1997

A Study to Determine the Differences in Undergraduate Technology Education Teacher Preparation Curricula in Virginia

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A STUDY TO DETERMINE THE DIFFERENCES IN UNDERGRADUATE TECHNOLOGY EDUCATION TEACHER PREPARATION CURRICULA IN VIRGINIA

A Research Paper

Presented to

The Graduate Faculty of the Department of

Occupational and Technical Studies

Old Dominion University

In Partial Fulfillment

of the Requirements for the Degree

Masters of Science

in Secondary Education

by

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July 1997

APPROVAL PAGE

This research paper was prepared by Cecil S. Burgett under the direction of Dr. John M. Ritz in OTED 636, Problems in Education. It was submitted to the Graduate Program Director as partial fulfillment of the requirements for the Degree of Master of Science of Education.

APPROVAL BY: John M. Ritz — 7-2-97

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ACKNOWLEDGMENTS

These individuals have given me valuable help in writing this research paper:

Dr. Thomas Jeffrey, Assistant Professor, Virginia Polytechnic Institute and State University;

Dr. John Ritz, Chair of Occupational and Technical Studies at Old Dominion University; and

Mr. Posey R. Young, Instructor of Industrial Education, Virginia State University.

This research would not have been possible without their assistance.

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CHAPTER I

INTRODUCTION

"In the 1980s, technology education emerged as a new school subject given to the study of technological systems--specifically, communication, production, and power/transportation systems" (Hoover & Sanders, 1996, p. 109). Wright and Lauda's definition of technology education from the January 1993 issue of *The Technology Teacher* defines technology education as "an educational program that helps people [to] develop an understanding and competence in designing, producing and using technology products and systems, and in assessing the appropriateness of technological action" (Martin, 1995). The computer age caused a need for the inclusion of physics, chemistry, mathematics, computer science, and studies of technology into the field of education. Hard work and dedication by leaders in the industrial arts field resulted in the development of technology education programs.

A statement in *Foundations of Technology Education* says that "Educational reform, economic factors, and the transformation from industrial arts to technology education are only a few of the elements affecting the design, structure, and implementation of college level programs in technology education" (Scott & Buffer, 1995, p. 443). An example of the changes going on in the technology education arena is illustrated in an article in *The Journal of Technology Education* by Kenneth Volk (1993).

The philosophical change from industrial arts to technology education has involved the renaming of programs, the restructuring of courses, and changes in facilities.

> Since the first program name change to technology education in 1970, over 30 programs listed in the *Industrial Teacher Education Directory* (Dennis, 1990) now contain such a descriptor. Courses are restructured, with traditional industrial arts content as wood crafts and drafting being replaced or reconceptualized into manufacturing and communications. Facilities have also witnessed changes due to the philosophical and programmatic shifts to technology education. However, despite this apparent shift in program philosophy, by the end of 1988 only 23.7% of the programs reviewed under ITEA/CTTE guidelines for technology education had full or conditional approval (Weins, 1990, p. 25-35).

How do these changes manifest themselves in Virginia's undergraduate technology education programs?

In this study information is presented on the four Virginia undergraduate technology education teacher preparation programs. The four programs include: Norfolk State University, Old Dominion University, Virginia State University, and Virginia Polytechnic Institute and State University. This paper describes each Virginia undergraduate technology education teacher program and explores the differences in them. Within this research is work that will give information on the programs of study, and subsequent course content used to prepare future technology education teachers in Virginia.

STATEMENT OF THE PROBLEM

The problem of this study was to determine the differences in the university curricula for Virginia undergraduate technology education teacher preparation programs.

RESEARCH GOALS

These goals were analyzed to detect the specific variances among the four technology education certification programs in Virginia.

1. How are the Virginia technology education teacher preparation programs accredited?
2. What is the pedagogical curriculum in undergraduate technology education teacher preparation at each university?
3. What is the technical content of the four Virginia undergraduate technology education teacher preparation programs?
4. What are the field experiences of the four Virginia undergraduate technology education teacher preparation programs?
5. What are the general education requirements of each program?

