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Emerging themes and patterns of information-based teacher education curricula in response to NCATE standards

Turner, Susan S., Ed.D.

The University of North Carolina at Greensboro, 1992

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EMERGING THEMES AND PATTERNS OF INFORMATION-BASED TEACHER EDUCATION CURRICULA IN RESPONSE TO NCATE STANDARDS

by

Susan S. Turner

A Dissertation Submitted to
the Faculty of the Graduate School at
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of the Requirements for the Degree
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APPROVAL PAGE

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While technological changes in society and the workplace influence the need for an information literate citizenry with sophisticated abilities to analyze, adapt, and interact in an abstract computing milieu, reforms in teacher education have not been linked to these changes. The purpose of this study was to determine whether themes, interrelationships, or patterns of information-based attributes needed for students to achieve information literacy skills were emerging across selected teacher education programs and individual specialty studies. The study analyzed the National Council for Accreditation of Teacher Education (NCATE) Standards and the responses of ten Institutional Reports selected for their diverse representation of teacher education models.

Qualitative inquiry and ethnographic content analysis were used to discover emergent themes of information-based education. The inductive process of constant comparison with the documents and the interactive analysis of information-based attributes resulted in a three-level coding process for interpreting the emerging phenomenon. Information resources attributes (Code Level One) and related action attributes (Code Level Two) were identified and coded. Information resources attributes were used to link more abstract affective/facilitative information-based attributes (Code Level Three) with other curricular attributes associated with learning and teaching.

The information-based attributes found in the NCATE standards and the Institutional Reports showed no evidence of a cohesive or central focus for information-based teacher education curricula. The information-based

attributes that did emerge ranged from concrete information resources to relationships linking resources with other curricular components. The attributes reflected the application and development of information resources as teaching/learning tools. Evidence also suggests that more complex and abstract information-based attributes at Code Level Three (i.e., Affective/ Facilitative) are occurring in some specialty studies as well. Occurrences of complex information-based attributes appeared to be the result of the specific application of individual institutions rather than as a result of the NCATE standards. These occurances resulted in some rich data as seen by the information-based attributes in the selected teacher education programs reflecting the Process, Liberal Education and Values Models.

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Next, my thanks and admiration go to the extraordinary members of my committee who offered their unique expertise and professional strengths to this research endeavor. During the entire process, Dr. Keith Wright was a generous source of provocative ideas and substantive solutions. At the final stages, Dr. Mary Olson and Dr. Bert Goldman provided untold hours of invaluable guidance as I shaped the final product. I am particularly grateful as well to Dr. Marilyn Miller for her contribution to the genesis of this project, my vision of information professionals for the next century, and the standards of excellence for which I strive.

Finally, a special thanks to my family and friends who encouraged me ad infinitum.

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CHAPTER I

INTRODUCTION

For the first time in history, instead of lessening our work, technology is increasing the demands on our cognitive abilities. Abstractions of work performed by computers are presenting new challenges for conceptual skills and knowledge of the interrelationships within organizations (Zuboff, 1988). Open, flexible, and nonlinear flow of information created by technology is in conflict with administrative hierarchical structures of organizations. Existing parameters for administrative procedures and for relationships with other organizations and work are challenged as expectations and goals are reframed by newly encountered experiences that occur as a result of technology.

The current work force trends of an aging population, more frequent job changes, industry downsizing to fewer employees, increased use of temporary workers, and a need for workers with multiple skills affect the growth of a competitive global market. Growth depends on a work force able to interact effectively, creatively, and productively within sophisticated networks of information. Increasingly, interdependent socio-economic and political environments demand the most responsive information access and enhancements that technologies can provide. These environments create a critical and ongoing need for citizens to improve their information management skills and information processing skills, and have the ability to apply

(i.e., transfer) these skills to new situations. Citizens who have acquired these skills are information literate.

Teachers and students must be prepared to achieve information literacy skills that are flexible and transferable to anticipated and unanticipated future needs. This goal cannot be met if basic prose and computational literacy skills remain low and workers are not adequately prepared to compete in a global environment. The responsibility for preparing students for a competitive and global environment is shared by educators in business, industry, schools, and higher education. Competition requires businesses to respond rapidly to the changing demands of competition. Yet it does not ensure a simultaneous response from educational agencies to provide the foundation for skills needed most in the workplace. Teachers, therefore, are at great risk for being ill-prepared and, thus, unable to provide students with skills essential for success. To prevent this, teacher education programs must restructure to accommodate the needs of a global community and prepare teachers with the ability to anticipate, adapt, transfer knowledge to new situations, and direct a course of action toward the future.

These abilities are linked to the integration of information processing, information management, and decision-making skills within the framework of a technology-driven and information-based society. Knowledge of the changing forms and applications of the information infrastructure (i.e., communications networks providing fundamental information needs for creating, disseminating, and preserving information/knowledge) and the implications for lifelong learning and success must undergird the epistemological and pedagogical bases of teacher education.

The Presidential Committee on Information Literacy noted in its Final Report (American Library Association, 1989) that information literacy is a lifelong survival skill in the information age. It requires a new model of active and integrative learning based on a foundation of information processing, management and transfer skills, and the effective applications of myriad information formats and networks.

To respond effectively to an ever-changing environment, people need more than just a knowledge base, they also need techniques for exploring it, connecting it to other knowledge bases, and making practical use of it. In other words, the landscape upon which we used to stand has been transformed and we are forced to establish a new foundation (American Library Association, 1989, p. 13).

A Symposium (Information literacy and education for the 21st century, 1989) and a Forum (Breivik, 1990) represented by diverse professional associations further defined the preliminary model of information literacy in the workplace, in schools, and in teacher education programs. Their recommendations include redesigning schools and teacher education programs as models of information literacy, analyzing national standards for information literacy skills, and promoting research to identify information literacy components. Our education system seeks to ensure that teachers prepare students to adapt to societal change while pursuing their instructional goals. Establishing information-based curricula in teacher education to ensure information literacy will facilitate this.

Problem

There are critical questions that educators of teacher preparation programs must address. For example, are we preparing teachers with

information-based skills needed to anticipate, manage, analyze, select, process, and transfer information? How are these skills different from those that students need to meet the challenges in an information-based society? Are information-based attributes appearing in curriculum goals as explicit/tacit, or peripheral/central components in teacher preparation programs? Do teacher education reform and current research support elements of an information-based curriculum as central and integral to existing curricula models? To what extent are information-based attributes reflected in the revised National Council for Accreditation of Teacher Education (NCATE) Standards? Are they central or cohesive components across the Standards? Are information-based curricula reshaping teacher education programs within the application of disciplinary knowledge bases? Studies indicate that information-based skills interact with structural or functional changes in work (Bailey, 1991) and have immediate implications for the preparation of teachers.

Among current research analyzing general skills needed by citizens to work and live in an information society, the Barton and Kirsch (1990) study tested young adult workers (with high school through graduate school education) on a broad range of literacy skills. These skills included prose and computational skills, and the ability to use a variety of standard document resources. The researchers also found that comprehension and problem-solving skills of young adult workers in performing moderately complex but everyday tasks were seriously limited. Other studies found that upskilling (i.e., work that requires increasingly more sophisticated thinking, problem-solving, and decision-making skills) is occurring in the information age (Caissy, 1989; Zuboff, 1988). So while studies have shown that upskilling is needed by

workers who interact with technology in an information-based environment, there is evidence that the skills associated with upskilling are the very ones our young adult work force is lacking. This becomes a critical problem in a business world increasingly competitive, global, and dependent on those with the abilities to adapt to new technologies and solve problems quickly. Governmental agencies and private industries as well as library/information and education professions are only now beginning to offer pragmatic and theoretical contributions in a concerted effort to meet this challenge.

Concurrently many industries are revising standards for job skills while the educational community orchestrates K-12 educational reforms and assessment revisions (America 2000, 1991). Skills are being more precisely linked with educational and occupational identification through a new Standard Occupational Classification system (Plewes, 1990). The Departments of Labor and Education have initiated public and private efforts to create job-related skills standards and core proficiencies through the Labor Department's Commission on Work-Based Learning and the Secretary's Commission On Achieving Necessary Skills (SCANS).

The effectiveness of the efforts by government and industry rests on (1) the linkage and transfer of educational standards to job skills (Bailey, 1990), (2) establishing local commitment (American 2000, 1991), and (3) a mechanism for assessing future expectations for the acquisition of knowledge and skills. The library/education community as represented by the American Library Association (ALA), American Association of Colleges for Teacher Education (AACTE), International Reading Association (IRA), American Association of School Administrators (AASA), National Council for the Social Studies (NCSS), and the U. S. Department of Education and others supports

the study of skills needed for information-based learning. Information-based learning skills include the cognitive ability to process information, manage information, locate information, and transfer that knowledge to new settings (American Library Association, 1989; Curtis & Eisenberg, 1991). A coalition of professional associations that includes those mentioned above and others is assessing ways to implement these and other information literacy skills into K-12 settings and also into teacher preparation curricula (Information Literacy and Education for the 21st Century, 1989). Although the library/information profession has traditionally concentrated on the integration of library- and resource-based skills into K-12 curricula, their efforts now promote a broader concern for information-based education (Breivik & Gee, 1989; Curtis & Eisenberg, 1991; American Library Association, 1989). While teacher education programs have not explicitly endorsed an information-based curriculum approach, certain aspects of such a curriculum are being applied, integrated, modified, or adopted into current models.

Although popular and scholarly literature refers to current changes in society that directly influence the need for an information literate citizenry (Toffler, 1990; Zuboff, 1988), reforms in teacher education have not been linked to changes in society. Recent literature indicates, however, that teacher educators are addressing *some* of the identified problems through curricular goals. Still, few outside the library/information studies discipline acknowledge the importance of focusing efforts for an information-based curriculum on goals targeting those needed skills.

Purpose of the Study

The purpose of this study was to determine whether patterns of information-based attributes needed for students to achieve information

literacy skills were emerging across selected teacher education programs. The study analyzed the NCATE Standards for patterns of information-based attributes and the responses of selected Institutional Reports for patterns of information-based attributes across the teacher education programs. There are eighteen NCATE Standards and 94 Criteria that address five Categories of teacher education programs: Knowledge Bases for Professional Education, Relationship to the World of Practice, Students, Faculty, and Governance and Resources (see Appendix A). While certain criteria are very specific and include some information-based attributes for compliance, the format of the knowledge base Standard I.A (Design of the Curriculum) is nonprescriptive and allows the uniqueness of program models to be fully explained. The presence of information-based curricula in the description of teacher education philosophies, goals, and objectives suggests support for specific components of an information-based curriculum. This evidence should provide themes and possible relationships woven among the curricular descriptions.

This study used qualitative inquiry to analyze information-based attributes as they emerged from the Institutional Reports (data documents) that described the respective institutions' responses to the NCATE Standards. Through ethnographic content analysis, emergent themes and patterns of information-based education were discovered in the context of teacher education. Ethnographic content analysis is a methodology used to achieve understanding of a culture by means of an interactive analysis of behaviors or concepts that emerge from data of selected documents (Altheide, 1987). The analysis, which used an inductive process of constant comparison of document data rather than predefined categories, was based on "grounded"

theory. Grounded theory is inductively derived from the study of the phenomenon it represents (Strauss & Corbin, 1990, p. 23). Findings, therefore, are described as being "grounded" in the narrative data. Tentative hypotheses became evident as patterns emerged from the data. These clarified possible relationships of information-based attributes within the selected curriculum models.

Research Questions

Since the purpose of the study was to determine whether patterns of information-based attributes needed for students to achieve information-based skills would emerge across selected teacher education programs, the ethnographic content analysis (Altheide, 1987) was used to code, categorize, and interpret themes and patterns. In this type of analysis, *a priori* hypotheses were not constructed in order to avoid unwarranted constraints in the analysis. This allowed patterns to emerge and be grounded in the data documents. The following research questions served to guide the exploration, the focus, and the parameters of this study.

1. To what extent do information-based attributes emerge as themes, interrelationships, or patterns in NCATE Standards?
2. To what extent do information-based attributes emerge as themes, interrelationships, or patterns across diverse curricular models and the knowledge bases that undergird them as described in selected NCATE Institutional Reports?
3. To what extent do information-based attributes emerge as themes, interrelationships, or patterns across selected specialty areas and the knowledge bases that undergird them as described in the selected Institutional Reports?

Importance of the Study

The importance of this study is its efforts to determine the extent to which educational curricula are responding to society's and business' needs for citizens who are information literate. It is important to remember that critical information literacy skills required in the workforce are seriously limited among young adult workers. This skill gap is being addressed by industries as they revise job skill standards and by government agencies as they test workers for all types of literacy skills (America 2000, 1991; Bailey, 1991). On the other hand, an information-based education would offer a foundation for teaching and learning in a global environment of changing resources and expectations. Contextual and structural curricular changes that result from the synergism of the education community and the information technologies should challenge current teacher education programs to support information-based education. The focus of this study explored the extent of the support for information-based education among teacher education programs.

Assumptions and Limitations

The following assumptions are made:

1. Recent articulation of diverse teacher education models reflects environmental influences of the information age.
2. Information-based concepts identified in the data documents and not expressly indicated by NCATE Standards reflect an implicit support by the teacher education program.
3. Institutions responding to NCATE Standards support the premise that teacher education programs should incorporate a cohesive knowledge base(s) reflected in a central model for preparing teachers.

This study was exploratory. It sought the discovery and tentative verification of similar patterns of information-based concepts and categories across the breadth of diverse teacher education programs. It did not set out either to determine the extent to which *a priori* information-based attributes were found in teacher education programs or the extent to which information-based attributes stated in Institutional Reports were actually implemented within the curriculum. It was limited, by design, to the organization and content of the NCATE Standards through which the discovery of categories of information-based education were assessed. There were other limiting factors involving the specialty studies' descriptions. First, the process of selecting documents based on the inclusion of specialty studies descriptions limited the representation of diversity among teacher education models. An additional limitation was the brevity of some of the specialty studies' descriptions. The selection process resulted in the analysis of ten Institutional Reports.

Definitions

Grounded theory.

> Grounded theory is inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon. Therefore, data collection, analysis, and theory stand in reciprocal relationship with each other. One does not begin with a theory, then prove it. Rather, one begins with an area of study and what is relevant to that area is allowed to emerge (Strauss & Corbin, 1990, p. 23).

Information-Based Attributes.

Information-based attributes are information-related characteristics of educational situations or learning events (i.e., the learner, teacher, content, objectives). In education they "may be derived from such areas as library and information skills, information transfer, instructional methods, instructional design systems, content, information roles, and information resources." (Curtis & Eisenberg, 1991, p. 15)

Information-Based Education.

Information-based education (IBE) views education from an "information perspective" in terms of information structures, information skills and processes, and information roles of those involved in learning events encompassing all settings and levels. The focus of IBE is broader than resource-based education and involves no *a priori* value judgments. (Curtis & Eisenberg, 1991)

Information Infrastructure.

The fundamental information resources and communications structure networks servicing the information needs of an area.

Information Literacy.

Information literacy is a survival skill of the information age in knowing how to find, evaluate, and use information effectively to solve a particular problem or make a decision. It calls for a learning process based on the information resources available for learning and problem-solving throughout people's lifetimes (American Library Association, 1989).

Information Professionals.

Information professionals possess specialized knowledge about knowledge itself which they use to empower their clients to understand

and know based on the exchange of "epistemic entities": data, information, knowledge, and wisdom. They deal with information in an objectified form of some external medium and, therefore, are concerned with both the exchange of information and the means by which it is conveyed (Mason, 1990).

Information Skills.

Skills related to library skills (e.g., location, access), the information search process (e.g., selection, exploration, presentation), information problem solving (e.g., task definition, use, transfer), and the research process (e.g., developing a thesis, planning, analyzing, evaluating). Information skills are essential information-based attributes for information-based education, however, informtion-based attributes are not limited to information skills (Curtis & Eisenberg, 1991). See definition for information-based attributes.

Information Technology.

The acquisition, processing, storage and dissemination of vocal, pictorial, textual and numerical information by means of a micro-electronics-based combination of computing and telecommunications (Longley & Shain, 1986).

Infrastructure.

The fundamental facilities and systems servicing a county, city, or area as transportation and communication systems, power plants, and schools (Random House Dictionary of the English Language. 2d ed. Unabridged. NY: Random House, 1987).

Professional Studies.

> Professional studies is that portion of the total preparation studies program that prepares education students to work effectively in their professional education roles. Sometimes referred to as professional education, it includes pedagogical, theoretical, and practicum studies (National Council for Accreditation of Teacher Education, 1990).

Program (Teacher Education).

> A program is the sequence of courses and experiences in general, specialty, and professional studies required by a college/university for the preparation of professional education candidates to teach a specific subject or academic area, to provide professional education services (e.g., school psychology or counseling), or to administer schools. A program area could be a major in education; it also could be a major, minor or endorsement in an academic area with professional education requirements for licensure (NCATE, 1990).

Resource-Based Education.

> Resource-based education refers to a body of work promoting the use of library media resources, personnel, and services in educational settings. ...the information-based attributes associated with resource-based education include: variety of resources, and library media program involvement (Curtis & Eisenberg, 1991).

Specialty Studies.

> Specialty studies include the sequence of courses and experiences in the academic or professional area that the education student plans to teach, for the grade level at which the student plans to teach, and/or for the services that the candidate plans to provide. Examples of specialty

studies include science, elementary education, school library media, counseling, principalship, reading, and physical education. For some specialty studies like elementary education or curriculum and instruction, the specialty and professional studies components are integrally interlinked (NCATE, 1990).

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of this study was to determine whether patterns of information-based learning components needed for students to achieve in an information rich environment are emerging across selected teacher education programs. Specifically, information-based curriculum components that emerged as themes, interrelationships, or patterns across diverse curricular models and the knowledge bases that undergird them were identified from selected NCATE Institutional Reports.

This chapter begins with an introduction and is followed by the literature review that is divided into five sections: Information Society: Context and Change; Information-Based Teacher Education: A Proposal; Higher Education Links to Information-Based Education; Application of Teacher Education Models; and National Council for Accreditation of Teacher Education. These five areas provide an analysis of the literature covering (1) the basis and rationale for information-based education, (2) its goals within the constructs of the major components of teacher education curricula models (general, specialty and professional studies), and (3) the revised NCATE Standards. In the first section, Information Society: Context and Change, research dealing with salient characteristics of the information paradigm, predicted trends for workplace skills, and the role of teachers as information professionals will be reviewed. The second section, An Information-Based Teacher Education: A Proposal, includes the selection of literature detailing the current status of

information literacy (also called information- or resource-based education) for the preparation of teachers. A review of information-based education in higher education through learning theory and general education trends is the focus of the third section, Higher Education Links to Information-Based Concepts. In the fourth section, Application of Teacher Education Models, the focus is on elements of teacher education models currently implemented at institutions that have undergone recent self-study and accreditation review from NCATE. This discussion introduces possible compatibility and linkage of the major elements with information-based concepts. The final section, National Council for Accreditation of Teacher Education, covers current literature concerning the influence of the accrediting agency for teacher education programs and the recent revision of NCATE Standards.

At no time in history has there been such a density of information networks of human communications. The information infrastructure (information resources and communications networks servicing fundamental information needs of a community) is currently being transformed by the dynamics of evolving and interacting technologies, work, and an information economy. Defining the impact of changing information services and resources on work, education, and everyday lives has been the impetus for recent calls for action that target schools and teacher education. New goals for learning, teaching skills, and values must accommodate the changing needs of a global, competitive, and information-driven society.

