pennsylvania preservice teacher education programs was examined. Data were collected from self-studies conducted by 14 public and private teacher education institutions in Pennsylvania. The types and levels of curriculum and instructional design skills taught in each program were examined. It was assumed that all of the teacher education programs had an objectives-based curriculum. Among the types of skills critical to curriculum design were goal analysis, content selection and analysis, and identification of terminal objectives. The skills associated with instructional design included identifying and sequencing enabling objectives, selecting optimal testing points, and preparing instructional materials and events. Little consistency was found across the programs in the types or levels of skills included, or in the levels of required performance. It was found that less than one out of four competencies on the elementary school level, and less than one out of ten on the high school level, required teachers to have curriculum or instructional design skills. Of the total skills analyzed, instructional design skills represented 76 percent, and curriculum design 24 percent. It is recommended that a standard set of minimum competencies in instructional and curriculum design be developed and implemented and that a standard format and specific guidelines for self studies be developed for use by teacher education institutions in Pennsylvania. (FG)

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Paper Presented at the Annual Meeting
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INTRODUCTION

This study was designed to analyze the types and levels of curriculum and instructional design skills presently represented in a cross section of pre-service teacher education programs in the state of Pennsylvania. Since pre-service education in the state of Pennsylvania is currently under scrutiny and pending redesign,* inquiry related to specific teacher competencies in a variety of areas takes on particular urgency for educators across the state.

This study specifically examines the kinds of curriculum and instructional design skills that Pennsylvania programs describe in their self-study reports as a current part of the pre-service curriculum. The assumptions underlying both the rationale for the study and the kinds of skills identified as relevant in the actual analysis are described here.

RATIONALE: WHY ARE CURRICULUM AND INSTRUCTIONAL DESIGN SKILLS IMPORTANT FOR TEACHERS?

The recognition that teachers, in fact, do perform both curriculum and instructional design in their classroom is aptly expressed by Fenwick English (1979):

> At the current time, the classroom teacher decides what, how much, and when to teach (p. 10) . . . until and unless the *real curriculum* is impacted and the teacher is recognized as the linchpin between a better future and the problems of the moment, curriculum development in most school systems will continue to be an expensive, repetitious and largely academic exercise. (p. 12)

*An actual redesign plan has been proposed at the State level, but is still in its review stages.

English and others (Shavelson, 1973; Chadwick, 1979; Hunter, 1979) agree that decision-making is a primary teaching skill and that a majority of these decisions are within the realms of curriculum and instructional design. (Shavelson goes so far as to suggest that decision-making is *the* basic teaching skill.)

The kinds of decisions that these authors describe are readily recognizable as curriculum/instructional design choices:

> - discriminate between dependent and independent [learning] sequences; to task analyze a more complex learning into its simpler components; to diagnose students in terms of the components already possessed and those to be acquired. (Hunter, p. 63)
>
> - diagnosis of students' necessities; provision of almost all forms of instructional treatment; control of classroom management; evaluation of student learning. (Chadwick, p. 8)

Smith (1979) has proposed that there are six domains of knowledge and skills essential to the professional teacher. One of these competencies is instructional design (the others include observation, diagnosis, instructional management, communication and evaluation). Gorman (1978) includes instructional design as one of five major tasks of the teacher (others include instructional diagnosis, instructional experience, instructional resources and instructional evaluation). Neither of these authors distinguish between "curriculum" and "instructional" design and it is suspected that they, like others, use the term "instructional" to refer to both kinds of skills as they are described here. In any case, both Smith and Gorman recognize instructional design as a critical competence requisite for the teacher and a recognized part of what teachers actually do.

If it is true that in actual practice, teachers are called upon to perform curriculum and instructional design tasks, can we determine whether or not their actual performance of these tasks makes a difference? Despite the

lack of consensus among educators and researchers regarding behaviors that constitute teacher effectiveness, there is evidence to suggest that these relationships do exist in certain teaching-learning situations; that teacher behaviors, contrary to the conclusions of some skeptics (Stephens, 1967, Combs, 1978), can make a significant difference in learning (Good, et. al., 1975; Rakow, et. al., 1978; Watts, 1978; Brophy, 1979; McCormick, 1979; Rosenshine, 1979; and Centra and Potter, 1980, for example).

Of these "teaching behaviors that make a difference," many are, like the decision-making tasks, easily recognizable as components of curriculum and instructional design processes:

- use of structured curriculum
- design of direct instruction
- optimal use of feedback
- appropriate use of questioning techniques
- appropriate selection of concept-teaching and other instructional strategies
- teachers' understanding of the structure and substance of the content
- modification of instruction on the basis of particular characteristics of the student(s).