BACKGROUND AND SIGNIFICANCE

The 1995 Council on Technology Teacher Education yearbook "*Foundations of Technology Education*" noted a lack of uniformity in the nation's technology education degree programs. The yearbook stated "there is little consistency in the types of degrees that are awarded in technology teacher education institutions" and that "the Bachelor of Science (B.S.) and Bachelor of Arts (B.A.) degrees are awarded almost equally" (Scott & Buffer, 1995, p. 450). Just how do Virginia institutions differ in their approach to technology education teacher preparation?

The International Technology Education Association influences the basic curricula in technology a great deal. "The ITEA delivers services to its members in four major areas: professional development, governmental relations, membership, and communications. Services in each of these areas developed as a result of volunteer and headquarters staff activities" (Starkweather, 1995, p. 555-556). The ITEA is the "hub" of technology education. "The International Technology Education Association (ITEA) serves as the heart of leadership for the technology education profession by helping it set direction and define values. ITEA leadership roles include, serving as a facilitator for change, a clearinghouse for information, and a perpetuator of ideas that professionals want enacted" (Lauda, 1995, p. 543).

The ITEA is strengthened through its affiliation with the Council on Technology Teacher Education (CTTE). The CTTE was originally named the American Council on Industrial Arts Teacher Education (ACIATE), and became the CTTE in 1986. "The mission of the council is to improve, advance, and develop a standard for judging the contemporary nature and level of attainments of technology teacher education (Council on Technology Teacher Education, 1990). "The CTTE has maintained a large membership, in excess of 1,000 members, many of whom have contributed significantly to the literature of the field (Lauda, 1995, p. 572). A certain flexibility remains at the discretion of the individual schools in designing their own technology teacher programs. Much of the design is dictated by state licensure requirements. This flexibility results in final technology education teacher preparation programs that vary one from the other.

LIMITATIONS

This research is limited to NCATE accredited undergraduate technology teacher preparation programs in the state of Virginia. The primary data for this research was obtained from the undergraduate course catalogs of Norfolk State University, Old Dominion University, Virginia State University, and Virginia Polytechnic Institute and State University. Further information was obtained from the technology education programs of each university and their internet pages.

ASSUMPTIONS

There are four undergraduate technology education programs in the state of Virginia. The undergraduate technology education teacher preparation programs differ from one another because each institution has input toward the final curriculum that it delivers. By gathering and presenting data on the programs at each institution, differences in the programs can be discerned.

PROCEDURES

Variances and similarities in similar courses will be described in this research. Program requirements and course descriptions will be obtained from the undergraduate course catalogs of each institution. The data gathered will contain course descriptions, kinds of accreditation, pedagogical curriculum, general curriculum requirements, technical content and field experiences at each university. Additional data from the four Virginia

universities offering undergraduate programs in technology education teacher preparation was obtained from the internet pages of the respective technology education departments.

The information gathered was compiled and presented to show the aspects of each Virginia undergraduate technology education teacher preparation program. Each of the research goals will be supported with research information from all four Virginia undergraduate technology education programs. The research data will contain information that imparts a knowledge of the courses of study at each in the four Virginia technology education teacher preparation programs.

DEFINITION OF TERMS

These abbreviations and terms are used in this report and are described as follows:

CIT	Prefix for computer courses at Norfolk State University.
CSSE	Child Study/Special Education courses at Old Dominion University.
COPA	Council on Post-Secondary Accreditation.
Course of Study	Subject studies undertaken at colleges or universities in a program that culminates in a college degree.
CTTE	Council of Technology Teacher Education.
ECI	Prefix for Educational Curriculum and Instruction courses at Old Dominion University.

EDVT	Prefix for technology education courses at Virginia Polytechnic Institute and State University.
Field Experiences	Educational experiences that take place off campus, outside the college or university environment.
GST	Prefix for the new student orientation course at Norfolk State University.
HIS	Prefix for history courses at Norfolk State University.
IEDU	Prefix for Industrial Education courses at Virginia State University.
ITM	Prefix for computer numerical courses at Norfolk State University.
ITEA	International Technology Education Association.
NCATE	The National Council for Accreditation of Teacher Education
NSU	Norfolk State University.
ODU	Old Dominion University.
OTED	Prefix for Occupational and Technical Education courses at Old Dominion University.
OTS	Prefix for Occupational and Technical Studies at Old Dominion University.
Pedagogical	Pertaining to the art of teaching.
Teacher Preparation	The training of teachers in colleges and universities.
TECA	Technology Education Collegiate Association.