Traditional patterns of work, organizational structures, and information access are shifting. In the current environment, workers need more sophisticated abilities to concentrate, analyze, adapt, and interact with work that is manipulated in the abstract of a computing milieu (Zuboff, 1988). While

empirical evidence indicates the need for these abilities (Bailey, 1991), studies show a work force that has inadequate literacy skills involving the interpretation of prose, or the ability to use information, or apply numerical operations contained in everyday directions, indexes, advertisements, and the like (Barton & Kirsch, 1990). Current reform efforts are addressing these issues from the different perspectives of the global marketplace and of learning and pedagogical theory. Few studies, however, target information-based curricular elements that are compatible with concerns for an information literate society and currently evident in teacher education models undergoing assessment.

We are in the midst of major reform efforts in restructuring schools and teacher preparation to improve students' abilities to prepare for a competitive and increasingly complex market. Discovering whether the characteristics of interacting trends in work skills, learning theory, and the application of teacher education models are consistent with the characteristics of an information-based education is essential for achieving teacher education programs that are responsive to the needs of the information age.

Information Society: Context and Change

From the perspectives of diverse disciplines, salient features of the information age continue to be analyzed. This section highlights literature focusing on those features and is followed by two related subsections. The first subsection, Work Preparedness and Information Skills, discusses predicted trends for workplace skills. The second subsection, Teachers as Information Professionals, explores the convergence of teachers' roles with those of information professionals.

The information age is characterized as a framework influencing lifestyles and the economy. The driving force of its influence is interactive computer technology. Evidence of its broad-based impact may be found in the common elements of historic eras as defined by different disciplinary perspectives. The three stages of history, for example, emphasize the significant economic production eras of agriculture, industry, and information. The information science perspective, however, focuses on the means of knowledge preservation and dissemination in stages characterized as writing, printing, and computer eras. Both disciplines offer an understanding of the trends and common essence of an information/computer era but from different perspectives. The effects of the information/computer era on lifestyles and the economy are similarly reflected in and defined by work settings.

The symbiotic interaction of information technologies and society is recognized by futurists. They treat the concept of computers, and more broadly, technology, as a universal force of the information age. Much of the empirical literature, however, continues to analyze computers as a tool, with little acknowledgement of the "technical drift" (i.e., the impact of technology on socio-economic issues) occurring. The limited view of technology is inherent in the multiple meanings of the term: (1) a body of technological knowledge, (2) a practice of technological professions, (3) a physical tool of technological professional organizations, (4) an integration of technical personnel and processes into large systems or institutions (e.g., education, military), and (5) a technological condition and quality of social life resulting from the cumulation of technological activity (Vig, 1988). For example, literature for teacher preparation focuses on information technology primarily as a tool for teaching, learning, and classroom management. It does not address the indirect but

critical impact information technology has on changing the network of communications, the expectations, problems, and work of students and teachers, and ultimately the substance of curriculum.

The literature focuses on the dichotomous choice between technological determinism, defined as the belief that people have limited capacities or need to control ethical decisions regarding uses of technologies (Schwalter, 1990), and social determinism, defined as the belief that technology is shaped by socio-economic and political forces (Gilder, 1989; Lyon, 1988). A third choice, instrumentalism, offers a more balanced perception by symbolizing the belief that rational decisions regarding the uses of technology must be consistently made. Instrumentalism, however, will not become automatic if workers abdicate responsibility for anticipating a changing environment. Anticipating change and understanding the interdependencies of environmental influences are critical features in preparing teachers for the information age. Specific lifelong abilities and workplace skills applicable to teachers, and needed by all citizens are identified from the literature review that follows.

Work Preparedness and Information Skills

Much of the current literature investigating generic skills needed to work and live in an information-based society derives from research of futurists, sociologists, and information technologists (Zuboff, 1988; Friedrich, 1985; Mason, 1990). Government-sponsored research attempts to identify and anticipate action necessary to maintain productive growth that is competitive on a global standard (Bailey, 1991; Barton & Kirsch, 1990). Findings from varied sources show similar patterns of skills needed in the areas of communications, information processing, research inquiry, abstract and

analytical thinking, and problem-solving (Bailey, 1991; Barton & Kirsch, 1990; Brand, 1990; Caissy, 1989; Friedrich, 1985).

The Zuboff (1988) and Abbott (1988) case studies support the importance of critical thinking skills and offer richly detailed evidence of the significance and relevance of these skills for all educational levels. These researchers also analyze the history and the critical essence of changing work patterns in the era of information technologies. For example, Zuboff's case studies analyze job content that was recently transformed by "informatics" (i.e., the work computers do). In other words, informatics in the workplace requires reconceptualizing work as work tasks become abstract and "disappear" into computers. Conversely, the record keeping, communications, and policies of organizations become open and accessible through their computerized networks. This encourages nonhierarchical, participatory, and entrepreneurial involvement of all workers while simultaneously challenging them to conceptualize work in a different and more intense way.

Aspects of technological applications are factors in the downsizing of the work force today and the continuing debate over deskilling, upskilling, and reskilling of the work place for the 1990's (Bailey, 1991). Automation and standardization that reduced work was the norm for technological applications until computers influenced the current trends in customization and networking. These trends increase the need for information processing by requiring humans to interact with technology. This interactive phenomenon increases the demand on intellectual capacities to think abstractly, make connections, and adapt to rapid and continual change. For example, teachers must be adept in applying interactively (i.e., simultaneously and progressively)

research and technological knowledge to database searching in order to keep up-to-date in their fields.

The current challenge for organizations is to facilitate information literacy among workers concurrent with their completing projects (Zuboff, 1988). Toffler (1990) and Zuboff (1989) speak of the significance of the "symbolic age" as the abstract environment of computing that replaces manual manipulations with abstract conceptualizations. Workers are required to work with symbols in a new way at a time when knowledge and decision loads in organizations are being redistributed.

The juxtaposition of a technology-driven information age characterized by global competition, customization, entrepreneurial workers, and information networks that are process-oriented and location-free is in contrast with present social structures. Organizations which still use mass production or hierarchical communication patterns risk conflicts and crises in the workplace as communication networks change.

Futurists caution about the widening gap between the "information-rich and information-poor" or the "know and know-nots" (Shay, 1991; Laver, 1989; Lyon, 1988; Toffler, 1990). The technology-inspired ability of workers to have ownership in their work may be tempered by a widening gap between those who have the knowledge to use information/technology networks creatively and those who do not. According to Shay (1991) that gap is intensified as the knowledge workers must have to remain effective in their jobs becomes obsolete in far less time than ever before.

Studies based on both organizational and socio-economic environmental interaction with technology show upskilling needed by workers. There is concurrent research, however, that finds skills associated with upskilling are

the very ones our work force is lacking (Barton & Kirsch, 1990). Citing the limitations of projections that ignore factors affecting work skills, such as changes within industries and in the content of work, Bailey (1991) associates upskilling with technology-driven consumer demands, global competition, and the need for ongoing learning or training cycles. This becomes a critical problem in a world increasingly competitive and global. Government, industry, education, and the library/information profession are contributing in various ways through special programs and research to meet this challenge.

Many industries are presently revising standards for job skills concurrent with the educational community's reforms, revisions of professional standards for higher education, and development of national standards in core subject areas for K-12 curriculum (America 2000, 1991). For example, in industry, skills are being more precisely linked with educational and occupational identification through a new Standard Occupational Classification system (Plewes, 1990). Moreover, the Departments of Labor and Education have initiated efforts to create job-related skill standards, and core proficiencies through the Labor Department's Commission on Work-Based Learning and the Secretary's Commission On Achieving Necessary Skills (SCANS). At the same time, the library/education community is studying information-based attributes identified for lifelong learning strategies (Curtis & Eisenberg, 1991) and assessing ways to implement an information-based component into K-12 and teacher preparation programs (Information literacy, 1989). To achieve a responsible citizenry that has world class standards necessary to compete and serve in a global community rests on the linkage of educational standards to job skills (Bailey, 1991). Maintaining this standard in teacher education programs will require a framework for continually assessing the changing

contexts of knowledge acquisitions, decision-making, and information transfer capabilities.

Schement (1990) argues that there is a compelling need to ask questions pertaining to the patterns and relationship of work, work skills, and the educational environment within an information infrastructure that alters expectations and process. While job growth can be predicted, projections do not address changes taking place within the content and context of the information infrastructure of technology, economics, and work. These changes will suggest important questions regarding the relationship of teacher education and the information infrastructure. With perpetual and active learning required of an upskilled and downsized work force in a competitive, global community (Bailey, 1991), who else but informational professionals, among them teachers, especially teachers, are empowered to lead the way?

Teachers as Information Professionals

The education/information linkage of information professionals involved in teaching and library work has been established in the literature that defines the jurisdiction of information professions. While some professional organizations expressly support this linkage, such as the established roles of school library media as teacher/consultants, there is no corresponding linkage through professional organizations' standards for teachers as information professionals despite converging roles. This becomes problematic when information is no longer confined to a centralized structure but is increasingly ubiquitous, customized, personal, and location-free. It offers infinite possibilities and challenges for creative application in learning environments. Studies that explore the history of the work of these professionals show some trends that bring the work jurisdictions of education and information

professionals closer together (Abbott, 1988; Schement, 1990). The linkage of teaching and information professions is compelling when reviewing the new focus on information skills. Several studies define the information professional to encompass teachers (Abbott, 1988; Kraemer & Danziger, 1990; Schement, 1990). The definition used by Mason (1990) is the one applied for the purpose of this study. Mason describes those who possess specialized knowledge about knowledge to empower clients to understand the exchange of "epistemic entities" (data, information, knowledge, and wisdom) and its conveyance through "objectified" forms (technology). Teachers cannot adequately prepare their students unless both have an understanding of the applications and implications for the wide array of information resources and the necessary information management skills appropriate for particular networks of communications and problem-solving.

With technologies impacting all aspects of work and causing the need to stay information-competitive, the necessary workplace abilities identified by futurists, government studies, and the professions must be recognized as fundamental issues for schools and teacher education. Knowing what information is needed and how to find, use, evaluate, and apply it was far less complex when storage, delivery, packaging, and processing of information remained relatively standard. Now, the nature of these aspects of information have become a dynamic that forces information processing and management skills into a perpetual state of adaptation. Increasingly, professions outside the information professions are merging at the periphery as information skills become the strategic foundation of industry as well as education.

Studies suggesting which skills teachers and other information professionals should have in the information age concur with skills cited for

citizens in the workplace. Kraemer and Danziger's (1990) model of computing's impact on information professionals shows the interrelationship of technology and information tasks (exchange, storage and retrieval, analysis) on decision-making, control, productivity, and social interaction. Schement (1990) states the need for further study that explores the different task-technology mixes affecting productivity or the work environment.

The early commitment of the library profession to self-education and lifelong skills (Abbott, 1988) became a strong component of school librarianship and more recently of public librarianship. Similarly, teachers have an obvious link to the knowledge base they teach (whether models of learning or discipline) and the data and information sources that substantiate the knowledge bases. What has not been studied is the impact that varied formats, delivery, and retrieval systems have on increasing the necessity for teachers to achieve this understanding.

The preparation of teachers should encompass a role as an information professional whose knowledge of a particular discipline and learner characteristics can be expanded and updated. Other information professionals (e.g., librarian, telecommunications specialist, school library media coordinator, instructional designer) would have collaborative roles with teachers and specialize in specific areas of information and technology. This knowledge that teachers must have to ensure that their students learn and have the skills they need to function, stay up-to-date, and problem-solve in the competitive workplace are compatible with those supported by the information literacy campaign. The campaign embarked in 1989 with the Final Report of the Presidential Commission on Information Literacy (American Library Association, 1989).

Information-Based Teacher Education: A Proposal

The workplace skills needed for the information age are those supported and promoted by various coalitions of educators and library leaders. Recent efforts have stressed "information literacy" skills as critical for lifelong learning and active citizenship and emphasized the role of teacher preparation in achieving the goals set forth by the Presidential Commission on Information Literacy (American Library Association, 1989). Recent literature regarding information literacy has not reached the wider audience of educators outside the library/information studies field, particularly that of teacher educators. Details regarding goals of coalition groups and symposia for furthering the implementation and understanding of information literacy (also called information-based education) for the preparation of teachers will be included in this section. These goals address the concerns for models of formal and informal information literacy programs and focus primarily, but not exclusively, on K-12 school curricula, and teacher preparation curricula. The Presidential Commission on Information Literacy (American Library Association, 1989), the Symposium on Information Literacy (Information Literacy and Education for the 21st Century, 1989), the National Forum on Information Literacy (1989), and the Treasure Mountain Retreat in 1991 were all represented by professional education associations, and government agencies [e.g., ALA, American Association of School Librarians (AASL), American Association of Colleges of Teacher Education (AACTE), U. S. Department of Education, and the Council of Chief State School Officers]. They have continued the work and recommendations of the Presidential Commission's Final Report (American Library Association, 1989).

In its Final Report, (American Library Association, 1989) the Presidential Commission on Information Literacy (1) defined the importance of information literacy for lifelong learning, business and citizenship, (2) offered a framework for models of information literacy in any formal and information learning environment, and (3) considered the implications of information literacy for continuing education and the preparation of teachers. "To respond effectively to an ever changing environment, people need more than just a knowledge base, they also need techniques for exploring it, connecting it to other knowledge bases, and making practical use of it" (p. 13). The recommendations call for a coalition of supporting agencies, research outside library literature on the impact of information management skills on performance, involvement of states to encourage its integration in K-12 and teacher training curriculum, and restructuring the learning process based on (1) information resources of the real world and (2) learning that is active and integrative. The specific recommendations for teacher education include developing the role of teacher as facilitator using an array of resources, emphasizing problem-solving, integrating new knowledge about thinking skills with pedagogical skills, and developing advanced information management skills appropriate to individual disciplines.

The Symposium on Information Literacy (Information Literacy and Education for the 21st Century, 1989) set an agenda for action by a coalition of educators committed to the concept of information literacy in the K-12 and teacher preparation curriculum. Additional recommendations for designing teacher education programs include analyzing national standards and educational reform to identify information literacy components. Formulating preservice/inservice information literacy models, and incorporating field

experience, teamwork skills, collaboration among teachers, and curriculum reform are also suggested. Similar to the Presidential Commission (American Library Association, 1989), the focus of the National Forum on Information Literacy in 1989 was the need to implement a broad-based program of information literacy (beyond the formal role of education) to benefit individuals, the economy, and citizenship. Their activities promote public awareness and maintain a clearinghouse of current programs to encourage research and monitor emerging trends.

When the 1991 Treasure Mountain Retreat took place, the task of researchers attending was to determine priorities for a research agenda covering information literacy issues. It concentrated priorities on the need for the integration of information literacy in K-12 curricula with the associated impact on parallel programs for the preparation of teachers. The resulting research priorities covered all levels and educational settings. Some of the questions generated included: (1) What constitutes information literacy skills?; (2) What would an information literacy curriculum look like?; (3) What are the influences of reflection, transference, context, and environment on information use?; (4) What fields explore good information handling?; (5) How do the information skills of adults relate to those taught in the schools; (6) what are library media specialists and teachers being taught about information skills?; (7) How are technology and the subject disciplines changing the face of how information services should be presented?; and (8) What implications are there for information skills when a resource-based curriculum is implemented?

Information literacy skills, information-based attributes, and other terms refer to similar skills. Terminology associated with information skills is fuzzy and often overlaps. Curtis and Eisenberg (1991), however, make useful

distinctions of terms. They refer to an "information-based education" as "an approach to learning and instruction that focuses on the information-based attributes [an information-related characteristic] of educational situations" (p.6). They further distinguish "resource-based education" as educational programs involving "the use of a wide variety of resources to meet curriculum objectives" (p. 14). Since the Curtis and Eisenberg definitions suggest broader application (i.e., beyond the traditional parameters of "library" skills) they will be used in this study unless referring specifically to literature using other terminology.

Library literature offers a number of prescriptive taxonomies of information-based skills and summaries of program models at the K-12 level (Kuhlthau, 1987; Ridgeway, 1990). Other taxonomies appropriate to all levels have been designed as preliminary value-free information skills (Curtis & Eisenberg, 1991). Examples of these skills may be found in Appendix B which lists information skills based on the rationale and guidelines of the Presidential Commission on Information Literacy (American Library Association, 1989). Curtis and Eisenberg (1991) suggest using broad categories of information-based education components that include: (1) information processes (e.g., cognitive), (2) information roles (e.g., teacher, student, library, computer specialist), and (3) information structures (e.g., resources, information network). A preliminary classification scheme for information-based attributes associated with specific learning events are:

(1) Library and information skills (e.g., information management skills, information search process);

(2) Information transfer (e.g., information needs, value-added processes);

(3) Computer-based education and instructional design (e.g., nature of computer technology, degree of use of computer technology, learner control);

(4) Resource-based education (e.g., variety of resources, library media program involvement) (pp. 10-15).

A summary of literature delineates writings that focus on specific educational levels (Ridgeway, 1990). Most of the literature is from the library/information science discipline. Information literacy is not a new concept for either higher education or K-12 curricula. It has, however, been revised to reflect current concerns for students who are prepared to enter the workplace in the information age and prepared for lifelong learning and active citizenship (American Library Association, 1989). Breivik (1991) suggests placing less emphasis on building specific (e.g., library) information services and bibliographic skills and concentrating efforts on achieving a broader consensus of information goals as they become integral components of curricula goals. An application of information literacy in higher education would exhibit a new model of learning that is active and integrated to provide "a framework for various components of the expanding information base" (p.15). Teacher education would provide an excellent model for this integration while simultaneously preparing teachers with the essential need to ensure the appropriate proficiencies for teaching and learning.

The dynamics of societal changes are interacting with changes in the information infrastructure. The result is the accommodation of new formats and rules impacting how, when, where and what information is accessed. It is not known if the goals of an information-based education are reflected in

current changes taking place in higher education curricula, teacher education models, or accreditation standards of teacher education programs.

Higher Education Links To Information-Based Education

The next two sections dealing with higher education and specifically teacher education reviews literature relating information-based curriculum concepts with undergraduate student learning and teacher education curriculum. This section covers learning theory applied to higher education concerns and the applications of information-based concepts to the general education component of teacher education.

A review of current curricula issues provide little evidence of the emergence of information-based curriculum trends in higher education curriculum reform beyond the continuing integration of information technologies. The integration of information technologies within the general education and liberal arts component of undergraduate curriculum differs widely among institutions and among disciplines. The pervasive societal influence of technology, however, may be the precursor to a more generalized recognition of the linkage between information resources, curricular goals, and learning. "With or without the advocacy of educators, [technology] has already changed the educational equation" (Adams & Hamm, 1987, p. 111).

The information age or knowledge revolution is driven by technological advances in computing and telecommunications. Fiber optics, voice activated computers, lasers, distance learning, computer workstations, and cyberspace (i.e., artificial, computer generated reality that projects the user into three-dimensional space) are among the many current advances. These and others challenge citizens to understand the capabilities, limitations, and impact of technological applications in creating and solving societal problems. The

influence of information technology on society and education has been heralded, berated, misunderstood, ignored, and feared, yet its contribution magnifies the significance of democratic participation and plurality (Abramson, Arterton, & Orren, 1988) in higher education. Dialectical forces are continuing issues of American higher education reform movements, such as access/quality and responsiveness/efficiency. They are frequently the impetus for curriculum reform. Learning theory and knowledge bases are applied to and interact within that dialectic framework. The application of a commitment to the integration of information technologies in higher education, however, is generally an organizational or structural policy. Its impact or rationale is not usually incorporated into program philosophies.