Much of our energy in educational research and development has been devoted to the design and development of curriculum based on our research results related to learning and teaching. It is important that such development continue as one means to promote application of our research results where it counts--in the classroom. However, as Fenwick English warns:

> . . . "the guide ain't the curriculum!" Therefore, the cycle of writing the curriculum guides and buying or writing tests based on them may never influence the behavior of the teacher who controls the real curriculum. (1980, p. 558)

For these reasons--because we believe teachers do perform curriculum and instructional design tasks in the classroom, and because we believe that the behaviors teachers perform in the classroom, including those directly related to curriculum and instructional design, do make a difference in

learning--we propose that curriculum and instructional design skills should be a major part of the pre-service teacher education curriculum.

RATIONALE: WHAT IS THE NATURE OF THE CURRICULUM AND INSTRUCTIONAL DESIGN SKILLS THAT ARE IMPORTANT FOR TEACHERS?

Perhaps the most important criterion for identifying a theoretical framework to guide our selection of the types of skills analyzed in this study was a clarification of the distinction between the often-difficult-to-distinguish concepts of *curriculum* and *instruction*. For this purpose, we relied on Robert Gagné's abbreviated definition of a curriculum as "a sequence of content units" (Gagné, 1967, p. 23). In this description, Gagné states that a curriculum is specified when

1. the terminal objectives are stated;
2. the sequence of prerequisite capabilities is described;
3. the initial capabilities assumed to be possessed by the student are identified.

From this set of curricular "components," one can derive skills that are critical to curriculum design. These skills would include:

- goal analysis
- analysis and selection of content (concept and content analyses)
- writing terminal objectives
- analysis of logical and psychological levels of learning
- sequencing of content
- analysis of prerequisite skills (component or task analysis)

It is these abilities that we have specifically identified as "curriculum" as opposed to "instructional" design skills.

Briggs (1977, p. 22) defines *instructional design* as

> the entire process of analysis of learning needs and goals and the development of a delivery system to meet the needs; includes development of instructional materials and activities; and tryout and revision of all instruction and learner assessment activities.

From this definition and various models for instructional design (Gow, 1976; Briggs, 1977; Dick and Carey, 1978; Diamond, 1975), we have identified the following as critical instructional design skills:

- analysis of terminal objectives and identification of enabling objectives (component or task analysis)
- writing enabling objectives
- sequencing enabling objectives
- selecting optimal testing points
- preparing tests and other diagnostic measures
- preparing instructional materials and events:
  - diagnosing learner characteristics
  - selecting appropriate methods, strategies, mode, and media
  - designing learning activities that incorporate appropriate methods, strategies, mode, and media
  - analysis of existing materials to identify their appropriateness to the learner and the intended outcomes of instruction
  - identifying appropriate content instances
- designing formative and summative evaluation procedures and instruments

There are several important characteristics to note about all the curriculum and instructional design skills that we have identified for this study.

1. First, you will note that we have assumed the use of an objectives-based curriculum. This is consistent with the trend of instruction in Pennsylvania schools and the theoretical approach of most pre-service programs. It is also consistent with our own views of the kinds of curriculum and instructional development that is effective for learning.

2. Second, it is apparent from the kinds of skills identified that this analysis was delimited to include only design skills and did not address skills required to actually carry out the instruction. Therefore, skills related, for example, to the teacher's ability to lecture or to manage a classroom, to provide student feedback or to facilitate small group instruction are intentionally omitted from these lists.

3. Third, you will note that these skills are described in most cases at their highest levels--note the large proportion of analysis and synthesis level abilities in both cases. Obviously, there are numerous skills subsumed within those listed and these subsumed skills were recognized and included in the process of analyzing the pre-service

programs. In fact, a significant portion of that analysis was devoted to the identification of various skill levels that were represented in the programs considered.

METHOD

This section describes the procedures used in locating the self studies,* coding the curriculum design features of the studies and analyzing the resultant data.

Sample

The state of Pennsylvania has 86 institutions of higher education which offer teacher preparation programs. A random sampling was taken of those which underwent major reviews from 1977 through 1980 (see Table 1). Five

TABLE 1

Major reviews, 1977-1980

1977-78	1978-79	1979-80
24	5	14

institutions were undergoing experimental models for their self study process, and therefore were excluded from the pool of possible institutions relevant to the study. Of the remaining 38 institutions, 14 were sampled. The breakdown of these institutions is shown in Table 2.