Technical Content	Courses of study in technology education involving the direct study of technology.
Technology	The application of knowledge and technical systems to improve the world (Ritz, Hadley & Bonebrake, 1990, p. 23).
TEDU	Prefix for technology education courses at Virginia State University.
Virginia Tech	Virginia Polytechnic Institute and State University.
VSU	Virginia State University.

OVERVIEW OF CHAPTERS

In Chapter I, the field of technology education was described and defined. Factors affecting the design of college level programs were also emphasized, and the fact that differences exist in these programs was pointed out. The discussion topics in Chapter I included research goals, background and significance, limitations, assumptions, procedures, and definition of terms. The specific research goals for this research are listed, and the background and significance for making this research is also pointed out in Chapter I. The limitations section of Chapter I describes the area to which this research is limited, the assumptions describe the premise upon which the theme of this research is based, and the procedures describe the way this research was conducted. The chapter also has a list of terms and abbreviations, defined and described. Chapter II is a review of literature on technology education, with a discussion on technology education curriculum designs and goals. Chapter II contains a review by subject topic of some authoritative writings and

information about the leading technology education associations. Chapter III contains information on the methods and procedures, including population, instrument design, methods of data collection, statistical analysis and summary. Chapter IV consists of the findings that were drawn from the undergraduate course catalogs at the four Virginia Universities, and information gathered from authorities at those schools. Chapter V is a summary, conclusions reached in the study, and recommendations.

CHAPTER II

REVIEW OF LITERATURE

The Virginia technology education teacher preparation programs are a result of hard work on the part of a large number of individuals. Only part of the ideas and impetus that brought about Virginia technology education teacher preparation programs is contributed by the host institution. Professional organizations, individuals, accrediting organizations, and state and local governments, all play a vital role in establishing teacher preparation programs. This chapter will present discussion on the organizations that establish guidelines and act as accrediting organizations for Virginia undergraduate technology education teacher preparation programs. Additionally, the respective teacher preparation programs are described according to their pedagogical curricula, technical content, and student field experiences.

ACCREDITING ORGANIZATIONS

How are technology education teacher preparation programs regulated and controlled with so many different parties contributing to the resulting curriculum? How great can the difference be between a technology education teacher program at one university and the same type of program at another university? A great part of the answer lies in accrediting organizations. NCATE is the most powerful accrediting organization in teacher preparation programs in the United States. "The National Council for Accreditation of Teacher Education (NCATE) is a private organization formed in 1952 with equal representation from

public school practitioners, preparing colleges, and state education legal authorities" (Stinnet, 1970, p. 25).

> For much of its history, NCATE concentrated on evaluating individual teacher education programs (e.g., art education or elementary education), though as part of its recent redesign (Gideonse, 1992; Roames, 1987), NCATE now accredits the basic "unit" (including programs for the advanced preparation of teachers and the initial and/or advanced preparation of programs, considered either individually or in clusters, with the purpose of assuring that institutions are accountable for maintaining [the] quality of the professional preparation programs offered by those institutions (Christensen, 1980, p. 42).

All four of the Virginia undergraduate technology education teacher preparation programs are accredited by the National Council of Teacher Education (NCATE).

NCATE works with professional organizations in establishing the guidelines for its accreditation policies. "In 1986, the CTTE engaged in a project with the ITEA and the National Council for the Accreditation of Teacher Education (NCATE) to develop technology education accreditation standards at the undergraduate level. These standards were approved by NCATE in April 1987 and were implemented immediately" (Lauda, 1995, p. 573). The guidelines and standards are a challenge that must be met by any institution that aspires to have a technology education teacher preparation program in the state of Virginia. The field of technology education continues to grow and strengthen through its teacher preparation programs. "The CTTE/ITEA/NCATE technology teacher education folio requirements consist of three major components: (a) overview and scope of the program, (b)

guidelines and matrix, and (c) appendices. "When the ITEA and the CTTE engaged in accrediting programs through NCATE, the latter allowed a member of CTTE to serve on NCATE's national boards. Membership on these boards has given recognition to technology education and has increased the awareness of technology education among the other disciplines" (Lauda, 1995, p. 575). "NCATE provides the only national teacher education accreditation recognized by the U.S. Department of Education and the Council on Postsecondary Accreditation" (COPA) (Emans, 1986).