The literature assessing the role of information technology on learning and curriculum reform for future teachers provides a base for discovering parallels, linkages, and interdependences among curriculum components. Recent criticism of the undergraduate curriculum has centered on the inability of liberal arts and general education curricula to prepare students with higher level thinking skills characteristic of cognitive learning (Boyer & Levine, 1987). Since information technologies are alternative communications pathways, they introduce not only models of mental processes, but new influences on what is learned, how learning takes place, and the conditions of learning. In the creation, transmission, and preservation of knowledge, information technology and learning are linked in the human process of making judgments based on information transfer and understanding. As the linkage between human and technological processing of information increases, "flexibility rather than technical specialization" will become the most essential value along with transferability (Carlson,1988).

The complexity of the impact of information technology, its wide-ranging roles, and interactive influence on learning requires an exploration of theory from which current principles and implications for the future will emerge. It is not surprising then that the relationship of information technology to learning within the context of undergraduate curriculum design has been variously defined and implemented in both liberal arts and professional programs.

In the history and analysis of learning theory research as it relates to college students and undergraduate curricula, Fincher (1986) finds trends in dichotomous theories. For example, in finding convergence in diverse theories of behavioral, cognitive, and developmental learning dimensions, he identifies evolving patterns. Since the 1970's cognitive theory has predominated over behaviorist trends and become identified with pedagogical principles of problem-solving and decision-making. That is, the focus has been less on behavior and more on the mental processes and knowledge structures (Shuell, 1986). Recent research on learning has focused on learning outcomes (McCord, 1985) and, since the 1970's, has incorporated developmental concepts. In colleges and universities the developmental concept has been applied most frequently to personal development and cognitive goals, such as group processes, communication skills, leadership, decision-making, inquiry strategies, and higher-level thinking skills (Fincher, 1986).

The research trends have progressed from learning theories in the 1950's, and instructional theories in the 1970's, to their connection in the 1980's using cognitive and metacognitive instructional strategies (McCord, 1985). Cognitive sciences and strategies of pedagogy are frequently treated as unrelated; however, some see evidence of narrowing that gap with a shift in

research from learning products to learning processes (Fasano, 1986). Learning skills and information technology have been the focus of research projecting the impact of technology on learning by futurists, curriculum experts, administrators, and technology experts (Dik, 1987; Chapman, 1986; Berbekar, 1987). The consensus of experts is conservative in the estimates, yet the experts raise questions regarding the widespread impact information technology will have on learning conditions and expectations. Technology provides individualized learning conditions in time, place, and customized materials never before possible. Yet for every access to knowledge and networks of interactive communications that technology creates, new avenues of information for learning offer corresponding challenges to cognitive styles (Dik, 1987).

Among the cognitive styles by which individuals organize information are field independence characterized by analytic and convergent thinking skills and field dependence characterized by global and divergent thinking (Fincher, 1985). Although few studies explore the cognitive development of college students, Pascarella (1985) finds evidence that critical thinking may be positively influenced by instructional approaches when classroom involvement is at a relatively high level of cognitive activity. An increased focus on the personal and dynamic nature of learning has decreased the importance of institutionally controlled variables, such as study skills programs. The focus has also increased the "emphasis on strategies to enable cognitive and metacognitive control" (Sherman, 1985, p. 97). This shift coincides with the renewed focus on humanities, general education curricula (Boyer, 1987) and the cognitive processes needed in the information age (Dik, 1987; Chapman, 1986).

The integration of curriculum and learning must evolve along with the connection offered through technology. As this occurs, fundamental changes in college curriculum may result. Organizational innovation and adaptation involving the integration of information technology and learning processes may be seen in "wired" campuses striving to place a computer workstation in the hands of each student and faculty member. This evolves at campuses such as Massachusetts Institute of Technology, where a dual commitment to liberal education in a highly technological-based institution creates unique learning situations. This may drastically alter the structure, organization and content of curriculum as learning expectations, conditions, and styles interact. Boyer (1987) cautions, however, that information is not knowledge; knowledge is the judgment to know which connections to make and how they should be used. Knowledge of the information needed -- how to use it, adapt it, apply it, and transfer it -- is essential. As new technologies bring down the barriers of time and place, barriers of the mind, just as the isolation of fragmented curriculum, must become transformed into connections of creative inquiry.

The convergence of the influences of the information age with general education and liberal arts results in compatible goals of broad-based information and thinking skills. Similar goals are cited in the recommendations of the Presidential Commission on Information Literacy (American Library Association, 1989). These include information transfer, active learning, problem-solving, focus on selection and interpretation over dissemination of knowledge, and the ability to anticipate rather than adapt. These are cited as well in discussions concerning learning theory and curriculum issues for higher education, the liberal arts areas in particular (Shuell, 1986; Boyer, 1987). Our society and economic future are based on

information from which people must choose alternatives. From divergent orientations emerge convergent goals that form an interactive and dynamic network for integrity of purpose and renewal.

Although there is ample literature, there is scant research in the area of professional teacher education programs. This may be due, in part, to what Tetenbaum and Mulkeen (1986) say is the politicized issue of education. Fundamental changes in teacher education programs must coincide with societal needs and focus on identifying the characteristics of a technological society and designing the components of a teacher education program to accommodate these characteristics. Some of the recent studies predicting the impact of technology on curriculum and learning address broad issues and through consensus of experts in these fields, show parallels of the current principles of learning theory in higher education and the information skills needed(Dik, 1987). New expectations are occurring as a result of the impact of information technology on education and society. Some of these factors are a problem-centered approach to learning and a focus on analyzing, selecting and sharing information for communication and decisions.

Application of Teacher Education Models

The following section provides some background on the curricula models applied to the group of teacher education programs under study (Appendix D), and the knowledge bases (i.e., scholarly literature) that undergird them. The teacher education models were varied and uniquely applied to each institutional program. They encompassed areas focusing on leadership, reflection, progressive education, social reconstructivism, developmental perspectives, multicultural and global emphases, effective teaching, and teachers as total persons, and decision makers. The models were applied to

curricula that had undergone recent self-study, review, and accreditation by NCATE 1991-92. The most prevalent models espoused by the group of 99 institutions initially analyzed were the inquiry, personalistic (e.g., value or developmental), academic, and professional (multiple roles) models. Many, however, had a strong foundation in a performance-based (behavioristic) tradition. Others had strong elements of traditional-craft through field components. Those that did not present an explicit model of teacher education, described the traditional curriculum of general, specialty, and professional studies and were grouped as a structural model.

An overarching model that offered a symbiotic relationship among a variety of distinctly different approaches was important for institutions with many specialty programs. These institutions often accommodated different models and had a need to present them within a cohesive framework. The literature suggests several frameworks within which diverse models could "fit." The one used most often by the teacher education models is Zeichner's (1983) four paradigms identified as traditional-craft, personalistic, behavioristic, and inquiry-oriented teacher education. He adds the academic paradigm which stresses a strong liberal arts orientation and foundation.

Few institutions supported a field-based (traditional-craft) curriculum as its primary focus. Only one of the 99 institutions in the study cited it as a primary focus while others cited it as a focus secondary to effective teaching, reflection, decision-making or a professional model. Theorists cited as supporting the field-based model ranged on a continuum from a technical focus on effective teaching skills (Hunter, 1976) to a process focus (Berliner, 1985). The theories of Dewey (1938) were cited most frequently by programs with a strong orientation to clinical and field-based aspects.

The personalistic paradigm was represented by institutions whose focus was on developmental or values models. In both cases, sub areas are identified. The application of developmental models ranged from those focusing on holistic perspectives (e.g., the invitational model of Purkey & Novak, 1984) to others emphasizing the cognitive (Neves & Anderson,) or professional perspectives (Maslow, 1971; Fuller, 1969; Bruner, 1966). The application of values models ranged from foci on social/cultural issues (Freire, 1984; Bandura, 1977) to those centered on spiritual and ethical (Purpel, 1989). The commonality among these models is the emphasis on personal growth and development from which student teachers construct the knowledge, abilities, and skills required. The diversity among them is evident in the range of foci from holistic personal growth to social and democratic responsibility. As implemented by the institutions under study, these had additional areas of emphasis, such as, outcomes, liberal arts, or reflection orientations.

The behavioristic paradigm includes models of teacher education programs that are outcomes-based or competency-based curricula. While these models have been replaced in practice more recently by inquiry and constructivist theories, their influence on curricula remains a significant force through state competency-based criteria for program approval and accountability. The institutional models reviewed which followed this tradition were effective teaching models and those emphasizing the knowledge of the multiple roles of the professional. Many institutions in the study identified outcomes or performance skills as the secondary influence on curriculum and many that did not were most certainly affected by this influence if they were in states with competency-based guidelines for program approval. Institutions

which explicitly identified competency-based curriculum as the primary driving force, generally cited the American Association of Colleges for Teacher Education (AACTE) and competency documents of a specific state. While the behavioristic models have been a tradition for decades, models supporting the need for reflection, critical thinking, and decision-making in a world of change have become more prevalent. The competency-based structure in many states and institutions remains in place as a means to measure outcomes and provide accountability.

The inquiry paradigm, however, is prevalent in institutions whose models grouped into areas explicitly focused on decision-making, reflective practitioner, and reflection. These groups reflect an intention to focus on the inquiry (process) model often in conjunction with a competency-based curriculum (product). Others models cited the inquiry paradigm as a secondary focus. Authors such as the Holmes Group (1986) and Schon (1987) were cited as knowledge bases for these inquiry-based institutions.

A strong liberal arts model represents an academic paradigm. Some institutions that applied liberal arts models represented a continuum ranging from critical reasoning to independent learning and scholar. Other institutions which emphasize the practitioner models use scholar/education as a secondary focus. Institutions which focus on reflection and critical thinking models frequently cited a liberal arts framework. Authors cited by these groups include Paul (1986), Shulman (1987), Tonjes (1991), Cognitive and Technology Group (1990), and the Holmes Group (1986).

The paradigms that most closely resemble an information-based education supporting goals for information literacy are the traditional-craft and inquiry models. The literature of information literacy calls for curriculum that

has active learning experiences using resources of the "real world" and cognitive processes. The findings of the study indicated the information-based elements found across diverse models.

It is interesting to speculate on models not represented in this group. However, this study is limited to those models implemented at institutions during a particular time period. Many institutions under study cite references to current teacher education research and established practice that combine elements of many models. Those calling on restructuring curriculum may face difficulties. The review of the teacher education programs reflected shifting models occurring despite an underlying curricular foundation that remains fixed and difficult to change. Working within these philosophic and structural frameworks of disciplinary perspectives and environmental influences may present some possibilities for change through commonality of purpose and rationale.

National Council for Accreditation of Teacher Education (NCATE)

NCATE is the sole national agency for accrediting teacher education programs and through its revised Standards has established a system by which those programs undergo a renewal process for improving programs and keeping them current.

In 1983, NCATE initiated the process of redesigning its standards and procedures. Following extensive study, the revised Standards were piloted in 1987. Basic changes were the result of concerns about the ambiguous and redundant standards that were inconsistently applied and the cursory attention paid to the administrative units responsible for the programs (Gollnick & Kunkel, 1986). The primary changes established a more clearly defined focus

on the importance of the unit in ensuring quality and a well-articulated and cohesive program (National Council for Accreditation of Teacher Education, 1990). More coherence and cooperation between the various accrediting agencies was sought as well (Roth, 1989). Much of the impetus for this reform came from the AACTE which has supported a national accrediting system (Gollnick & Kunkel, 1986) and called for the national certification of teachers. Both agencies support multilevel cooperation and coordination of accrediting/approval that includes state, national, professional, and industry involvement.

As a result of the revision, the five unit-based NCATE Categories now center on the knowledge base, relationship to the world of practice, students, faculty, and governance and resources. Within these Categories, eighteen Standards and 94 Criteria must be met by teacher education institutions seeking accreditation. Since the revision, the literature has centered on issues related to the knowledge base (Galluzzo & Pankratz, 1991; Shulman, 1987), updates on the accreditation status of member institutions, and most recently, the debate over the merits of the revised accreditation process (Diegmuller, 1992; Nicklin, 1992). Findings of a survey taken of those involved in piloting the revised NCATE Standards showed a positive response to the cohesiveness and unity that resulted from the collaborative process of defining the program and the knowledge bases. These outcomes have not been refuted as the current debate over NCATE Standards and other credentialing issues and agencies continue (Diegmueller, 1992; Nicklin, 1992).

As NCATE approaches completing the accrediting process for all institutional members under the new Standards, it does so amid controversy. The concerns over the accrediting process with regard to time, cost,

duplication of efforts, and whether the Standards are outmoded, too prescriptive or not outcome-based continues within a larger framework. The education profession is currently negotiating the whole issue of coordination and responsibility of standards and accreditation by professional association, and state standards (Leatherman, 1992; Olson, 1991). The Standards, however, provide not only a means by which programs are approved, but also a document of the curricular patterns applied to teacher education programs over time.

Summary

While studies from a variety of sources address the need to ensure that teachers have the skills necessary to prepare students for a changing workplace and lifelong learning, few address the importance of information skills as central to the foundation of curricula. The focus of this study is to determine whether teacher education curricular models are responding to society and business needs by supporting goals consistent with information-based curricula. It is based on the literature of library/education coalition groups, predictions of futurists, and studies linking curriculum and learning theory trends to the rationale and goals for information-based education. The coalition groups advocating an information-based education recommend its integration in K-12 and teacher training curriculum and suggest a need for research to analyze national standards and educational reform that identifies information literacy components. A current assessment of the literature confirms a continuing need for this research. There is no evidence of recent studies that have analyzed categories of information-based attributes that are integrated across different teacher education models. Evidence of patterns or

interrelationships of information-based attributes across applications of these models will be a first exploratory step leading to further studies.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine whether patterns of information-based components that are needed for students to achieve information literacy skills are emerging across selected teacher education programs. The study analyzed the NCATE Standards for patterns of information-based components and the responses of selected Institutional Reports for patterns of information-based components across teacher education programs. The theoretical basis of the research model used to guide this study is congruent with characteristics of qualitative and naturalistic inquiry. Among the characteristics that Lincoln and Guba (1985) describe as a framework for naturalistic research design and methodology are: (1) the nature of reality as multiple-constructed and holistic and (2) hypotheses developed from the mutual, simultaneous shaping that makes cause and effect indistinguishable. Investigating phenomena of emerging information-based curricula elements in teacher education is compatible with this perspective. To ensure their own and their students' continuing readiness to shape their environments requires a capacity for ongoing learning and an understanding of evolving information networks that undergird the creation, dissemination, and preservation of knowledge. The guiding questions for this research emanated from basic concerns for preparing information literate teachers who can anticipate change and meet the challenges of an information age.

As reported by Lincoln and Guba (1985), a 1979 study by Schwartz and Ogilvy has implications for several aspects of the design of this investigation. Their analysis across disciplines identified converging belief patterns congruent with characteristics of naturalistic inquiry (i.e., multiple realities, mutually causal) rather than the dominant quantitative paradigm. The findings by Schwartz and Ogilvy of converging shifts of basic beliefs across disciplines, such as chemistry, philosophy, linguistics, the arts, and others, were grounded in the specific contexts of the theories of each discipline (Guba & Lincoln, 1985). This study explored the phenomenon of information-based attributes as expressed in the application of teacher education programs across different models of education.

Content analysis is a methodology that uses procedures to make inferences from texts by classifying the content of the texts into categories. The purpose of content analysis may range from coding open-ended survey answers, or detecting the existence of propaganda reflecting cultural patterns, or describing trends in communication content. Traditionally, content analysis derives from a quantitative, positivistic tradition for measuring frequency and variety of textual data (Weber, 1985); however, a more recent tradition of content analysis has evolved from qualitative and naturalistic inquiry. This new tradition provides a means to discover emerging patterns and ideas in data documents and comparing findings back to documents in a process of constant comparison that can lead to tentative theory development and subsequent testing (Guba & Lincoln, 1985) .

Using an ethnographic perspective for content analysis can clarify patterns of cultural behavior by perceiving document analysis as fieldwork. Ethnographic content analysis is a reflexive analysis of documents. In this

study, it is applied to explain regularities, connections, interrelationships, and possible patterns of information-based attributes among and across teacher education programs. The characteristics of naturalistic theory most applicable to ethnographic content analysis and this research are: qualitative methods, inductive data analysis, grounded theory, emergent design, research conducted in a natural setting, purposeful sampling, special criteria for trustworthiness, tentative application of findings due to multiple realities, utilization of tacit knowledge, and focus-determined boundaries (Lincoln and Guba, 1985).

Research Design: The Application of the Model

The research model applied to this study was used to discover the phenomenon of information-based attributes in teacher education programs. It was guided, therefore, by a naturalistic inquiry perspective. Finding evidence of an information-based curriculum in the goals, philosophy, and components across teacher education programs must be accomplished in a natural setting without any possibility of interference with the data. The Institutional Reports of teacher education programs responding to NCATE standards are written as the culmination of an extensive self-review process in preparation for the NCATE accreditation visit. The reports are well-suited for an ethnographic content analysis.

Current institutional reports, therefore, were examined to investigate information-based attributes by means of an ethnographic content analysis. Although the emphasis was on descriptive/interpretive findings, an effort was made to suggest a tentative model of theory building as well. Theory building will occur if patterns of an information-based curriculum phenomenon appear

across curricula and they suggest possible hypotheses that could test "why" these patterns or relationships are occurring.

Within the format of the NCATE Standards, the Institutional Reports describe teacher education programs that have undergone extensive and recent review, modification, and articulation of their knowledge bases. Moreover, curriculum models and coherent theoretical bases were presented in the Institutional Reports and sometimes included individual specialty areas. The exploration of teacher education programs for evidence of information-based curriculum specifically involved the use of those Institutional Reports that were submitted to the NCATE office for review during 1991-92. The textual narrative as defined by the topics of the eighteen NCATE Standards facilitated the identification of information-based themes or patterns that emerged.

Purposeful Sample Selection

Evidence of any patterns of information-based attributes between and among teacher education programs and NCATE Standards was contingent upon selecting reports that reflected a diversity of teacher education curricular models. Purposeful sampling assured this diversity by employing a maximum variation sampling procedure (Patton, 1990). That is, each selected document represented a different curricular model in the response to Standard I.A (Design of the Curriculum) until "redundancy" was achieved and duplication of models would have resulted from further selection (Lincoln & Guba, 1985). On this basis, ten institutional reports were examined.

Institution selection was limited to those institutions which were required or chose to submit information about their specialty area programs. Of the 99 institutional reports available for analysis for 1991-92, 75 (76%) included brief

descriptions of individual specialty areas in the general format requested by NCATE. These descriptions pertained to the knowledge base or major goals, and course requirements (Standard I.A-Criteria 1; Standard I.D-Criteria 13, 14; Standard I.E-Criterion 17). Each institution offering this information presented specialty areas either as individual areas or groups of areas that shared curricula goals, program outcomes, or organizational similarities. For example, some institutions described secondary programs as one area, others as several individual areas.

While standard sampling for quantitative/deductive inquiry allows researchers to generalize to a broader population, purposeful sampling selection for qualitative/inductive inquiry established a means by which I sought "representativeness" based on an evolving condition or pattern, and variations that occurred. This ethnographic content analysis, therefore, did not seek "generalizability" to a larger population; its purpose was expressly to allow possible connections to become evident from the varied data sources (Altheide, 1991).