TABLE 2

Type of Institution	Elementary Program	Secondary Program
private college	6	4
state college	2	0
private university	1	1

Procedures

The Teacher Education program component which all students experience regardless of chosen majors in education is called the professional education

*See Appendix A for description of the Pennsylvania Teacher Eduaction program approval.

program. This includes such things as field experiences, foundations of education, educational psychology or child development, media and so on. It is this part of the program, experienced by all in Teacher Education in the state of Pennsylvania, which was used in this study.

All of the competencies listed under the professional education program in each self study were examined. Those referring to curriculum or instructional design skills were listed, statement by statement, on file cards. At the same time, the demographic data on the institution was recorded. This included general size, type of institution, programs, and the total competencies which were included in the professional educational program.

The statements so listed were then analyzed for levels and types of skills. Level was determined primarily by the verb in the competency statement; type was determined by the object and/or modifier in the competency statement, using a modified syntactic analysis approach. So, for example:

"develop appropriate pretests to measure learner readiness"

became

develop pretests appropriate

Bloom and Bloom and Crathwohl's taxonomies were used in coding the levels of the described competencies. The types of design skills were coded in two categories: curriculum design skills, as defined by Gagné, and instructional design skills, as defined in such models as Gow, Briggs, Dick and Carey, and Diamond. Finally, the types and levels were analyzed in light of current research and findings on curriculum and instructional design.

RESULTS

Table 3 represents the percentage of the total competencies listed in the professional education program in each institution which referred to any aspect of curriculum or instructional design. This excludes all such

competencies which might be described under a specific certificate area, i.e., physics, math, social sciences, and so on. The total competencies in the elementary education programs average 17 percentage points above those in the secondary education programs.

TABLE 3

Curriculum and Instructional Design Competencies

	Number of competencies related to design skills	% of the total items
High school		
1	15	11
2	11	18
12	9	11
15	6	11
16	9	7
Elementary school		
3	20	32
4	7	20
6	7	35
7	59	27
8	10	40
9	6	19
11	22	21
13	25	46
14	8	18

Of the competencies related to curriculum or instructional design skills, Table 4 presents the spread of the levels of these skills according to Bloom's taxonomy.

Types of skills are presented in Table 5 and 6. Thirty-seven discrete skills were identified in the competency listing. These were subsumed under the general skills critical to curriculum design (Table 5) and instructional design (Table 6). Curriculum design skills represented 24% of the skills identified, with instructional design skills completing the remaining 76%.

TABLE 4

Level of Curriculum Competencies
Identified In Programs

High school programs	Levels of skills 1	2	3	4	5	6
1	53%	13%	-	6%	26%	-
2	27	-	27	9	36	-
12	6	6	12	52	12	12
15	-	-	50	17	-	17
16	-	11	33	11	22	22
Elementary school						
3	25	-	45	-	20	10
4	14	-	57	-	29	-
6	29	27	-	-	43	-
7	33	7	25	8	19	7
8	40	-	40	-	20	-
9	-	-	83	-	17	-
11	23	9	36	14	23	-
13	8	-	28	40	24	-
14	38	13	-	-	50	-

TABLE 5

Curriculum Design Skills

Skills	Occurrence	% of Total Program Skills
curriculum theory/models	11	1.0
curriculum movements	4	0.3
task analysis	4	0.3
subject matter/content	6	0.5
instructional variables	2	0.2
concept characteristics	6	0.5
scope and sequencing	3	0.2
goal setting	7	0.6
domains (cog., etc.)	5	0.4

TABLE 6

Instructional Design Skills

Skills	Occurrence	% of Total Program Skills
t/learning strategies (inductive, deductive, questioning, inquiry)	26	2.4
evaluation	30	2.0
objectives	14	1.0
student needs (entry level, individual differences, behaviors)	14	1.0
classroom procedures, activities	11	1.0
curriculum-methods/materials	10	1.0
theories and models of instruction (inquiry, CBE, behavior modification, etc.)	9	0.8
lesson plans/learning sequences	8	0.7
innovations	6	0.5
instructional patterns	5	0.4
individualizing	5	0.4
curriculum selection strategies	3	0.2
problem solving	3	0.2
integrating experiences	3	0.2
motivating	3	0.2
community resources	3	0.2
cognitive development	3	0.2
use of test results	2	0.2
climate of learning	2	0.2
learning theory	2	0.2
"strategies" (undefined)	2	0.2
needs assessment	1	0.1
relationships	1	0.1
grouping	1	0.1
observation skills	1	0.1
transfer of learning experiences	1	0.1
research (use)	1	0.1

CONCLUSIONS

Based on these findings, it is reasonable to conclude that: (a) all PA teacher training programs presently include some aspect of curriculum design skills; and (b) the perceived importance of these skills can be evidenced by the data on their inclusion in the total professional education program as described by the sampled institutions.