Purposeful sampling, in contrast to random sampling, is the selection of "information-rich cases whose study will illuminate the questions under study" (Patton, 1990, p. 169). Several strategies may be used for purposeful sampling depending on the focus of an investigation. For this study, maximum variation sampling (Patton, 1990) was used to achieve a diverse selection with respect to teacher education models described in the institutional reports for 1991-92. Using maximum variation sampling, an analysis was made of the teacher education curricular models (NCATE Standards I.A, Design of the Curriculum, Criterion 1) of selected institutions by delineating characteristics of

similarities and uniqueness. Basic demographic information for each institution was also compiled.

Selection of Diverse Models

Institutions responding to NCATE Standards are required to articulate a model of teacher education which is undergirded by knowledge base(s). As defined by NCATE, the term model identifies:

> ... a coordinated and articulated system or design for the preparation of professional school personnel that has a knowledge base to support it. A professional education unit might adopt one or more models to undergird its programs. Models might be based on direct instruction, cognitive development, individual differences, cultural diversity, effective schools, behaviorism, etc. They might be based on themes or expected outcomes like teacher as decision maker, reflective teaching, etc. (National Council for Accreditation of Teacher Education, p. 65)

In order to analyze a diverse representation of teacher education program models, institutions were selected on the basis of the model of education they described. These models encompassed the internal and external influences to which they were accountable plus any other factors they included in their program design. An analysis of all 99 institutional responses to NCATE Standard I.A (Design of the Curriculum) Criterion 1 was made to determine the scope and general characteristics of the models. In a few cases the description of the model was located in the overview section of the institutional report. Appendix C shows the list of all institutions submitting reports to NCATE 1991-92.

The models fell into two groupings. One group (three) reflected models describing foci on curriculum structure, or curriculum design process, that

included outcome-based, or field-based curricula. Basically, this broad grouping focused on the what, where, when, and how of curriculum. These models were grouped under the general heading "Curriculum" in Appendix D.

The second group, and the majority of institutions reflected models as products (e.g., teacher as decision maker) or models as themes (e.g., developmental). Assigning institutions to one of the two general groups was not a mutually exclusive process. As seen in Appendix D, most models identified subthemes to clarify general models or to present additional emphases. The subthemes were not always consistent with the initial group assignment.

The models articulated in the institutional reports may have been influenced partially by assumptions made at the institutional level of what the NCATE Standards "meant" by models and the knowledge base(s) that undergirded them. It was assumed, however, on the basis of the self-study required by NCATE, that the models described were developed from consensus and reflected the recently reviewed, if not revised, curriculum of the teacher education program.

The models selected for analysis in this study presented identifiable characteristics of one of the previously described groups or were unique examples that would enrich the diverse data of models represented (e.g., spiritual-ethical). (See Table 1.)

Appendix C lists all the institutions reviewed by NCATE 1991-92. Those institutions (23/23%) that did not submit brief descriptions of specialty area programs were eliminated from possible selection and are so noted in Appendix D. These institutions either submitted separate folios for review by

Table 1

Selected Teacher Education Models

Case #	Model	Emphasis/Theme/Product
01	Curriculum-Outcomes Driven	Managers of learning environments
02	Curriculum-Process	Systematic model of program/curricular design
03	Curriculum-Structural	Major components: General education, professional studies, specialty studies
04	Developmental-Holistic	Invitational education
05	Decision Maker	Effective decision makers
06	Facilitator	Facilitator of student success
07	Independent Learner	Teacher as an independent learner
08	Liberal Education-Scholar	Multiple models guided by image of school and theme: Teacher as intellectual, analyst, knowledgeable
09	Professional	Educator as scientist/artist
10	Values-Spiritual/Ethical	Teacher as leader:Spiritual, liberal arts, justice, equality

professional associations or addressed state standards.

The purpose of using the specialty area program descriptions in the analysis was to broaden the range of teacher education program goals to include goals unique to specific disciplines. The information provided from program descriptions was varied in content and did not necessarily include the program descriptions for all programs at the institution. This meant that in many cases an institution with 50 or more programs may only have submitted descriptions to NCATE for fewer than ten. On the other hand, many institutions chose, for consistency, or perhaps as an internal review process, to include all program descriptions. While this was a limitation, an assessment of the specialty studies goals was still expected to enrich the total assessment of information-based attributes. A review of program descriptions written to reflect the standards of a state or learned society rather than NCATE was beyond the scope of this study.

The demographics of the selected institutions are representative of those that submitted reports to NCATE for 1991-92. This can be seen in the breakdown by type institution, funding source, and enrollment in Table 2. Regions are an exception with six of the ten institutions in the southern region as designated by their Southern Association of Colleges and Schools (SACS) regional accreditation.

Table 2

Demographics of Selected Institutions*

Case #	Region**	Type	Funding Source	Enrollment
01	SACS	Comprehensive	State	2,158
02	SACS	Comprehensive	State	6,261
03	NCA	Comprehensive	State	1,746
04	SACS	Comprehensive	Independent	1,902
05	WASC	Comprehensive	State	27,544
06	NCA	University	State	26,828
07	SACS	Comprehensive	Independent	1,338
08	SACS	University	Independent	9,161
09	NASC	University	State	17,937
10	SACS	Four-Year	Independent	1,250

* Petersen's Higher Education Directory, 1989

** Membership in one of six regional accrediting agencies is used to denote regional base: MSA (Middle States Association of Colleges and Schools; NASC (Northwest Association of Schools and Colleges); NCA (North Central Association of Colleges and Schools); NEASC (New England Association of Schools and Colleges, Inc.); SACS (Southern Association of Colleges and Schools); WASC (Western Association of Schools and Colleges, Inc.);

Analysis

Ethnographic content analysis is a constant interaction of these concurrent activities: sampling, data collection, coding, categorizing, data display, conclusion-drawing, and verification. The unit of coding analysis in the document is the sentence or stand-alone phrase. Information-based attributes are determined from these units. The institutional report describing each individual teacher education program was analyzed reflexively for emerging elements of information-based attributes. This was accomplished in (1) concurrent, reflexive activities of data reduction through the coding and categorizing of information-based concepts and (2) the display of themes, interrelationships, and patterns that emerged from the data. The purpose of the ethnographic content analysis, then, was a reconceptualization and analysis of the emergent data in relation to the information-based phenomenon under study.

All the documents needed for the ethnographic content analysis were available for review at the NCATE office in Washington, D.C. Selecting, organizing, and coding data was compiled by hand and entered into word processing, data management, and hypertext enhancement programs to facilitate organization and analysis. The latter, a software program called HyperRESEARCH is designed for organizing qualitative research data. Standard assurance of confidentiality will be maintained, and access to data collected from the study is the sole responsibility of the researcher. The following account details those processes and procedures for data collection, coding and categorizing, conclusion-drawing, and interindexer consistency.

Data Collection

Since NCATE Standards cover major elements of teacher education programs and allow institutions broad parameters to describe unique aspects, institutional responses to the Standards were used as the means for analyzing selected program models. To ensure the most recent data, institutional reports were selected which underwent the NCATE process in 1991-92. It was assumed those institutions had undergone recent self-study and modified their programs based on the current consensus of knowledge bases, institutional goals, state certification requirements, and myriad other forces on the curriculum. The structure of the reports was ordered topically by eighteen NCATE Standards which was divided among five NCATE Categories identifying major components of the teacher education program (Appendix A). The most important Standards for this study are in Category I (Knowledge Bases for Teacher Education). This Category covers the first five Standards dealing with the design, delivery, and content of the curriculum. Responses to other Standards were used in relationship to the curriculum, such as Standard II.A (Clinical and Field-Based Experiences), Standard II.B (Relationship With Graduates), Standard IV.C (Faculty Development), Standard V.A (Governance), and Standard V.B (Resources). These Standards, except V.A-B, were also analyzed for information-based attributes. Standard V.B (Resources) was used to provide supporting information regarding the resources available and accessible to the teacher education program.

Prior to using these documents for analysis, the NCATE Standards were first analyzed to determine what NCATE says about the importance of information-based elements within the content of the Standards. Emerging information-related attributes in the institutional reports were then assessed to

determine whether the reports went beyond those elements explicitly included in the NCATE Standards.

Coding

In this study I coded information-based attributes derived directly from the data documents (grounded theory). Themes and interrelationships of categories were analyzed among and between the teacher education programs that reflected diverse knowledge bases and the NCATE Standards. Tentative hypotheses were formulated based upon patterns as they emerged.

While the NCATE Standards, as revised in 1987, are said to be nonprescriptive, there are criteria which endorse specific curriculum perspectives considered essential for accreditation (i.e., cohesive program, recognition of the importance of technology, and multicultural perspective). To the degree that categories of these information-based elements were identified in the description of the individual models, a commitment of that program to aspects of an information-based curriculum was suggested. It was the totality of connections between and among certain codes that presented results in the form of emerging themes, connections, interdependencies, and patterns. These results are displayed in the analysis and findings in the next chapter.

For the purpose of this study, a taxonomy of information-based attributes (concepts) was developed (Appendix B) to use initially as background and guidance. The taxonomy aided the identification of the information-based attributes in the data documents and did not serve as a constraint on the emergence of categories. Developed as a review of information-based attributes compatible with the goals of the Presidential Commission on Information Literacy (American Library Association, 1989), the taxonomy

broadly defined and coded information-based attributes. The attributes included information resources, information processing skills, information technologies, and information management skills. Other sources in the literature as well as recent symposia on the topic have also provided clarity and support for a general coding to guide this analysis. In sum, the taxonomy reflects the literature that focuses on generic lifelong, information-based skills needed for information literate citizens, workers, college students, and pre-service teachers in an information-driven society.

A protocol for coding information-based attributes identified in the text was established to identify and code relevant terms or phrases as they emerged (Miles & Huberman, 1984). This protocol was developed as information-based attributes were "tagged" in the documents and coded by their function rather than by their organization within the Standards. Segments were initially coded as information-based attributes relevant to information structures, processes, information management skills, or information roles. Gradually codes were established from these attribute concepts in the context of the data.

The coding took place tentatively with the first four documents. The interactive process of comparing information-based attributes and codes of each successive document to those from previous documents (constant comparison) required ongoing modification to insure the eventual stabilization of the codes. Once stabilized, these codes were then considered "grounded" in the data documents. Code level one included terms related to information resources; code level two covered action terms directed at the resource; code level three reflected affective/facilitative terms. (For a fuller explanation of code levels, see Chapter IV.) Some information-based attributes did not fall

into particular codes and, thus, remained separate. Each attribute was identified by location in the document and by context in the structure of the NCATE Standards which associated it with a particular topic. Once the codes were formed, a dichotomous procedure linked to the developing codes provided a systematic way to establish consistent coding across documents (Patton, 1990).

Conclusion-Drawing and Interindexer Consistency

Although computer programs have been developed that are knowledge-based, none can interpret the variety of specific meanings that will occur in documents. All documents, therefore, were scanned by hand and information-based attributes were identified and categorized for meaning relevant to the phenomenon and within the context of the text. Each segment was initially coded as an information attribute and entered into the computer using HyperRESEARCH. HyperRESEARCH is based on the hypertext concept of organization which allows non-sequential links to the data for flexible retrieval and tentative hypothesis testing. It enhances the organizational tasks and facilitates flexible coding and analysis of the elements categorized by information code, by knowledge base model, and by NCATE Standards. This is a deconceptualization/reconceptualization process (Tesch, 1990) of qualitative analysis which allows the exploration of coding and patterns. Data is described to show the themes and conceptual linkages, interpretations, and conclusions consistent with the ethnographic content analysis.

Techniques to determine consistency of the coding were accomplished using an interindexer consistency check. In order to determine if the coding process that was used could be repeated with a degree of consistency, a fellow doctoral student and novice coder repeated the coding procedure using

a randomly selected document. A set of directions with definitions, code list, and document was provided. The coder selected the segments to be coded and, using the code list, assigned codes which most closely resembled the type information resource and the contextual meaning of the phrase in which the information resource term was contained. There were four initial tasks to this coding check: (1) the agreement of the units selected to code, (2) the agreement of the information resource term selection, and (3) the agreement of action term selection, and (4) the agreement of affective/facilitative term selection. The interindexer coding consistency was 83% agreement of units selected for coding, and 84% agreement of the Information Resource term selection, 65% agreement of Action term selection, and 41% agreement of Affective/Facilitative term selection respectively (See Table 3).

Table 3

Percent of Interindexer Consistency Selection Agreement

Agreement	Analysis unit	Information Resource terms (Level one)	Action terms (Level two)	Affective/Facilitative terms (Level three)
Selection	83%	84%	65%	41%

An additional task for the coder was to determine the actual subcodes within each code level. For example, code level one, information resource-

related terms, included such subcodes as Traditional Resources, Information Technology, Audiovisual, and others. While the percent of agreement for *selecting terms to be coded* was not as high as one would hope (see Table 3), the percent of agreement for *assigning only those terms that were previously selected for coding by the researcher* to the appropriate subcodes was relatively high. The percent of agreement for subcoding Information Resource terms was 92%, for subcoding Action terms was 97%, and for subcoding Affective/Facilitative terms was 90% (see Table 4).

Table 4

Percent of Interindexer Consistency Subcoding Agreement

Agreement	Information Resource subcodes (Level one)	Action subcodes (Level two)	Affective/Facilitative subcodes (Level three)
Subcoding	92%	97%	90%

The process of analysis involving the identification of information-based attributes, the patterns that evolved into subcodes and code levels, the exploration for commonalities found across models, and the linkages to teacher education were an integral development of the results described in the next chapter.

CHAPTER IV

RESULTS

The purpose of this study was to determine whether patterns of information-based attributes emerged as themes, interrelationships, or patterns across selected teacher education programs. The study analyzed the patterns found in the NCATE Standards, the institutional reports of selected teacher education programs, and selected specialty studies.

This chapter is organized into four sections. The first section continues a detailed discussion of the coding process. This is followed by three sections which address the research questions: an analysis of the information-based attributes in the NCATE Standards; the information-based attributes across teacher education curriculum models; and the information-based attributes across specialty studies.

Results of the Coding Process

It was anticipated that different categories of codes would form from the data collection. What was not anticipated, however, was the concept of code *levels* making connections and allowing a continuum from simple listings of information resources to more complex, affective and facilitative concepts. For example, as the analysis progressed, the function of coding information-based attributes expanded from organizing them by similar type to representing semantic linkages that showed their conceptual range. The following description of the three-level coding process details a progressive

interaction of information-based attributes and curricular attributes and is integral to the results.

Concrete and abstract information-based attributes were the basis for analyzing the extent that they were integrated within selected teacher education curricula models. As these information-based attributes were identified in the NCATE Standards and the institutional reports, they were coded for patterns and themes across the teacher education models.

The process of identifying and coding information-based attributes used constant comparison analysis associated with grounded theory. Identifying the information-based attributes began as an open inquiry process. The range of information-based attributes was expected to include, but not be limited to, those identified in the literature (e.g., information management, information processing, and information resources). Only the institutional reports' responses to NCATE Standards pertaining to undergraduate curriculum were analyzed (NCATE Standards I.A-E, II.A-C, IV.B, and specialty studies). The institutional reports from which multi-level meanings of information-based attributes were initially identified ranged from the description of curricular goals and the structure and design of a program to the process of the institutional self-study and the function of administrative procedures. Ultimately, the information-based attributes involving administrative functions were not used in the analysis. The information-based attributes analyzed dealt only with aspects of information resources, information management, and information processes as related to curriculum, teaching, and learning.

The results of the initial analysis evolved from a progression of coding refinements. The refinements set additional parameters that served to link, not limit, information-based attributes to broader concepts. Having selected

portions of the institutional reports that pertained directly to curricular issues, I found patterns of information-based attributes emerging into broad categories of information resources, learning/teaching activities and processes, and curricula content. While these areas are all a part of the broad construct of information-based attributes (Curtis & Eisenburg, 1991; ALA, 1989), unless linked to a central, information-based context, interpretation would vary. For example, decision making, critical thinking skills, role playing, and active learning are elements of an information-based curriculum and much in evidence in the documents under study. It would require additional research, however, to assess the associations among these elements and an information-based curriculum.

Instead, I made a more direct focus on the explicit, contextual links to information-based curricula by identifying terms related to information resources. While an information-based curriculum assumes a central role for information-related attributes in educational situations, it does not require the inclusion of specific information resources. Proponents of information literacy, however, recommend a resource-based education in which active learning takes place using a variety of "real world" resources, such as computer, curriculum, or library resources. This interaction of learning with varied resources encourages critical thinking and facilitates the ability to adapt, transfer skills, and problem-solve when confronting new information formats. By identifying additional information-based attributes in the data, the linkage from concrete, information-based resources to more abstract learning processes and practical problem solving skills may occur.

"Information Resources," therefore, became Code Level One for information-based attributes that represented concrete information-based

resources. These resources were subcoded by similar properties (e.g., Traditional Information Resource, Information Technology) and became the means by which connections were made to other information-based attributes. From the data, attributes coded at Code Level One included persons, agencies, technological resources, or information structures that mediated information or were the means to information in its primary role.

The actions or operations made directly on these resources were then identified as Code Level Two, Action. These included types of actions, such as the application, location, analysis, integration, construction, or repackaging of information resources. While these actions were usually identified in the literature as information management skills, and research skills, they could also represent concret operations performed by technologies. The actions identified as Code Level Two were subcoded by similar properties (e.g., Manage/Search, Research, Develop/Adapt, Collaborate). They reflected concrete operations and were frequently found in the data as specific competencies or behaviors required for the preparation of teachers.

Code Level Three is the Affective/Facilitative Code for information-based attributes *related* to Information Resources (Code Level One). I identified these information-based attributes from the semantic connections between information-based resources and an action, a rationale, or influence that expanded the resource-based term to a broader concept or implication for learning. For example, a phrase linking "the selection of materials" to "making decisions" and "independent thinking" connects the concrete actions of selecting materials to the implications it has for decision making and independent thinking skills. The information-based attributes identified as Code Level Three were further refined into subcodes (e.g., Learning

Skills/Processes, Influence and Attitude, Learning Environment, Content Delivery). The linkages of information-based resource terms to affective/facilitative aspects of curriculum are important aspects of preparing teachers to be information literate.

The subcodes for each code level are listed in Table 5. Code levels and subcodes with examples of information-based attributes that were found in the selected institutional reports are listed in Appendix E.

Each of the three code levels often occurred in multiples representing different types of operations or resources in the same sentence or phrase (unit of analysis). Information-based attributes coded Information Resources at Code Level One, however, frequently had no link to any type of Action Code (Level Two) or Affective/Facilitative Code (Level Three). This was the case when resources were simply listed as being available, or when courses of study were listed with relevant titles (e.g., methods and materials, or computer applications courses). A unit of analysis with information-based attributes coded at both one and two levels might cite two separate types of concrete operations on two separate types of resources, both leading to an abstract concept which would be designated as Code Level Three. For example, a sentence with the phrase, "using video to evaluate teaching performance," includes information-based attributes coded as described in the following paragraphs. (See Table 6.)

At each coding level, information-based attributes were grouped and subcoded by type. (See Table 5). The information-based attributes for Code Level One (Information Resources) were identified by how information was stored, retrieved, delivered, or processed, or by persons or agencies

Table 5

Codes and Subcodes Formed from Information-Based Attributes*

Level One Code Information Resource	Level Two Code Action	Level Three Code Affective/facilitative
A. Traditional Information Resources	G. Manage/Search	O. Learning Skills/Processes
B. Information Technology	H. Research	P. Teaching Skills/Processes
C. Audiovisual Technology	I. Apply	Q. Influence and Attitude
D. Associative Information Roles	J. Develop/Adapt	R. Content Delivery/Information Management
E. Generic Information Resources	K. Collaborate	S. Learning Environment/ Classroom Management
F. Other Information Resources	L. Know	T. Other Affects
	M. Integrate	
	N. Other Skills/Processes	

* Information attributes associated with code levels and subcodes are listed in Appendix E.

Table 6

Example of Identified Information-Based Attributes and Coding Levels

Subcodes examples	Code Level One Resource-related terms	Code Level Two Action terms	Code Level Three Affective/Facilitative terms
Information Technology	*video*		
Apply		*using*	
Learning Processes			*evaluate*
Teaching Skills			*teaching performance*

responsible for the storage, retrieval, delivery, or processing of information. These codes were broadly defined to account for meaning in context by different writers. For that reason, the general term, "technology," is placed in the subcode, Information Technology, just as is the specific term, "computers." For a different example, the term, "media," usually suggests films, transparencies, prints, and so forth and is subcoded as Audiovisual Resources (see Appendix E). The subcode, Generic Information Resources, includes terms which are too vague to place in other codes (e.g., resources, materials). The Associative Information Role subcode includes information-based attributes with collaborative properties, such as persons or agencies. They

were frequently found linked with descriptive information-based attributes. For example, the phrase, "library media," was subcoded two times, first as Associative Information Roles and second as Audiovisual Technology subcodes within Code Level One.

Information-based attributes at Code Level One were the most prevalent in the data findings, however, many of them could only be single coded because they were listed as information resources or resource-related courses of study without any linkages to specific actions or affective/facilitative conditions. There are progressively fewer information-based attributes, consequently, coded at Code Levels Two and Three in comparison to Code Level One. The fewest information-based attributes are coded Affective/ Facilitative at Code Level Three and have the richest data for identifying substantive elements of an information-based curriculum. Table 7 shows examples of units of analysis (sentence or phrase) with information-based attributes underlined to reflect coding at the first two levels. Using Information Resources as Code Level One, "materials" falls into the subcode Generic Information Resources. In the examples above, the Action Code at Code Level Two is evident. To "understand," "evaluate," "work with," and "demonstrate" are actions taken on an information resource. The subcodes used range from Know subcode and Research subcode in example one, to Apply Subcode in example two. These are typical examples of units of analysis that include both Information Resources and Action Codes (Code Levels One and Two).

By expanding to the Code Level Three, occurrence of affective/ facilitative attributes were identified and linked directly from an information resource with

Table 7

Examples of Information-Based Attributes at Code Levels One and Two*

---

1. *Understand* and *evaluate* curriculum and **materials**...
2. Field-based opportunities to *work with* **audiovisual materials, equipment** and *demonstrate* **computer competence**..

* Information-based attributes at Code Level One are in Boldface. Information-based attributes at Code Level Two are in Italics.

---

the three levels usually explicit: (1) information resource attributes, (2) action attributes, and (3) affective/facilitative attributes. Examples in Table 8 show the coding of information-based attributes at Code Level Three. Note that in Table 8, example one, a link was made from the concrete operations of "selection of materials" to "making decisions" and "independent thinking." In example two, a series of applications by which "professional journals" were used by faculty is given. A more complex process in example three links transfer skills with resources by expressing the need for teachers to "convert knowledge" into appropriate "materials for teaching." It is the analysis of data linking the abstract concepts to particular resources and actions that will be the focus of the following discussion.

Table 8

Examples of Information-Based Attributes at Code Level Three*

---

1. Independent thinking developed by making decisions concerning the *selection* of content, methods, **materials** and the evaluation of effective teaching...
2. Professional **journals** *used* by faculty for personal use, professional development, and resources for classes...
3. *Understand* **materials** of content and techniques to convert knowledge skills into methods and materials for teaching...

* Information-based attributes as Code Level One are in Boldface.
Information-based attributes as Code Level Two are in Italics.
Information-based attributes as Code Level Three are Underlined.

Results of Information-Based Attributes in NCATE Standards

The following discussion will center on the information-based attributes found in the NCATE Standards, their code levels, and their relationship within the Standards. Standards that address teacher education curricular issues directly were assessed for information-based attributes. This included standards concerned with Knowledge Bases for Professional Education (Standards I.A-E), Relationship to the World of Practice (Standards II.A-C), and Faculty Development (Standards IV.C) as they related to the three code levels: Information Resource, Action, and Affective/Facilitative. Standard V.B

(Resources) addresses information resources separate from teacher education curricular issues. It was not, therefore, used in assessing information-based attributes.

It is important to remember that while the NCATE Standards provide a relatively free structure by which institutions articulate a model and respond to the Standards, there are current educational concerns that are *specifically* addressed by the Standards. These areas are multicultural/global concerns, exceptionalities, and technology. The NCATE Standards were assessed for information-based attributes, such as technology, to see if the information-based attributes described in the institutional reports went beyond the NCATE Standards.

Reference is made to information resources in Standards I.A (Design of the Curriculum), I.E (Content of the Curriculum - Professional Studies), and V.B (Resources). In the Design of the Curriculum (Standard I.A), Criterion 4 specifically mentions the "use of major journals" (Code Level One, Information Resources; Code Level Two, Action) in the field as one of the ways in which "knowledge bases of the professional studies component(s) are reflected" (Code Level Three, Affective/Facilitative). Information-based attributes in the Standards show the connection of applying traditional resources in order to facilitate the delivery and preservation of the knowledge bases.

In the Standard I.E (Content of the Curriculum - Professional Studies), Criterion 19 notes the "impact of technology and societal changes on schools" (Affective/Facilitative attributes) and Criterion 21 requires the preparation of teachers to include "knowledge about and appropriate skills" (Action attributes) in "instructional technology." While the emphasis of these information-based attributes do not reflect a foundation or central component,

given the conceptual range of attributes, it was expected that Standard I.E would elicit a preponderance of responses reflecting conceptual breadth of attributes. Some institutions, however, simply listed "instructional technology" as being addressed in the curriculum without elaboration while other responses required multi-level coding and showed connections among computer skills, learning, teaching, and the implications of technology on preparing teachers. The range of information-based attributes reflected by code levels cover Information Resources, Action, and Affective/Facilitative Codes. Table 9 shows the connections made to the Affective/Facilitative Code Level Three that go beyond concrete operational actions related to resources.

Standards concerned with Clinical and Field-Based Experiences and Relationship to Graduates (Standards II.A-B), and Faculty Development (Standards IV.C) do not address resources directly. It was anticipated that responses in the Institutional Reports to these standards would address the issue of information-based attributes using concrete Action Codes related to information resources.

The NCATE Category V (Governance and Resources), focuses much attention on the area of technologies as well as on traditional forms of library, curriculum, and audiovisual collections. The term "resources" in the context of Standards V.A (Governance) and V.B (Resources) refers to the whole range of resources that includes personnel, funding, physical facilities, library, equipment, materials, and supplies. An analysis of Criteria 84, 88, 90-4 that mentions specific information resources presents a straightforward emphasis on library/curriculum resources related to adequacy, review, access and availability and financial support. Although Standard V.B concentrated on

Table 9

NCATE Standards and Information-Based Attributes

NCATE Standard (Criteria)	Example
I.A(4)	Knowledge bases of professional studies component(s) are reflected in ... use of major journals in the field. (Content Delivery/Information Management)
I.E(19)	Professional studies component(s) include knowledge about the ... impact of technological and societal changes on schools. (Influence/Attitude)

information resources, it was not used in the analysis since it was not related directly to an explicit and integral link with teacher education curriculum. The information-based attributes covered in the standards are reflected in a range from all Code Levels. While Code Level Three connects information resources to both the delivery of the knowledge base as well as the impact of technology and societal changes, these information attributes are not cited as central curricular concepts. To determine if institutions went beyond the intent of the NCATE Standards, a comparison of the extent to which information-based attributes emerge and form linkages across teacher education models and program descriptions with those found in the NCATE Standards is discussed at the conclusion of this chapter.

Results of Information-Based Attributes Across Teacher Education Models

What follows is an analysis of the information-based attributes found across selected programs within the context of NCATE Standards and a description of the program models. The phrasing of the examples is abbreviated from the actual documents for ease of display while retaining contextual clues that lead to connections between information resources and other curricular issues. (See Appendix F for a full listing of the linkages of information-based attributes.)

Information-Based Attributes Across Teacher Education Models

The initial review of aggregate frequencies of information-based attributes suggested a need to explore (1) more sophisticated concepts currently in use, (2) collaborative issues, and (3) unique categories or patterns across teacher education models. Most responses to Information Resources (Code Level One) were in Standards I.A (Design of the Curriculum), I.E (Content of Curriculum - Professional Studies), and II.A. (Clinical and Field-Based Experiences). These showed primarily references to the application of computers and video toward some learning objective (Code Levels Two and Three). Code Level Three attributes are the most abstract and related to affective/facilitative conditions. They also reflect richer material that can be considered across teacher education models. Thus, an overall assessment of the themes, patterns and connections was made at that level.

The broadest range of coded information-based attributes was found in Standard I.A (Design of the Curriculum). These addressed the influence and ethical considerations of technology, learning and teaching skills using resources, content delivery and management of resources, the application of

resources in classroom management, and collaborative issues regarding information services. Of note in this group were the wide ranging concepts and the extensive use of technological references as well as traditional resources. The collaborative concepts were limited primarily to libraries' involvement in the traditional introduction of resources and research skills, and collaboration with the librarian in the design of the curriculum. Some examples of the range of these linked information-based attributes from Standard I.A (Design of the Curriculum) are in Table 10. Table 10 indicates a degree of sophistication concerning the connection between technology and cognitive skills and the influence on the learning environment by mediated instructional technology. It also offers examples of librarians' involvement in curriculum design; knowledge transfer; ethical and equitable decisions; impact of learning on technology; and analysis, evaluation, identification, construction, and knowledge transmission. All these examples were linked by Code Level Three to concepts that go beyond action directly related to information resources (Code Levels One and Two).

In Standard I.B (Delivery of the Curriculum), the conceptual range of information-based attributes is narrower than in Standard I.A (Design of the Curriculum). Most information-based attributes related to teaching skills and using technology and resources as tools. For example, collaborative events included an innovative method of encouraging faculty to use resources to develop their courses. The range of information-based attributes encompassing teaching skills was associated with evaluation, drill and practice, and independent study. Those information-based attributes associated with collaboration were faculty development, a study with the

Table 10

Curriculum Design and Information-Based Attributes

Case Number	Example
01	Use methods, materials, and media guided by theories of teaching. (Teaching Skills/Processes)
02	Employ knowledge of individual in learningenvironment mediated by instructional technology. (Learning Environment/Classroom Management; Content Delivery/Information Management)
07	Traditional knowledge transfer no longer suffices in technological society. (Learning Skills/Processes; Influence/Attitude)
08	Apply technology for useful ethical educational objectives. (Influence/Attitude)
08	Technology materials developed from cognitive science to impact learning. (Learning Skills/Processes)
10	Faculty collaborate with librarians on curriculum. (Other: Collaboration)

librarian, and utilizing services to use technology effectively. Some examples are included in Table 11.

Table 11

Curriculum Delivery and Information-Based Attributes

Case Number	Example
05	Student-centered instructional strategies use computer for tutoring. (Teaching Skills/Processes)
10	Faculty study reference collection with reference librarian. (Other: Collaborative)

In Standard I.C (Content of the Curriculum-General Studies), I.D (Content of the Curriculum-Specialty Studies), and I.E (Content of the Curriculum-Professional Studies), different patterns of information-based attributes appeared. Those pertaining to General Studies, like those in Standard I.A (Design of the Curriculum), covered a broad range of information-based attributes focusing on the influence of technology, ethical issues of technology, and the changing structure of content to collaboration and teaching. Some examples from Standard I.C (Content of the Curriculum-General Education) are in Table 12. Nearly all of the occurrences of collaborative efforts (78%) were from Case 08.

Those information-based attributes from Standard I.D (Content of the Curriculum - Specialty Studies) reflected the orientation of teaching skills. With the examples available, links were made to converting knowledge skills to teaching materials and the collaboration between faculty and computing

Table 12

Curriculum Content-General Studies and Information-Based Attributes

Case Number	Example
08	Understand powers/limitations of science & technology in changing world. (Influence/Attitude)
08	Be responsible to use technology ethically and appropriately. (Influence/Attitude)

Table 13

Curriculum Content-Specialty Studies and Information-Based Attributes

Case Number	Example
08	Understand materials to convert knowledge skills into materials. (Teaching Skills/Processes; Learning Skills/Processes)
05	Computer Education Plan for faculty collaboration. (Other Collaboration/Workshops)

services. Examples for Standard I.D included subcodes within Code Level Three: such as "Teaching Skills/Processes," and "Other: Collaboration/ Workshop" as shown in Table 13. These examples cover aspects of

converting knowledge and skills, being aware of technological trends for future implications, and acquiring data management skills and computer assisted instruction skills.

As noted in the previous section, Standard I.E (Content of the Curriculum-Professional Studies) does have statements in Criterion 19 regarding the inclusion in the curriculum for the knowledge of "the impact of technology and societal changes on schools." Criterion 21 refers to preparing teachers with knowledge about and skills in "instructional technology" as one of a series of professional components required for programs. The information-based attributes in responses to this standard were related to Code Level Three

Table 14

Curriculum Content-Professional Studies and Information-Based Attributes

Case Number	Example
04	Students need skills to make choices in technological society. (Learning Skills/Processes)
06	Independent thinking developed by making decisions about the selection of materials. (Learning Skills/Processes)
10	Time established for intensive use of library resources. (Other: Collaborative)

learning skills and collaborative events. These data included making choices in a technological society, integrating computer skills into specific courses,

using intensively library resources, and having a media specialist available to assist. Examples for Standard I.E are shown in Table 14.

In Standard II.A (Clinical and Field-Based Experiences), the subcodes were in Teaching Skills/Processes and Collaboration. The information-based attributes reflected a more narrow focus of practical tasks. Examples for Standard II.A are shown in Table 15.

Table 15

Clinical and Field-Based Experiences and Information-Based Attributes

Case Number	Example
01	Plan and utilize media or audiovisual to achieve objectives. (Teaching Skills/Processes)
02	Observe school library for resources, media, and types of equipment. (Other: Collaborative)
02	Review using library/learning resources center as noninteractive experience. (Other: Collaborative)

In Standard II.B (Relationships with Graduates), Development/Adapt subcode (Code Level Two: Action) was the major area which alluded specifically to curriculum revision resulting from suggestions made by graduates, particularly in areas of computer use. Most responses related to concerns graduates reported regarding the preparation of school personnel in areas of technology. Standard II.C (Relationship with Schools) was similar in

focus but lacked the involvement with information professionals that might be expected. Examples for II.B are shown in Table 16.

Table 16

Relationships with Graduates and Information-Based Attributes

Case Number	Example
02	Faculty assist graduates through teleconferences and sharing resources. (Other: Professional Development)
02	Media Services collaborate concerning improving delivery of quality education to public schools. (Other: Collaborative)

In responses to Standard IV.C (Faculty Development), a similar focus linked subcodes by Teaching Skills and by Collaborative events. Examples from IV.C are shown in Table 17.

The NCATE Standards provided a means by which current information-based attributes found in curricula could be analyzed. The extent to which they were identified and the patterns of information literacy that became evident were explored. By using the coding procedure that evolved from working with the data, the information-based attributes formed patterns of use, attitude, and influence.

Table 17

Faculty Development and Information-Based Attributes

Case Number	Example
10	Faculty computer leave to initiate new instructional computing styles. (Teaching Skills/Processes)
09	Computer center consults with faculty. (Other: Collaborative)

Individual Teacher Education Models: Information-Based Attributes in Context

The institutional reports addressed the educational issues required for NCATE accreditation. Patterns of information-based attributes which appeared across teacher education models were discussed in the previous section. This section considers the analysis of selected institutional reports and patterns of information-based attributes that appeared. It is important to remember that the individual institutions represented different models of teacher education.

In assessing the information-based attributes in individual models, it was clear that great differences existed in the extent to which information-based attributes were present among the institutions analyzed, particularly the extent to which Code Level Three attributes were present. These differences could be the result of the influence of the model, the institutional organization, leadership priorities, or external influences from constituents, professional standards, and accrediting agencies. Still, it was useful and necessary to

know the origin and context of the occurrences of the information-based attributes.

The two major groups of teacher education programs included three programs that focused on the content, structure, and process of curriculum, and seven that emphasized a product (e.g., teacher as decision maker) or theme of the program (e.g., invitational education). In the first group there were an outcomes-driven curriculum model, a structural model, and a process model. The Outcomes-Driven Model (Case 01) expressed a strong orientation for teacher as managers of learning environments. In this model, few information resources were linked to Code Level Three, Affective/ Facilitative codes. Most of the information-based attributes were at Code Level Two, Action codes. Of the specialty studies described, math was especially active in expressing a range of information-based attributes in the three levels of coding. Math also signaled the impact of technology in the workplace and in education.

The Curriculum Process Model (Case 02) strongly emphasized the process of curriculum design, curriculum decision-making, and curriculum implementation with no particular focus on a product or thematic orientation. Code Level Three (Affective/Facilitative) information-based attributes were expressed across a broad range of curriculum areas primarily as audiovisual and traditional resources that were applied to and developed for teacher skills. In Case 02, most activity took place in the area of faculty workshops and information resources and within the specialty studies of math and foreign language. Of Code Level occurrences, this case reflected the second greatest number (48) and the second highest percent (42%) of Code Level Three citations.

The Structural Model (Case 03) also had no discernible thematic orientation, but rather expressed the traditional organization of the inclusion and relationship of three traditional components: general, professional, and specialty studies. Here the information-based attributes expressed were generally in the area of technology and generic resources that were applied to specific teacher tasks. It gave no elaboration of the importance of the influence of technology. Most activity of information-based attributes came from the specialty studies areas, particularly school library media (undergraduate), elementary, and business programs.

The second group of thematic or product-models included values, liberal education, developmental, independent learning, decision-making, professional, and facilitator models. These models showed information-based attributes linked to curriculum issues that were far richer in content, even given the limitation of any in-depth discussion in the documents.

The Values Model (Case 10) represented an independent four-year institution that stressed a spiritual, ethical orientation rather than a social/cultural emphasis, and focused on its Quaker background and strong liberal arts tradition. The model was cohesive and clearly articulated as a driving force in curriculum decisions. Its activity with regard to information-based attributes was strongly based in both traditional and sophisticated technological resources. Collaborative efforts were widespread involving all the information provider agencies available at the institution. Additional collaborative efforts were supported through internal grant possibilities involving library staff and faculty members. The model also made clear linkages among information-based attributes, resources in particular, and concepts of learning. While linking resources to liberal arts and cognitive

processes, it did not discuss ethical considerations. It identified strong links to the application of information and to the identification and selection of resources with an emphasis on primary resources. The same consistency for an extensive information-based curriculum was not reflected in the brief program descriptions. Of Code Level occurrences, this case reflected the highest percent (48%) of Code Level Three (Affective/Facilitative) citations.

The Liberal Education Model (Case 08), like the Values Model, had a strong liberal arts orientation and expressed extensive activity for information-based attributes. In fact, it had a unique perspective called "Anchored Instruction," which linked technological advances with cognitive processes in curriculum design and implementation. Information resources identified in the document were predominantly computer and video. While the activity involving information-based attributes was mostly applied, that application ranged from affective/facilitative connections with learning processes, to institutional development, problem-solving, and teacher as relator. Collaboration and faculty development attributes encouraged faculty leave alternatives that focused on developing instructional computing styles. Early Childhood and Elementary programs were equally active. Of Code Level occurrences, this case reflected the greatest number (55) of Code Level Three (Affective/Facilitative) citations across the broadest range of curriculum areas.