The study indicates that less than one out of four competencies on the elementary school level and less than one out of ten on the high school level require curriculum design or instructional design skills. Analysis

of the types and levels of these skills shows that the major type of curriculum design skills do not comprise even one percent of the sampled programs. It is possible that some of these skills are included in the content specialization portion of the training programs, but the more generic, content-general preparation for what curriculum design is and what its role is in teaching seems scant in the programs reviewed.

The types of instructional design skills, when reviewed separately from curriculum design skills, fair a little better. These represent approximately fourteen (14) percent of the total program skills and provide for evaluation, writing of objectives, analyzing student needs, classroom procedures, and teaching/learning strategies.

The level of skills in elementary and secondary preparation have some similarity. Based on strict content analysis of the skills as described in the self studies, both are heavily representative of the knowledge, application and synthesis levels. It is important to note, however, that in many cases, a decision had to be made by the researcher using the context of the competency statement to determine its level.* These decisions represent the judgement of the reviewer.

DISCUSSION AND RECOMMENDATIONS

It is apparent from the analysis of selected self-studies that curriculum and instructional design skills are a recognized part of teacher preservice education. However, there is little consistency across programs in the kinds of skills included or in the levels of required performance for those that were identified. No standard set of skills or competencies appeared across all or even most programs and no standard performance levels were identified among the programs reviewed. In addition, there was a fairly

*For instance, the verb "to identify" is listed both under knowledge and analysis in the taxonomy, depending upon the intended level of performance specified by the objective.

wide variation (see Table 3) in the percentage of competencies related to curriculum and instructional design across programs.

If the programs surveyed are, in fact, representative of all Pennsylvania programs, this inconsistency in amount, type and level of design competencies suggests that there are no accepted state-wide standards for this area of pre-service teacher education. A review of the proposed redesign plan for Pennsylvania further suggests that this lack of recognized standards is yet to be addressed. In the final draft copy, the program content (listed under Professional Education, p. 11) has one item: "knowledgeable about the instructional process" with a follow-up statement: "The comprehensive program content will be more specifically defined when program approval standards are revised . . . but MAY (emphasis your authors') include such areas as curriculum, tests and measurements, diagnostic procedures, human growth and development . . ." (p. 12) While this description is not intended to provide sufficient guidelines for defining actual pre-service competencies, it points out the need for more precise language and standards in this and other program areas.

Use of the Pennsylvania self-studies for the type of analysis desired for this study raised a number of questions for your authors. Those examined reflected little consistency in either mode of presentation or language usage. As mentioned earlier, judgement decisions were required of the researcher in order to assess the level of various competencies as it could not be assumed that any one standard taxonomical system was employed across programs to communicate those competencies. A further lack of consistency was observed across studies in format and degree of specificity.

As a result of these observations and the outcomes of the analysis performed, the following recommendations are proposed:

1. *Develop a standard set of minimum competencies in curriculum and instructional design for pre-service*

teacher education in the state of Pennsylvania. Specification of such standards should be preceded by a thorough analysis of the kinds of competencies required in actual teaching practice and the competencies recommended by curriculum and instructional design experts nationwide.

2. *Develop a standard format and specific guidelines for the preparation of self-study reports in the state of Pennsylvania.* While certain guidelines for self-studies currently exist, more precise format and language-usage standards would facilitate preparation, review and interpretation of these documents. Comparisons across programs would become more feasible for the evaluator, the researcher and the program personnel who are required to prepare and use the reports.

This study has provided beginning information on the present state of curriculum and instructional design skills in pre-service teacher training programs in Pennsylvania. Further research is needed to determine which skills are appropriate for entry level and what systems can be built to develop or reinforce these skills in inservice or continuing education. A Kappan article by Howsom raised the question of whether teaching is a profession and defined as essential to a profession that it ". . . possess a body of knowledge and a repertoire of behaviors and skills and can use these" (p. 94). He further states that "[t]he teaching profession appears to have a strong tendency to reject valid knowledge, principle, and theory and to rely on personal experience and conventional wisdom as sources of insight and behavior" (p. 94). Your authors are proposing that a specific repertoire of behaviors and skills in the area of curriculum and instructional design be compiled and adopted for pre-service teacher education in the state of Pennsylvania, and that this repertoire be based on the substantial body of knowledge in this area that is currently available to educators.

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APPENDIX A

Preface

The standards, policies, and procedures for implementing the approved program approach to the certification of professional school personnel in the Commonwealth of Pennsylvania are presented in this publication. The approved program approach was recommended by the Advisory Committee on Teacher Education to the State Council of Education on July 1, 1957. The procedure for approving programs was begun during the 1962-63 school year and has been refined and improved during the ensuing years. The adoption of Pennsylvania Code, Title 22, Chapter 49 - Certification of Professional Personnel reinforced the approved program approach effective July 1, 1969.