The Developmental Model (Case 04) represented an Invitational Education model. It expressed little evidence of information-based attributes as integral to its program other than some traditional and audiovisual resources for teaching skill applications.

The Independent Learner Model (Case 07) emphasized information-based attributes with regard to tradition resources as well as computer

software for the acquisition of knowledge and its role in transfer skills and independent thinking more than its application in teaching. Ethical issues were expressed with regard to traditional resources (privacy issues). The link of resource-based attributes in this model at Code Level Three (Affective/ Facilitative codes) was primarily in the role resources have for developing independent thinking, communication, and relevant judgments.

The last three models were all at state run and very large institutions. Their foci ranged from one with a teacher focus (Decision-Making Model, Case 05), another with a focus on student success (Facilitator Model, Case 06), and finally, the third with a focus on the melding of multiple roles of teachers (Professional Model, Case 09). In the Decision-Making Model, information attributes were widespread throughout its curricular program as described. They were primarily technological in application covering areas of information management/search tasks. Information-based attributes were linked to learning processes, ethical considerations of educational objectives, independent study and its value in evaluation and decision-making. Physical education and music specialty studies were described as having extensive information-based attributes, even more than in business or elementary programs.

The Professional Model (Case 09), however, presented few information-based attributes. What there was related primarily to utilizing computers in the area of teaching strategies. The Facilitator Model (Case 06) mentioned telecourses, yet otherwise expressed information resource attributes in mostly generic terms with some computer and video activity. Traditional resources were not emphasized. The application of resources was generally limited to the area of organization, record keeping and decision-making, and

independent thinking with regard to the selection and development of materials.

The models that had described a substantive range of information-based attributes as integral components throughout curriculum were the Process, Liberal Education, and Values Models. They represent large and small, and state and private institutions.

Results of Information-Based Attributes Across Specialty Studies

The aggregrate information-based attributes exhibited in individual specialty studies models formed a wide range of code level subcodes, in Code Level Three, Affective/Facilitative, from Influence/Attitude to Teaching Skills/Processes and Content Delivery/Information Management (see Appendix F). Some program area descriptions were very brief and reflected mostly Code Levels One and Two. The Code Level Three attributes identified, showed the broadest application of technology across teacher education programs for the purpose of teaching skills and content delivery/information management. Specialty studies with the most activity in information-based attributes were math, business, elementary, early childhood, and undergraduate level school library media. Examples from the specialty studies descriptions are shown in Table 18. Individual teacher education models with the most activity were those specialty areas found in the Values Model (e.g., elementary, history), the Curriculum - Outcomes Driven Model (e.g., early childhood, mathematics), and the Decision Maker Model (elementary, music, social studies).

Table 18

Specialty Studies Models and Information-Based Attributes

Case Number	Example
01	Problems caused by inability of workforce to function in technological workplace. (Influence/Attitude)
02	Update, deliver curriculum information by analysis, synthesis, evaluation of new published materials. [Content Delivery/Information Management)
03	Using childrens' literature materials effectively in the classroom. (Teaching Skills/Processes)
05	Critical thinking skills crucial in culturally diverse technologically complex society. (Learning Skills/Processes)
10	Develop analytical skill using primary sources. (Learning Skills/Processes)
10	Use original sources to learn about interrelationship of communications. (Content Delivery/Information Management)
10	For classroom management tasks, use computer and software. (Classroom Management/Learning Environment)
10	In library unit students gather research to support their inquiry. (Other Affects: Collaboration)

Summary

An ethnographic content analysis allowed an assessment of information-based attributes in ten NCATE Institutional Reports. The three-level coding process provided the means for identifying and organizing information-based attributes from the data. The assessment of information-based attributes showed the extent to which they connected with related curricular goals, such as learning and teaching processes. The information-based attributes found in the NCATE standards ranged from the use of resources to support curricular design, to the knowledge and skills needed to use resources in teaching, to the abstract concept of the impact of technology. The information-based attributes described by institutions varied according to the uniqueness of their programs. Some institutions went beyond the intent of the NCATE Standards in describing sophisticated and integral applications of information-based attributes. This was most clearly reflected by the individual teacher education models (e.g., Liberal Education and Values models) that represented tightly focussed curricula. Individual specialty areas, however, were less likely to show the same focus within their individual institution as they did to their specialty areas (e.g., math, elementary, business, undergraduate school library media areas). In the analysis of information-based attributes across the institutions, most of the emphasis was on the application of resources, particularly computer and video, as tools for teaching.

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

The purpose of this study was to determine whether patterns of information-based attributes needed for students to achieve information literacy skills are emerging across teacher education programs. This study used an ethnographic content analysis of the NCATE Standards and selected NCATE Institutional Reports to identify patterns of information-based attributes.

This chapter has three sections. The first section acknowledges the limitations of this study. The second section presents the conclusions drawn from the data and is organized by the three research questions that guided the study. Finally, the third section suggests areas for further investigation based on findings from the data.

Limitations

This study was limited by the small number (10) of institutional reports selected to represent a broad diversity of theoretical models. A further limitation to answering the third research question (To what extent do information-based attributes emerge as themes, interrelationships, or patterns across selected specialty areas and the knowledge bases that undergird them as described in the selected Institutional Reports?) was the selection process that excluded Institutional Reports with no specialty studies' descriptions and included selected Institutional Reports with very brief specialty studies' descriptions. While other descriptions of specialty studies' curricula (e.g., folio reports) may be a rich area for the investigation of the question, that effort was

not within the boundaries of this study. The following section does not attempt to generalize from the results of this small select group, but rather presents conclusions based on the "representativeness" of the teacher education program models under NCATE review for 1991-1992.

Conclusions

Based on the results of the coding of information-based attributes I concluded that the attributes could be identified at three conceptual levels of curricular involvement across all teacher education descriptions. In the selected Institutional Reports, however, the attributes did not emerge as central, integrated elements related to curriculum goals (e.g., teaching skills, learning processes), but ranged from concrete resources to relationships among those resources and other curricular components. In other words, the coding process and analysis did lead to themes, interrelationships, or patterns of information-based attributes as guided by the research questions, but not in a central a role. The research questions are repeated below for the purpose of organizing the concluding discussion.

Research Question One: To what extent do information-based attributes emerge as themes, interrelationships, or patterns in NCATE Standards?

The data from the analysis of the NCATE Standards and criteria suggest there is no cohesive or central focus that reflects an awareness of the need for information-based education teacher education curricula. While not precluding the importance of new information-based services, technologies, or roles, the standards and criteria are not specific, central, or inclusive enough to encourage responses that recognize the importance of information-based education. That is, information-based attributes do not emerge as themes,

interrelationships, or patterns throughout the criteria for describing curriculum design, delivery, content, and clinical experiences.

On the other hand, the inclusion in the standards of the *impact of technology* (see Criteria 19) suggests an awareness level by NCATE that is beyond the traditional awareness level that recognizes applications of technology as tools for teaching and learning. This inclusion could be the beginning of greater institutional awareness of the links among the impact of technology on work, the need for more sophisticated information skills, and a curriculum responsive to change. In sum, for the most part, NCATE Standards are not forcing a sophisticated information-based teacher education curricula.

Research Question Two: To what extent do information-based attributes emerge as themes, interrelationships, or patterns across diverse curricular models and the knowledge bases that undergird them as described in selected NCATE Institutional Reports?

All selected institutional reports contained data coded at Level One (i.e., Information Resources). Because these resources occurred across all of the selected institutions, it appears that computers, audiovisual technology, traditional library resources, electronic databases, and information professionals are commonly a part of teacher education programs.

At Code Level Two (i.e., Actions), information-based attributes were not described as part of the curricula quite as extensively as resources were listed. Even though all institutions applied resources to teaching and learning skills to some extent, institutional reports did not reflect the use of information management or research skills to the degree desired. It may be that institutions are only beginning to appreciate the implications information

resources can have on curricula. It is important to remember these conclusions are based on data from only 10 selected institutional reports.

Most of the Code Level Three attributes (Affective/Facilitative) found across the institutions were subcoded as Teacher Skills/Processes. Teacher Skills included a variety of information resources that made the connection between the application of resources and teaching skills to areas such as tutoring, teaching methods, and instructional strategies. More specifically, the data suggested that most of the selected institutions mediated students' learning environments with information-based resources and acknowledged the connections among computer applications to abstract learning processes and/or teaching skills.

Few patterns among affective/facilitative attributes were found across all programs except in three institutions that went beyond the intent of the NCATE Standards. In these cases, the institutions described a substantive range of sophisticated applications that connected information-based attributes with other curricular elements of teaching and learning. These appeared to be the result of the specific application of individual institutions rather than by NCATE. This resulted in some rich data as seen by the information-based attributes in the selected teacher education programs reflecting Process, Liberal Education and Values Models.

As mentioned above, not all of the concepts subcoded at Code Level Three occurred across all curricular models and knowledge bases. In fact, the findings suggest a limited showing for these concepts. First, the collaboration among information professions and other faculty appeared limited to the traditional introduction of students to library resources and research skills. Even though some cases of more substantive involvement encouraged

alternative forms of collaboration (e.g., grants and professional leaves), generally, collaboration appeared largely underutilized. In addition to collaborative efforts with other information professionals, research skills, an equal emphasis of a variety of resources (e.g., traditional resources and information technology), information management skills, the influence of technology and ethical considerations, and the impact of technology on content delivery were also underutilized information-based attributes.

Second, ethical considerations with respect to technology, did not appear to be a major concern across the institutions' teacher education curricula. On the other hand, ethical considerations were mentioned in four reports, suggesting, at the very least, some awareness of their importance by those institutions.

Third, since only two institutional reports acknowledged the lack of transfer skills (e.g., applying standard research skills to electronic data bases) in the workforce as a rationale for preparing teachers to be information literate, institutions do not appear cognizant of society's needs in this area. As mentioned in chapter one, a Symposium (Information Literacy and Education for the 21st century, 1989) and a Forum (Breivik, 1990) recommended that schools and teacher education programs be redesigned as models of information literacy, analyzing national standards for information literacy skills, and promoting research to identify information literacy components. Our education system must seek to ensure that teachers prepare students to adapt to societal change while pursuing their instructional goals. Establishing information-based curricula in teacher education to ensure information literacy will facilitate this.

Fourth, data provided evidence of the recognition of information-based resources and linkage to restructuring of the organization of knowledge. Institutions may be starting to recognize the possibilities of changing knowledge structures.

Finally, few institutions acknowledged the role or impact of technology as a disseminator of information in their curricular descriptions. While not present across curricula to the degree hoped, the presence of information-based attributes found in certain institutions did indicate acknowledgement of the impact of information resources and information skills in curricula.

In sum, a continuation of fragmented reactions on curricula will leave teachers struggling with ongoing demands of changing information and unable to prepare themselves or their students for the impact of information technologies on their lives - political, economic, education. Teacher education must be more responsive to the demands of an information-driven, technological age. Business and industry continue to make demands on the learning capacity of the workforce, consequently, these same demands are implied for teachers. Modifications in teacher education curricula are slow to occur even though they are encouraged by professional associations, state certification departments, and specific program requirements. With new standards being developed, however, and new job skills revised, it is time to design a mechanism for change responsive to competitive needs for lifelong learning required by information literate teachers.

Research Question Three: To what extent do information-based attributes emerge as themes, interrelationships, or patterns across selected specialty areas and the knowledge bases that undergird them as described in the selected Institutional Reports?

The boundaries of this study limits few conclusions that could be drawn regarding specialty area curricula. Nevertheless, this is a rich area for study. While program descriptions were very brief, some evidence within specific specialty areas (i.e., math, elementary, business) suggests that more complex and abstract information-based attributes at Code Level Three are occurring. Conversely, the information-based attributes at Code Levels One and Two (without the linkage to more abstract concepts in the Affective/Facilitative Code) are more evident.

Further Research

This study prompts a need for further investigations of the forces that encourage curricular change to include information-based attributes. Of particular value is the possibility that information-based attributes preparing teachers to be information literate are occurring concurrently within different disciplines, professional association standards, state competencies, and workplace skills required by related industries. Such a concurrent framework offers the coherence, articulation, and impetus needed for professionals in all disciplines to work collaboratively toward an explicit information-based teacher education. This is timely since standards and job skills are currently under review (as stated in chapter one).

The converging information phenomenon of all major disciplines needs to be investigated to determine how it can be synchronized with standards and job skills revisions. Information-based attributes reflect the influences of

changing technology, information structures, and information processes in job skills. They assimilate into multiple discipline philosophies either by design or default. Curricula must be responsive to mutual influences and reflect skills needed in the workplace.

In specific specialty studies trends should be researched that analyze the extent, nature, and explicit intent, and rationale of the use of information-based attributes over time. Questions should be raised concerning any differences between disciplines, particularly those that have a traditional information-base. Additional questions should address the range of information-based attributes that extend across all specialty studies and the conceptual level and central emphasis they have within each specialty studies' program.

If an information-based education is to succeed, further studies are needed to explore the issue of when and what information skills should be taught, and by whom. The philosophical framework of faculty members with regard to the importance of an ongoing information base, and whether information skills should be taught within or separate from curriculum must be addressed. Higher education faculty have had varied views on this issue. These studies could help determine who is responsible for preparing teachers to prepare themselves and their students to select, adapt, apply and transfer information skills at all levels.

This study also suggested some possibilities for further investigations into the simultaneous shaping of disciplines, standards, job skills, and the philosophic framework for teaching information-based curriculum. To ensure the continuing readiness of teachers and their students for shaping their environments requires a capacity for ongoing learning and an understanding

of evolving information networks that undergird the creation, dissemination, and preservation of knowledge.

The preparation of information literate teachers who can anticipate change and apply it to curricular issues to meet the challenges of an information age is the critical need today. Change is too rapid in a competitive, global society to be complacent about its impact on teachers and students in a competitive, global society. An information-based curriculum that is the foundation of existing restructured curricula must be the explicit objective for preparing information literate teachers.

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APPENDIX A

STANDARDS FOR THE ACCREDITATION OF PROFESSIONAL EDUCATION UNITS

Category I

Knowledge Bases for Professional Education

Standard I.A: Design of Curriculum

The unit ensures that its professional education programs are based on essential knowledge, established and current research findings, and sound professional practice. Each program in the unit reflects a systematic design with an explicitly stated philosophy and objectives. Coherence exists between (1) courses and experiences and (2) purposes and outcomes.

Criteria for compliance.

(1) The unit ensures that its professional education programs have adopted a model(s) that explicates the purposes, processes, outcomes, and evaluation of the program. The rationales for the model(s) and the knowledge bases that undergird them are clearly stated along with goals, philosophy, and objectives.

(2) The knowledge bases used in professional education are broad and include the traditional forms of scholarly inquiry as well as theory development related to professional practice.

(3) The unit ensures that coursework in general education, specialty studies, and professional studies complement one another.

(4) The knowledge bases of the professional studies component(s) are reflected in curricular design and planning; course syllabi; instructional design, practice, and evaluation; students' work; use of major journals in the field by faculty and students; and faculty and

students' (especially graduate students) participation in research and synthesis.

(5) The faculty responsible for professional education collaborate in the design, delivery, and evaluation of curriculum for the unit's programs.

Standard I.B: Delivery of the Curriculum

The unit ensures that knowledge bases and best practice in professional education are reflected in the instruction offered. The instructional practices and evaluation are fully congruent with the current state of knowledge about curriculum design, instruction, and evaluation.

Criteria for compliance.

(6) Instruction by faculty in the unit is congruent in content and process with best practice and current and established research.

(7) Faculty instruction in the unit provides students with systematically varied models of instruction.

(8) The institution as a whole regards the unit as one where instructional practice is consistently superior.

(9) The unit maintains a rigorous, professional instructional quality control mechanism.

Standard I.C: Content of the Curriculum--General Education

The unit ensures that education students receive appropriate depth and breadth in an integrated course of study that is offered by faculty in the liberal arts and other general studies. At the advanced level, education students should have a solid grounding in general education that will allow for concentration on professional and specialty studies.

Criteria for compliance.

(10) The general education component is a well-planned sequence of courses and experiences that includes theoretical and practical knowledge gained from studies in communications, mathematics, science, history, philosophy, literature and the arts. [NOTE: This criterion applies to the basic level only.]

(11) Education students are guided in the selection of general education courses that will provide an intellectual foundation in liberal arts and general studies and that are appropriate to the background of individual students. [NOTE: This criterion applies to the basic level only.]

(12) Faculty in the unit and faculty who teach in the general education component collaborate on program planning and evaluation of general education. [NOTE: This criterion applies to the basic level only.]

Standard I.D: Content of the Curriculum--Specialty Studies

The unit ensures that education students attain a high level of academic competence and understanding in the areas in which they plan to teach or work.

Criteria for compliance.

(13) The specialty studies component is a well-planned sequence of courses and experiences that includes academic, methodological, and clinical knowledge necessary for professional competence in teaching or other professional education assignments.

(14) The guidelines and standards of professional learned societies are used in the development of an appropriate sequence of courses for each specialty area.

(15) The specialty studies provide education students with a mastery of the structure, skills, concepts, ideas, values, facts, and methods of inquiry that constitute their fields of specialization.

(16) Faculty in the professional education unit and faculty who teach the specialty studies from other academic units collaborate in program planing and evaluation of specialty studies.

Standard I.E: Content of the Curriculum--Professional Studies

The unit ensures that the professional studies component(s) prepares education students to work effectively in their specific education roles.

Criteria for compliance.

(17) The professional studies component(s) is a well-planned sequence of courses and experiences that includes knowledge about professional education and relates it to the realities of practice in schools and classrooms.

(18) The unit ensures that each course and experience of the professional studies component(s) is built upon and reflects defensible knowledge bases.

(19) The professional studies component(s) includes knowledge about the social, historical, and philosophical foundations of education; theories of human development and learning; research- and experience-based principles of effective practice; impact of technology and societal changes on schools; evaluation, inquiry, and research; and educational policy.

(20) Courses and experiences support the development of independent thinking, effective communications, the making of relevant judgments, professional collaboration, effective participation in the educational

system, the discrimination of values in the educational arena, and professional ethics.

(21) The professional studies component(s) for the preparation of teachers provides knowledge about and appropriate skills in learning theory, educational goals and objectives, cultural influences on learning, curriculum planning and design, instructional techniques, planning and management of instruction, design an use of evaluation and measurement methods, classroom and behavior management, instructional strategies for exceptionalities, classrooms and schools as social systems, school law, instructional technology, and collaborative and consultative skills. Courses and experiences ensure the development of classroom and time management, effective communication, knowledge of different learning styles, teaching strategies, and assessment techniques. [NOTE: This criterion applies to the basic level only.]

(22) The unit provides for study and experiences that help education students understand and apply appropriate strategies for individual learning needs, especially for culturally diverse and exceptional populations.

(23) The curriculum for professional studies component(s) incorporates multicultural and global perspectives.

Category II

Relationship to the World of Practice

Standard II.A: Clinical and Field-Based Experiences

The unit makes certain that clinical and field-based experiences in the professional education curriculum are designed to prepare students to work effectively in specific education roles.

Criteria for compliance.

(24) Field-based and clinical experiences are systematically selected to provide opportunities for education students to observe, plan, and practice in a variety of settings appropriate to the professional roles for which they are being prepared.

(25) Clinical and field-based experiences provide education students with the skills that allow them to diagnose and solve problems that involve the application of the principles and theories from the knowledge bases of the particular professional program.

(26) Field-based and clinical experiences are accompanied by professional supervision and feedback that include attention to instructional plans, characteristics of learners and instructional settings, structured observation of the experiences, and detailed debriefing relative to program goals.

(27) Education students participate in field-based and/or clinical experiences with culturally diverse and exceptional populations.

(28) Field-based and clinical experiences are sequenced to enable education students to develop the skills that will enable them to assume full responsibility for classroom instruction or other professional roles in schools.

(29) The student teaching experience is direct, substantial, and full-day for at least 10 weeks [NOTE: This criterion applies to the basic unit only.]

(30) Three-member teams of the college-based supervisor, field-based supervisor, and education student have a well-defined charge to support a successful experience as the education student assumes full-time responsibility in the school setting.

(31) Sites are carefully selected for all field experiences, including cooperating schools and other professional internship locations, so that students are provided experiences consistent with the goals of the unit"s programs.

(32) The roles and responsibilities of education students, college-based supervisors and field-based supervisors who participate in field-based and clinical experiences are delineated in negotiated written agreements.

Standard II.B: Relationships with Graduates

The unit maintains relationships with graduates from its professional education programs that include follow-up studies and assistance to beginning professionals.

Criteria for compliance.

(33) The unit keeps abreast of emerging evaluation techniques and engages in regular and systematic evaluations, including follow-up studies, to determine the success and quality of graduates in the professional education roles for which they were prepared.

(34) The results of evaluation efforts, including follow-up studies of graduates, are used by the unit to modify and improve programs.

(35) The unit has developed arrangements with school districts in the area to provide assistance to its graduates who are first year teachers and/or who are beginning other professional education roles as an extension of their professional education program.

Standard II.C: Relationships with Schools

The professional education unit maintains positive working relationships with schools to advance the goals of the profession and to promote the effective preparation of professional educators.

Criteria for compliance.

(36) Positive working relationships with local schools are developed and maintained to improve the delivery of quality education in P-12 schools.

(37) The unit and local schools cooperatively develop research questions and inquiry strategies to encourage the involvement of practicing professionals with professional education faculty to further develop and refine the professional knowledge bases.

(38) Professional education faculty are regularly involve with the professional world of practice in preschool, elementary, and/or secondary schools.

Category III

Students

Standard III.A: Admission

The unit's admission procedures encourage the recruitment of quality candidates and those quality candidates represent a culturally diverse population.

Criteria for compliance.

[See complete NCATE Standards for Criteria 39-43]

Standard III.B: Monitoring Progress

The unit has systematic procedures for monitoring the progress of education students from admission through completion of their professional education programs.

Criteria for compliance.

[See complete NCATE Standards for Criteria 44-46]

Standard III.C: Advisory Services

The unit ensures that systematic academic and professional advising is available to all education students.

Criteria for compliance.

[See complete NCATE Standards for Criteria 47-49]

Standard III.D: Completion of Program

The unit ensures that the academic and professional competence of education students is assessed prior to granting recommendations for certification and/or graduation.

Criteria for compliance.

[See complete NCATE Standards for Criteria 50-52]

Category IV

Faculty

Standard IV.A: Faculty Qualifications and Assignments

The unit ensures that faculty in professional education are qualified to perform their assignments and also reflect cultural diversity.

Criteria for compliance.

[See complete NCATE Standards for Criteria 53-59]

Standard IV.B: Faculty Load

The unit ensures that policies allow for faculty opportunities in teaching, scholarship, and service.

[See complete NCATE Standards for Criteria 60-62]

Standard IV.C: Faculty Development

A systematic, comprehensive plan for faculty development is used by the professional education unit to provide for faculty development.

(63) Systematic and regular faculty development activities are provided for faculty, cooperating teachers, and others who may contribute to professional education programs.

(64) Faculty are actively involved in professional associations, and provide education-related services, at the local, state, national, and/or international levels in their areas of expertise and assignment.

Standard IV.D: Faculty Evaluation

The unit implements a faculty evaluation system to improve faculty teaching, scholarly and creative activities, and service.

Criteria for compliance.

[See complete NCATE Standards for Criteria 65-67]

Category V

Governance and Resources

Standard V.A: Governance

The governance system for the professional education unit ensures that all professional education programs are organized, unified, and coordinated to allow the fulfillment of its mission.

Criteria for compliance.

[See complete NCATE Standards for Criteria 68-76]

Standard V.B: Resources

Resources are available in the areas of personnel, funding, physical facilities, library, equipment, materials and supplies that allow the professional education unit to fulfill its mission and offer quality programs.

Criteria for compliance: Personnel resources.

(77) There are sufficient numbers of faculty, including cooperating teachers and other field-based supervisors, to support programs offered by the unit. Each advance degree program leading to the doctorate has at least three full-time faculty who have earned the doctorate in the field of specialization for which the degree is offered.

(78) There are sufficient administrative, clerical, and technical staff to support programs offered.

(79) Instructional resources for supervision of practicum experiences do not exceed a ratio of 18 full-time equivalent students to one full-time equivalent faculty member.

(80) Support for faculty development is at least at the level of other units in the institution.

(81) The use of part-time faculty and graduate students who teach in professional education programs is limited to prevent the fragmentation of instruction and the erosion of quality, and they are supervised by full-time faculty to ensure program integrity.

Criteria for compliance: Funding resources.

(82) The budget trends for the unit over the past five years and future planning indicate continued support for professional education programs.

(83) The unit allocates its available resources to programs in a manner that allows each of them to meet its missions and needs.

(84) Financial support provided during the last five years has been adequate for books in education, periodicals listed in Education Index, films and filmstrips, computer hardware and software, and other similar sources.

Criteria for compliance: Physical facilities.

(85) Facilities are accessible to individuals with disabilities.

(86) For each professional education program offered, faculty have office space, instructional space, and other space necessary to carry out the unit's mission.

(87) The facilities are well-maintained and functional.

(88) Facilities accommodate technological needs in professional education.

(89) An institutional long-range plans for renovation/updating of physical facilities (i.e., additions and replacements) has been developed.

Criteria for compliance: Library, equipment, materials, and supplies

(90) Library holdings provide adequate scope, breadth, and currency to support the professional education programs.

(91) Systematic reviews of library and media materials are conducted periodically and are used to make acquisition decisions.

(92) An identifiable and relevant media and materials collection is accessible to education students and faculty.

(93) Modern equipment is available to support administration, research, service, and instructional needs of the unit.

(94) Necessary supplies are provided to support faculty, students, staff, and administration in the operation and implementation of programs, policies, and procedures.

Note. From NCATE standards, procedures, and policies for the accreditation of professional education units by the National Council for Accreditation of Teacher Education, 1990, Washington, DC, Author. Reprinted in partial form by permission. For copies of the complete NCATE Standards, contact Jane Leibbrand, Director of Communications, National Council for Accreditation of Teacher Education, 2010.Massachusetts Avenue NW, Suite 200, Washington, D. C. 20036-1023.

APPENDIX B

Taxonomy of Information-Based Attributes

Listed below are some attributes of an information-based teacher education curriculum identified in the Final Report by the American Library Association Presidential Committee on Information Literacy (1989) and the proceedings of the symposium on Information Literacy and Education for the 21st Century (1989). The three general categories were used to illustrate an example of organization: (1) information structure (e.g., resources, information management skills, information technologies); (2) information processes (e.g., learning); and (3) information roles of participants (e.g., teacher, student, information professional) in the learning event or educational situation (Curtis & Eisenberg, 1991). The categories determined from the coding process during the study were grounded in the selected documents analyzed, and therefore, not expected to form any particular organization.

Information Structure:	Information Processes:	Information Roles:
Identify evidence	Recognize need for information	Work with resource people
Develop information management skills	Evaluate information	Identify role of librarian
Access information	Analyze information	Coordinate with computer specialist
Use community resources	Interpret information	
Use library resources effectively	Synthesize information	Facilitate learning with resources by teacher
Verify information	Use information effectively	

Information Structure:	Information Processes:	Information Roles:
Use original sources	Use information to problem-solve	Identify role of student as informed citizen
Apply information search process	Apply information in decision-making	
Determine range of appropriate resources	Develop critical thinking skills	
Use computer resources	Define problem	
Understand network of new information	Practice integrative learning	
Use databases, networks, software	Identify information need	
Apply new educational technologies	Synthesize information	
Apply range of reference resources	Reduce/repackage information	
Keep up-to-date with new resources	Develop information transfer skills	
Organize information	Encourage cooperative learning	
Understand organization of knowledge	Evaluate/reflect	
Appraise likely sources		
Understand network of new information		

APPENDIX C

INSTITUTIONAL REPORTS SUBMITTED TO NCATE FOR REVIEW 1991-92*

Institutions of Higher Education	Region**	Type	Funding Source	Enrollment
Albany State College, GA	SACS	Comprehensive	State	2,405
Alcorn State, MS	SACS	Comprehensive	State	2,863
Andrews University, MI	NCA	University	Independent	2,877
Armstrong State College, GA	SACS	Comprehensive	State	4,170
Auburn University-Mont., AL	SACS	Comprehensive	State	6,261
Augustana College, IL	NCA	Four-Year	Independent	2,253
Ball State University, IN	NCA	University	State	20,343
Birmingham Southern College, AL	SACS	Comprehensive	Independent	1,902
California State University, LA, CA	WASC	Comprehensive	State	36,420
Campbell University, NC	SACS	University	Independent	5,043
Catawba, NC	SACS	Comprehensive	Independent	967
Central Michigan University, MI	NCA	University	State	18,286
Central Missouri State University, MO	NCA	Comprehensive	State	11,429
Colorado State University, CO	NCA	University	State	26,828

Institutions of Higher Education	Region**	Type	Funding Source	Enrollment
Dana College, NB	NCA	Four-Year	Independent	507
Davidson College, NC	SACS	Four-Year	Independent	1,376
Delta State University, MS	SACS	Comprehensive	State	3,995
East Tennessee State University, TN	SACS	University	State	11,590
Eastern Montana, MT	NASC	Comprehensive	State	3.926
Edinboro University of PA	MSA	Comprehensive	State	8,131
Elmhurst College, IL	NCA	Four-Year	Independent	3,226
Emporia State University, KS	NCA	Comprehensive	State	6,072
Florida A&M University, FL	SACS	Comprehensive	State	8,344
Fort Hays State University, KS	NCA	Comprehensive	State	5,500
Fort Valley State College, GA	SACS	Comprehensive	State	2,158
Franklin College, IN	NCA	Four-Year	Independent	780
Freed-Hardeman College, TN	SACS	Four-Year	Independent	1,183
Gallaudet University, DC	MSA	Comprehensive	Independent	2,014
Gardner Webb College, NC	SACS	Four-Year	Independent	1,948
Graceland College, IO	NCA	Four-Year	Independent	2,371

Institutions of Higher Education	Region**	Type	Funding Source	Enrollment
Greensboro College, NC	SACS	Four-Year	Independent	733
Guilford College, NC	SACS	Four-Year	Independent	1,250
Hanover College, IN	NCA	Four-Year	Independent	1,058
Harris Stowe State College, MO	NCA	Four-Year	State	1,374
High Point College, NC	SACS	Four-Year	Independent	1,611
Hofstra University, NY	MSA	University	Independent	12,087
Idaho State University, ID	NASC	University	State	9,139
Indiana University-Purdue-FtW, IN	NCA	Comprehensive	State	11,889
Johnson C. Smith University, NC	SACS	Four-Year	Independent	1,165
Kansas State University, KS	NCA	University	State	21,137
Kent State University, OH	NCA	University	State	24,434
Langston University, OK	NCA	Four-Year	State	2,792
Lewis-Clark State College, ID	NASC	Four-Year	State	2,667
Livingston College, NC	SACS	Four-Year	Independent	642
Lock Haven University, PA	MSA	Comprehensive	State	2,890
Macalester College, MN	NCA	Four-Year	Independent	1,853

Institutions of Higher Education	Region**	Type	Funding Source	Enrollment
Mars Hill College, NC	SACS	Four-Year	Independent	1,319
Marshall University, WA	NCA	University	State	12,033
Methodist College, NC	SACS	Four-Year	Independent	1,360
Mississippi State University, MS	SACS	University	State	14,391
Missouri Southern State College, MO	NCA	Four-Year	State	6,016
Montana State University, MT	NASC	University	State	10,392
Morningside College, IO	NCA	Comprehensive	Independent	1,192
Murray State University, KY	SACS	Comprehensive	State	8,079
New Mexico State University, LasC, NM	NCA	University	State	14,812
North Carolina Central University, NC	SACS	Comprehensive	State	5,482
North Carolina Wesleyan College, NC	SACS	Four-Year	Independent	1,436
North Georgia College, GA	SACS	Comprehensive	Independent	1,192
Northwestern Oklahoma St. Univ. , OK	NCA	Comprehensive	State	1,746
Ohio Northern University, OH	NCA	Comprehensive	Independent	2,648
Otterbein College, OH	NCA	Four-Year	Independent	2,453
Ouachita Baptist University, AK	NCA	Comprehensive	Independent	1,313

Institutions of Higher Education	Region**	Type	Funding Source	Enrollment
Pembroke State University, NC	SACS	Comprehensive	State	3,133
Portland State University, OR	NASC	University	State	21,888
Queens College, NC	SACS	Comprehensive	Independent	1,338
Roosevelt University, IL	NCA	Comprehensive	Independent	6,142
Saginaw Valley State University, MI	NCA	Comprehensive	State	6,179
Saint Andrews College, NC	SACS	Four-Year	Independent	833
Saint Mary of the Plains College, KS	NCA	Four-Year	Independent	1,071
Saint Olaf College, MN	NCA	Four-Year	Independent	3,097
San Jose State University, CA	WASC	Comprehensive	State	27,544
Southeast Missouri State University, MS	NCA	Comprehensive	State	8,801
Spelman College, GA	SACS	Four-Year	Independent	1,710
Spring Arbor College, MI	NCA	Four-Year	Independent	1,644
Texas A&M University, TX	SACS	University	State	41,171
Towson State University, MD	MSA	Comprehensive	State	15,035
Union College, NB	NCA	Four-Year	Independent	617
University of Charleston, WV	NCA	Comprehensive	Independent	1,420

Institutions of Higher Education	Region**	Type	Funding Source	Enrollment
University of Connecticut, Storrs, CT	NEASC	University	State	25,497
University of Indianapolis, IN	NCA	Comprehensive	Independent	3,132
University of Mississippi, MS	SACS	University	State	11,288
University of Missouri at Kansas City, MO	NCA	University	State	11,263
University of Nebraska at Lincoln, NB	NCA	University	State	24,453
University of Nebraska at Omaha, NB	NCA	Comprehensive	State	15,804
University of Nevada, Las Vegas, NV	NASC	University	State	17,937
University of North Carolina-Ch Hill, NC	SACS	University	State	23,878
University of North Carolina-Gr, NC	SACS	University	State	12,882
University of Northern Colorado, CO	NCA	University	State	12,413
University of Oklahoma, OK	NCA	University	State	20,774
University of Rhode Island, RI	NEASC	University	State	16,047
University of Southern Colorado, CO	NCA	Comprehensive	State	3,946
University of Southwestern Louisiana, LA	SACS	University	State	15,764
University of Wisconsin-River Falls, WI	NCA	Comprehensive	State	5,196
University of Wisconsin-Whitewater, WI	NCA	Comprehensive	State	10,820

Institutions of Higher Education	Region**	Type	Funding Source	Enrollment
Vanderbilt Universtiy, TN	SACS	University	Independent	9,161
Wartburg College, IO	NCA	Four-Year	Independent	1,300
Wayne State College, NB	NCA	Comprehensive	State	3,512
Western Illinois University, IL	NCA	Comprehensive	State	13,747
Wichita State University, KS	NCA	University	State	16,151

* Institutional Reports on file at NCATE Office, Washington, DC.

** Membership in one of the six regional accrediting agencies is used to denote regional base: MSA (Middle States Association of Colleges and Schools; NASC (Northwest Association of Schools and Colleges); NCA (North Central Association of Colleges and Schools); NEASC (New England Association of Schools and Colleges, Inc.); SACS (Southern Association of Colleges and Schools); WASC (Western Association of Schools and Colleges, Inc.);

Chronical of Higher Education (1992, March 18). 38(28), p. A36-A44.

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APPENDIX D

ALL MODELS*

Curriculum - Field-Based

Curriculum process model: Field-based. Teacher role fluid and eclectic: educated person; professional.

Curriculum - Integrative Perspective (integrates curriculum perspective or models)

Integrative model. Emphasis on performance measures.

Multiple perspectives framework model. Accreditation and curriculum process models. Competency based.

Curriculum - Outcomes Driven

Skilled and effective managers of learning environments. Strongly performance based. (Case 01)

Outcomes-driven teacher education model: Philosophy, spiritual. Moral commitment.

Open knowledge base: State competencies.

Teacher as orchestrator of the learning environment. Competency based.

* Teacher education models as described by institutions (includes the primary and secondary foci).

Bold Teacher education models selected for analysis.

Italic Eliminated from selection. Program descriptions followed state standards format or not available.

Curriculum - Process

Teacher education model: input (philosophy), process (curriculum), output (six ideal outcomes). Outcomes-based.

Systematic model of program-curriculum design (decision making process). (Case 02)

Model for design/delivery of knowledge base. Theme: Preparation for education of diverse populations. Outcomes.

Integrative arrangement of educational expererience. Empowered educator model: Interactive process.

Structure of teacher educator. Model 3 levels: knowledge bases, developmental (curriculum), product (leader).

Program model: philosophy; knowledge base; goals/objectives; purpose, process, outcomes, evaluation. Outcomes.

Curriculum - Product (see thematic models, i.e. Values)

Curriculum - Structural (or unspecified)

Delta model for professional education: Needs based: societal, educational, personal. Outcomes based.

Curriculum structural model: mission,philosophy,theme (caring creator; director of learning experiences).

Curriculum content: general studies, concentration content studies, professional components. Program outcomes.

Model has 3 major components: general, professional, specialty. Outcome. No theme. (Case 03)

* Teacher education models as described by institutions (includes the primary and secondary foci).

Bold Teacher education models selected for analysis.

Italic Eliminated from selection. Program descriptions followed state standards format or not available.

Developmental, Cognitive (Teacher characteristics)

Teacher development model: Autonomous education. Cognitive development. Outcome based.

Developmental, critical, and humanistic model. Spiral curriculum.

Developmental, Holistic (Teacher/student characteristics)

Educators for harmonious development: physical, mental, spiritual, social. Curriculum process.

Invitational education model / Process (Case 04)

Teacher as facilitator of optimal development: Components: Socialization of professionals, wisdom of practice, current research.

Teacher as a developer of human potential: Development of person and pedagogy. Outcomes and behaviors (product).

Developmental, Professional (Teacher characteristics)

Four components: Human development; social conscience; decision making; professional development. Interaction of theory-experience.

Actualizing professional teachers. Performance-based. Holistic perspective.

* Teacher education models as described by institutions (includes the primary and secondary foci).

Bold Teacher education models selected for analysis.

Italic Eliminated from selection. Program descriptions followed state standards format or not available.

Professional teacher model: Common body of knowledge: ethical/professional; human and professional growth. Outcomes.

Career-long process developing master teacher: Core beliefs: intellectual, diversity. Inquiry-oriented (Process).

Decision Makers

Problem-solver concept. Eight domains.

Teacher as decision maker. Curriculum structural model. Developmental.

Professional educator as a decision maker. Competency based.

Student becoming active, problem-solving and decision making professional. Curriculum process.

Teacher as decision-maker. Reflective. Interactive and Introspective.

Educational professionals as effective decision makers. (Case 05)

Teacher as decision maker model. Roles of teacher as facilitator of learnng, clinician,education advocate.