The standards, policies, and procedures have been formulated under the direction of the Secretary of Education and the State Board of Education in accordance with statutory provisions. These statutory provisions empower the Secretary of Education, on behalf of the State Board of Education, to establish and promulgate the standards of preliminary and professional education and training for professional personnel in the public schools.

The Pennsylvania Department of Education investigates and determines the acceptability of colleges, universities and other institutions of learning which wish to offer programs leading to credentials, diplomas or degrees that permit the holder at act as a professional employee in the schools of Pennsylvania. The PDE also approves such colleges, universities and institutions of learning as are deemed by it to be acceptable, and withdraws its approval of institutions which fail to maintain the required standards. A registry of approved programs in the respective institutions is published periodically.

The standards for the undergraduate and graduate programs of certification conform in substance to the Proposed Standards for State Approval of Teacher Education, National Association of State Directors of Teacher Education and Certification, United States Office of Education, Circular 351, (Revised), 1966. Pennsylvania accepts these general standards; however, a statewide study has reviewed and refined the standards applicable for each area of certification. When NASDTEC standards did not exist for positions certificated by the Commonwealth, appropriate Pennsylvania standards were developed.

Objectives and Procedures of Program Approval

Program approval is the systematic effect initiated by the Pennsylvania Department of Education during the year 1962-63 to improve teacher education programs throughout the Commonwealth. The procedures of program approval permit professionals from appropriate and specialized areas to make determinations concerning the standards for approving programs, the unique practices in preparing professional personnel and the quality of preparation programs. This allows for flexibility, creativity, and innovation without eroding the standards of quality for the education of professional personnel.

Following an on-site evaluation visit to an institution, those programs identified by the visiting team as being of high quality are granted program approavl status. Conditions are set and recommendations are made for programs which do not qualify for approval. It is only when these conditions and recommendations are implemented that approval is granted. The net effect is to bring about desirable changes in teacher preparation. Instead of evaluating transcripts, teams of professionals make observations, decisions, and recommendations. Graduates of these approved programs enter the profession with the approval and endorsement of representative members of the profession.

Program approval is an improvement over transcript analysis because it is organic rather than mechanical in its approach to certification. Whereas transcript analysis merely assesses quantity, program approval determines the quality of the total program that leads to a particular teaching certificate, including student personnel, general education, professional education, specialized education and student teaching. Each of these programs is explored in depth as it relates to objectives, organization and administration, faculty, curriculum, resources, and student achievement. Transcript analysis cannot possibly consider all of these elements.

The program approval visits provide opportunities for valuable in-service education to the professionals who are directly or indirectly involved in teacher education. The experience of visiting a teacher preparing institution, analyzing all elements of its teacher education programs and exchanging ideas with other educators, is of great value to members of the visiting team, to the personnel at the institution preparing for the evaluation and to the institutions from which the visiting team members come. As a result of the visits to teacher preparing institutions in Pennsylvania, of the ensuing reports and of the following visits by Pennsylvania Department of Education personnel, many constructive changes have been made in curricula, faculty, facilities, and relationships among the academic and professional personnel in the colleges. Many of the valuable outcomes of the visits are by-products and have never been measured or evaluated.

Under the program approval approach to teacher certification, a graduate of an approved program whom the college recommends as having successfully demonstrated competency in the area of certification will be issued a certificate by the Secretary of Education.

APPENDIX B

Each higher education institution in Pennsylvania which has a teacher training program is reviewed every five years. The document the institution submits to the state and the state appointed teams describes how the institution plans to meet both the general and specific standards set by the state for teacher training programs.

Specifically, General Standards VI, VII, VIII addresses in various ways the role competencies of the pre-service teacher.

VI states that such role competencies must be published, must be both general and specific, and must be enabled in a program of studies and experiences

VII states that the program should reflect studies and experiences relevant to current school curriculum, services, and practices and that there be an evaluation of these role competencies

VIII breaks out eight areas of competencies sought in each candidate:

- application of theory and research on child development and learning
- use of materials and media
- use of appropriate methods to carry out the role
- preparation, selection, and use of evaluation procedures
- assessment of student basic skills
- application of skills in analyzing professional, institutional and political situations in order to make educational decisions
- promotion of interrelationships among people
- promotion of awareness of the work world

The standards are minimum. They are restrictive only to that degree, but put no upper limits on the levels and types of skills within a broad framework.