Teacher as competent and caring decision-maker. Liberal education.

Teachers as professional decision-makers in multifaceted roles. Reflective.

* Teacher education models as described by institutions (includes the primary and secondary foci).

Bold Teacher education models selected for analysis.

Italic Eliminated from selection. Program descriptions followed state standards format or not available.

Instructional decision maker. Roles of the teacher: learner, professional service, change agent, research. Outcomes focus.

Teacher as a knowledge-based decision maker.

Teacher as a decision maker and instructional leader. Curriculum structural model.

Effective Teacher (similar to reflective practitioner).

Alcorn's proficient and effective teacher: Proactive, facilitative, scholarly, manager. Curriculum process model.

Effective teaching: Technological-practical orientation. Application of professional knowledge to teacher tasks

Effective teacher: Reflective helping professional model. Program design model.

Effective teacher model (curriculum structure) for diverse society: Outcomes,teacher roles & functions. Skill based.

Effective educator as decision maker and problem solver: Components: liberal arts, interactionist (process).

Prepares effective professionals for effective schools.

Model of organization of teacher education curriculum. Model for teacher education programs.

Effective and reflective teacher: knowledgeable, reflective, cognitive.

* Teacher education models as described by institutions (includes the primary and secondary foci).

Bold Teacher education models selected for analysis.

Italic Eliminated from selection. Program descriptions followed state standards format or not available.

Facilitator

Teacher as facilitator of student success. No education degree. Outcome based. (Case 06)

Teacher as facilitator.

Teacher as facilitator of active learning. Learner construction and cognitive development.

Teacher as facilitator: Developmental constructionist model.

Teacher is a facilitator: Student construction of meaning. Learner centered.

Future Oriented

Quality teachers for 21st century: State of the art professional. Primacy of knowledge/cognitive development

Liberal Education, Critical Reasoning

Critical reasoning/critical thinking. Liberal arts. Reflection.

Liberal Education, Independent Learner

Teacher as an independent learner. 10 themes: liberal learning; experiential learning. Competency based. (Case 07)

Teacher as enabler: Knowledge of learner, discipline, pedagogy. Process oriented.

* Teacher education models as described by institutions (includes the primary and secondary foci).

Bold Teacher education models selected for analysis.

Italic Eliminated from selection. Program descriptions followed state standards format or not available.

Liberal Education, Scholar

Scholar-facilitator model (Domains: General, liberal, specialty, foundations, pedagogy/classroom). Outcomes: Teacher as facilitator of learning.

Secondary teacher as leader of academic development. Also, model to develop knowledge base.

Teacher of quality and distinction (focus on content & liberal education).

Model of multiple models guided by image of school and theme: Teacher as intellectual, analyst, knowledgeable. (Case 08)

Practitioner - Reflective

Teacher as a reflective practitioner. Previous life experience. Reflective interactive liberal arts, professional education.

STEP-Sound theory into effective practice. Reflective decision making.

Reflective practioner.

Teacher as thoughtful practitioner.

Reflective scholar-practitioner, collaboration, and cultural diversity (see Professional model).

* Teacher education models as described by institutions (includes the primary and secondary foci).

Bold Teacher education models selected for analysis.

Italic Eliminated from selection. Program descriptions followed state standards format or not available.

Teacher as reflective practititioner: reflective, inquiry, dialetics, decision making.

Teacher as a reflective practitioner (theme). Teachers for the future project.

Teacher as emerging reflective practitioner.

Practitioner - Scholar/Educator

Educated practitioner model. Liberal education. Theory to practice. Competency based.

Educator as theorist and practitioner: Learner, method, society, professional development, inquiry. Teacher characteristics and behavior/Christian mission.

Scholar-practitioner model. Emphasis on practitioner for Basic program

Professional (multiple themes across curriculum domains or integration of multiple roles of teacher)

Outcome is prof practice (CLEAR) model: Concept-knowledge-driven, learner-centered. Outcomes.

Professional as creative thinker, creative planner, effective practitioner.

Best practices model: research, environment, craft knowledge.

Integrating theme: preparing educators to be knowledgeable, caring, decision makers.

* Teacher education models as described by institutions (includes the primary and secondary foci).

Bold Teacher education models selected for analysis.

Italic Eliminated from selection. Program descriptions followed state standards format or not available.

Model of essential knowledge: Knowledgeable decision-maker; effective communicator; positive motivation; reflective practitioner.

Taxonomy of professional knowledge: knowledge of instruction (school), student, teaching, clinical. No clearly defined model. Outcome.

Teacher as competent professional educator. Field based. Outcome driven.

Teacher as professional: Educator, communicator, decision maker, scholar, leader. Integrate multiple roles of teacher.

Metacognitive model of teacher educaiton. Teacher as facilitator, decision maker, and leader. Integrate multiple teacher roles.

Educator as scientist/artist. (Case 09)

Reflection

Four phase model: Purpose, process, outcomes (Curriculum process). Teachers as reflective decision makers. Inquiry.

Reflective teachers. Liberal arts, effective teacher. Spiral curriculum model.

Teacher as a reflective decision-maker. Cognitive development.

* Teacher education models as described by institutions (includes the primary and secondary foci).

Bold Teacher education models selected for analysis.

Italic Eliminated from selection. Program descriptions followed state standards format or not available.

Teacher as reflective decision-maker. Behavavior competencies. Components: Content, research, theory, practice, caring communicator.

Teacher as reflective decision maker: Preteaching decisions; during teaching; post teaching reflective and pred.

Developmentally-based, encourages critical reflection. Process-oriented. Liberal arts focus.

Successful and reflective educator. Nine component program model: School mission; community need.

Building the reflective/analytic professional, interactive,decision maker. Emphasis as researcher, clinical. Competency based.

Professional educator as reflective inquirer: Overlap dimensions: Educated person, specialty in teaching, technical skills, practitioner.

Service (Needs of learner)

Leadership through service: Commitment of student learning, knowledge of subject and how to teach.

Teacher as nuturing instructor/manager (focus on needs of learner).

Values, Social/Cultural

Preparation for educators of culturally and linguistically diverse population in urban schools. Process model.

* Teacher education models as described by institutions (includes the primary and secondary foci).

Bold Teacher education models selected for analysis.

Italic Eliminated from selection. Program descriptions followed state standards format or not available.

Professional as enabler of persons with special needs: Celebrating diversity among learners. Process.

Values of equity, diversity, worldmindedness, developmental perspective and lifelong learning. 1991 global.

Three mutually supportive themes: social advocacy; lifespan development; cultural pluralism. Outcomes.

Educators for diverse cultural contexts. Outcomes.

Values, Spiritual/Ethical

Teacher as leader: Spiritual, liberal arts, justice, equality. (Case 10)

* Teacher education models as described by institutions (includes the primary and secondary foci).

Bold Teacher education models selected for analysis.

Italic Eliminated from selection. Program descriptions followed state standards format or not available.

APPENDIX E

Codes and Subcodes Formed from Information-Based Attributes

(with examples)

Code Level One

Information Resource Attributes

A. Traditional Information Resources (used in research and the study of teaching)

   Examples: books, journals, texts, curriculum guides, curriculum materials, research materials, primary/ secondary sources, authentic materials

B. Information Technology (related to hard- and software of video, computer, and telecommunications).

   Examples: videotaping, E-mail, search databases, campus-wide wiring for computer/video networking, technology

C. Audiovisual Technology (educational equipment and software not, generally, associated with information technology)

   Examples: film, transparencies, realia, teacher aids, media, maps

D. Associative Information Roles/ Resource of Specific Agency, Program, or Position (directly related to the production, storage, processing or retrieval of information resources)

Examples: librarian, computer consultant, Library, Academic Computing Center, Curriculum Materials Center

E. Generic Information Resources (broad, inclusive terminology)

Examples: materials, resources, equipment, instructional resources, instructional materials, material resources, educational resources

F. Other InformationResources

Code Level Two

Action Attributes

G. Manage/Search (concrete)

Examples: identify, select, locate, characterize (i.e. limitations), organize, access, store

H. Research (abstract)

Examples: interpret, sythesize, evaluate, critique, compare, review (as in analyze)

I. Apply

Examples: develop skills (as in use, not design), work with (as "hands on", not collaborate), presentation of media, demonstrate

J. Develop/Adapt

Examples: update, prepare (as in make, not study), construct, create, publish, design, prepare, repackage

K. Collaborate (with other roles, agencies or programs)

Examples: work with (as in collaborate, not hands on), tour, Teacher Skill Center provides curriculum resources

L. Know

Examples: skills, abilities, introduce to, discuss, expose to, explore, orient, view, listen, read

M. Incorporate/Integrate

N. Other Skills/Processes

Examples: supplement, disseminate, store, keep abreast

Code Level Three

Affective and Facilitative Attributes

O. Learning skills/processes (of student/teachers)

Examples: decision making, analysis, reflection, inquiry, interpretation,higher order thinking

P. Teaching skills/processes

Examples: interactive instruction, variety used, tutoring, workshop,view instructional strategies

Q. Influence and Attitude

Examples: impact of technology, changing knowledge

R. Content delivery/Information management

Examples: transmitting knowledge, locating accessing information/data, managing information

S. Learning environment/Classroom management

Examples: reflect new technology and resource

T. Other Affects

Examples: collaboration, workshops

APPENDIX F

LINKED INFORMATION-BASED ATTRIBUTES

NCATE Standard I.A. Design of the Knowledge Base

Influence of technology

Traditional knowledge transfer no longer suffices in technological society (Case 07).

Technology explosion changed the knowledge composition of social community (Case 05).

Ethical, social, cultural attitudes

Use technology to retain ethnic socioeconomic equity in decisions (Case 05).

Apply technology for useful ethical educational objectives (Case 05).

Learning skills and processes

Technology materials developed from cognitive science to impact learning (Case 08).

Use human/material resources appropriate to fulfill learning through inquiry process of independent learner (Case 07).

Analyze the thinking demands of text resources (Case 06).

Teaching skills

Critique journal articles for application of current information in classroom (Case 04).

Understand/evaluate curriculum/materials for content/learning demands (Case 04).

Use methods materials media technology guided by theories of teaching (Case 09).

Use audiotapes and videotapes and traditional forms to evaluate components discussions reflection and selfevaluation (Case 07).

Students evaluate/reflect on experience through writing of journals (Case 05).

Identify evaluate select effective courseware using evaluative criteria (Case 07).

Content, delivery, and structure of information

Select/construct best methods, materials/media for artfully relating knowledge and thinking skills (Case 09).

Provide educator with knowledge about the learner and methods and media for transmitting knowledge (Case 09).

Classroom management and learning environment

Employ knowledge of individual in learning environment mediated by instructional technology (Case 01).

Collaborative events

Faculty collaborate with librarians and others on curriculum (Case 10).

Topics include library research strategies (Case 07).

Make use of educational journals and resources of Learning Ctr (Case 08).

Library inquiry introduces scholarly experience in field (Case 10).

Introduce library resources including major journals (Case 10).

Faculty stay abreast of knowledge by journals, library acquis & bibliographies (Case 01).

Attain knowledge of library and media research methods (Case 09).

NCATE Standard I.B: Delivery of the Curriculum

Teaching Skills

Readings from texts, journals, computer generated bibliographies lead to independent study (Case 05).

Student centered instructional strategies use computer for tutoring, drill and practice and simulation (Case 09).

Use videotaping for assessment (Case 10).

Collaborative events

Faculty development included Library Fellows Grant (Case 10).

Faculty study reference collection with reference librarian (Case 10).

Faculty assistance from Telemedia Services for using technology effectively (Case 09).

NCATE Standard I.C: Content of the Curriculum - General Education

Influence of technology

Understand powers/limitations of science/technology in a changing world (Case 08).

Understand appropriate role of technology for gathering community information (Case 08).

Understand ways science and technology affect humans and the world (Case 08).

Be aware contemporary science/technology trends and future implication (Case 08).

Ethical, social, cultural attitudes

Be aware responsibility of society, institutions, individuals to use technology ethically/appropriately (Case 08).

Teaching skills

Understand function, use/impact of computer technology (Case 03).

Upgrade computer hardware and software for effective remedial services (Case 03).

Content, delivery, and structure of information

Understand how science/technology create, disseminate and reinforce knowledge (Case 08).

Understand appropriate role of technology for gathering community information (Case 08).

Classroom management and learning environment

Acquire data management and computer assisted education for assessing information (Case 08).

Collaborative events

None.

NCATE Standard I.D: Content of the Curriculum - Specialty Studies

Teaching skills

Understand materials of content and techniques to convert knowledge into materials for teaching (Case 06).

Collaborative events

Computer Education Plan example of faculty departmental collaboration (Case 05).

NCATE Standard I.E: Content of the Curriculum - Professional Studies

Influence of technology

Foundations component covers impact of technology and societal changes (Case 09).

Ethical, social, cultural attitudes

Multicultural perspective reflected in materials selected for classroom (Case 06).

Learning skills and processes

Students need skills necessary to make choices in technological society (Case 04).

Independent thinking developed by making decisions about the selection of content, methods, materials, and evaluation (Case 06).

Teaching skills

Computer education skills integrated with course for understanding relationship of computer technology and instruction (Case 05).

Workshops for nontraditional teachers include computer application (Case 06).

Collaborative events

Use of library media includes av equipment, production & skills in instructional design (Case 02).

Media specialist available to assist students (Case 07).

Plan workshops in Curriculum Materials Center (Case 10).

Time established for intensive use of library resources (Case 10).

NCATE Standard IIA: Clinical and Field-Based Experiences

Teaching skills

Use tape to critique student lessons and demonstrations (Case 02).

Plan and utilize media or audiovisual to achieve objectives (Case 01).

View videotape to examine teaching technique (Case 01).

Prepare instructional materials for noninteractive experiences (Case 02).

Review film & tapes to decide use of media in teaching (Case 02).

Use video replay in teaching analysis and evaluation skills (Case 02).

Use varied teaching methods such as developing teacher aids and evaluating audiovisual materials (Case 02).

Review self-contained instructional modules of books (Case 02).

Collaborative events

Utilize resources in Learning Resources Center/Library for student careers (Case 02).

School based sites selected for maintenance of professional library of reference materials to meet teaching needs (Case 01).

Lesson plans published and taped for Learning Resources Center (Case 02).

Observe school library for resources, media, and types of equipment (Case 02).

Use library for research (Case 02).

Review using library/Learning Resources Center as noninteractive experience (Case 02).

NCATE Standard IIB: Relationships with Graduates

Develop/Adapt

Graduate input resulted in addition of computer component in methods (Case 06).

Graduates suggestions to improve computer use and instructional application by students (Case 04).

Graduate input resulted in elimination of audiovisual materials and selected materials integrated into courses (Case 03).

Lab equipment updated to reflect new technology (Case 02).

Faculty assist graduate through teleconferences visits and sharing resources (Case 02).

Collaborative events

Resource Information Center assists students, graduates and other professionals with educational resources (Case 02).

Media Services collaborate concerning improving delivery of quality education to public schools (Case 02).

New teachers have access to video resources library (Case 06).

Library and content area provide resources for use by new teacher (Case 06).

NCATE Standard IIC: Relationships with Schools

Learning skills and processes

Faculty, student teachers, employers integrated learning, action, resources and use of journals (Case 10).

Teaching skills

Science teachers and principals learn computer application in seminar (Case 02).

Collaborative events

ENLIST supports local science teachers for applictions in technology (Case 02).

New media materials purchased for consortium (Case 02).

NCATE Standard IV.C: Faculty Development

Teaching Skills

Using media in the classroom workshop for faculty (Case 05).

Services develop video software and media for teacher (Case 02).

Faculty access materials equipment for good teaching and to develop new strategies (Case 02).

Faculty have computer leave to bring computer skills to curriculum (Case 08).

Faculty computer leave to initiate new instructional computing styles (Case 08).

Collaborative events

Computer Center consults with faculty (Case 09).

Teacher Effective Center for reference media for instructional development (Case 02).

Learning Resources Center has educational materials (Case 02).

Specialty Studies Descriptions

Influence of technology

Challenge facing education and economic competition is enhanced technological capability and global village (Case 01 Early Childhood).

Lack impact of computers on math instruction despite potential (Case 01 Math).

Public attitudes of low expectation in math reflected by media (Case 01 Math)

Address problems caused by inability of workforce to function in increasingly technological workplace (Case 01 Math).

Ethical, social, cultural attitudes

Consider social education ethical impact of computers (Case 03 Business).

Learning skills and processes

Critique curriculum resources for developmentally appropriate learning styles, content higher order thinking (Case 10 Elementary).

Develop concepts generate enthusiasm through identical of resources materials Case 01 Math).

Advance development of ideas by using calculator and computer (Case 01 Math)

Explore concepts using computers and calculator (Case 01 Math).

Critical thinking skills crucial in culturally diverse technological complex society (Case 05 Social Studies).

Enhance critical thinking by preparing research reports book journal reviews (Case 05 Social Studies).

Synthesize interpretive skills through secondary sources (Case 10 History).

Do original research with primary materials (Case 10 History).

Develop analytical skills using primary sources (Case 10 History).

Faculty use active learning including audiovisual materials, computer (Case 10 History).

Teaching skills

Understand and apply strategies using education technology and material needs (Case 01).

To assist students' developing growth must know human development, curriculum theory concerning teaching objectives and materials (Case 01 Early Childhood).

Develop and utilize a variety of media for effective instruction (Case 01 Early Childhood).

Prepare students to utilize technology appropriate for effective practice (Case 05 Elememtary).

Using children's literature materials effectively in classroom (Case 03 Elementary).

Incorporate computer use in instructional program (Case 10 Elementary).

Adapt text as developmentally appropriate (Case 10 Elementary).

Daily tasks include selecting and using strategies and working with resources (Case 02 Specialty).

Develop utilize variety of media essential for effective instruction (Case 01 Middle Grades).

Demonstrate effective decision making through selection of music material selecting technology (Case 05 Music).

For preparation and implementation of program, utilize a variety of resources (Case 01 Health).

To support instructional objectives; practice using videocam (Case 10 Physical Education).

In preparation and implementation of program utilizing a variety of resources (Case 01 Health).

Content, delivery, and management of information

Use instructional materials to facilitate transmission of content (Case 01 Early Childhood).

Evaluate materials for literary and age replacement (Case 03 Elementary).

Use original sources to learn about interrelationship of communications (Case 10 Elementary).

Connect with other subjects through learning to critique texts (Case 10 Elementary).

Update, deliver current information by analysis, synthesis, evaluation of new published materials (Case 02 Health).

Guided by principles of subject, use instructional materials (Case 01 Health).

Update delivery current information by analysis, synthesis, and evaluation of new published materials (Case 01 Health).

Prepare to communicate with foreign lang using new styles technology (Case 05 Foreign Language).

Classroom management and learning environment

Use of technology in classroom integrated through program (Case 05 Elementary).

To enhance learning environment experience using technology as computer assisted instruction & MIDI (Case 05 Music).

To manage learning environment use computer application as tools (Case 01 Health).

For classroom management tasks, use computer and software (Case 10 Physical Education).

Collaborative events

Library Media & Computer elective course (Case 03 Elementary).

Children's Literature the Library course (Case 03 Elementary).

In library unit students gather research to support their inquiry (Case 10 Elementary).

Show how media, library printing press affects concepts of structure of knowledge (Case 10 English).

Revise enhance knowledge skills, use Academic Skills Center resources (Case 10 English).

Be familiar with library material (Case 10 English).

Use Curriculum Materials Center and Academic Skills Center (Case 10 English).

Faculty use active learning including audiovisual materials, computers, library projects, maps (Case 10 History).