In addition to the national organizations, state departments of education also regulate undergraduate teacher preparation programs. The teacher education institutions must meet or exceed the requirements set down by the states for their graduates to be qualified for state teacher certification. "Six regional accreditation agencies examine educational institutions for the quality and completeness of all resources and programs." "These are the Middle States, New England, North Central, Northwest, Southern, and Western Associations of Schools and Colleges" (Emans, 1986).

PEDAGOGICAL CURRICULUM IN UNIVERSITY TECHNOLOGY EDUCATION PROGRAMS

In 1996, the ITEA published the *Technology for All Americans Project: A Rationale and Structure for the Study of Technology.* Through the publication, the ITEA calls for educational reform to ensure technological literacy for all and the development of standards based on the universals of technology and structure. The Rationale and Structure states that its goal is to develop standards for technology education in kindergarten through 12th grade

curriculum content standards with benchmarks at 4th, 8th and 12th grade; teacher enhancement and teacher preparation standards; student assessment standards; and program standards (p. 50). The *Technology for All Americans Rationale and Structure* expresses hope that "technology education leaders will develop new curriculum materials at the state and local levels" (p. 44). The importance of learning about technology is pointed out in the Rationale and Structure where it speaks of a wide technological gap that results from technological change. The gap exists between experts, who know a great deal, and the general public, who are left behind and know very little about the new technology (1996, p. 6). To establish technological literacy, the Rationale suggests a model for the study of technology. "The Universals of Technology", described in the Rationale, are processes, knowledge and contexts, each affecting technological systems. Processes pertain to technological systems through design and development, determining and controlling behavior, and utilizing and assessing impact. Knowledge explores the nature, evolution, linkages, concepts and principles of technology. Contexts affect the informational, physical and biological systems of technology (Technology for All Americans Rationale and Structure, 1996, p. 6 & 16).

The standard technology teacher education model is a four-year baccalaureate program culminating in a Bachelor of Science (B.S.), or a Bachelor of Arts (B.A.), with licensure by the State Board of Education. The Virginia programs offer the Bachelor of Science degree. The general or liberal studies are core requirements at the particular college or university. "Professional studies are methods courses, field or clinical experiences, laboratory and classroom management, foundations (history, sociology, psychology, ethics)

of education, and student teaching" (Buffer & Scott, 1995, p. 450). The technical components of a technology education teacher preparation program consist of the core courses in the technologies of communication, manufacturing, transportation, and construction.

The current curriculum for technology education teacher preparation is based on the CTTE/ITEA/NCATE folio guidelines. The guidelines specify that "technology education teacher graduates must be able to analyze the philosophy of technology education, articulate and promote technology education, and write appropriate psychomotor, affective, and cognitive objectives and use them to monitor student performance" (Israel, 1995, p. 31). Technology education teacher preparation has been described as "an integral part of the total field of teacher education [involving] laboratory and field experiences, theoretical and applied professional knowledge and skills integrated toward better teaching of subject matter and youth" (Martin, 1995, p. 4). The ITEA, CTTE, NCATE, state and United States Department of Education all work together to create standards for technology education teacher programs.

In addition to general studies, technology education technical courses, and the field experiences, the aspiring technology education teacher must undertake studies in pedagogical courses to complete the teacher preparation program. The goal of the pedagogical course work is to prepare the student to be responsible for an actual secondary school technology education class. The exact nature of pedagogical courses vary from school to school, but the fundamentals remain the same. In this phase of the teacher preparation program, students acquire professional teaching skills and learn to lecture, control and discipline in the

classroom environment. The undergraduate courses that make up the pedagogical curriculum of each school consist of several three credit hour courses. Students in technology education teaching programs usually begin pedagogical studies after the freshman year.

At Norfolk State University courses called "SED", standing for secondary education, make up the bulk of the pedagogical curriculum. The five secondary education courses required are: SED 201 (American Schools and the Teaching Profession), SED 380 (Foundations of Methods in Secondary Schools), SED 420 (Educational Technology), SED 486 (Educational Psychology and Behavior Management), and SED 420 (Educational Technology). The courses are rated at three credit hours each.

Old Dominion University's five pedagogical courses are rated at three credit hours each. The courses are: ECI 412 (Fundamentals of Adolescent Development), CSSE 431 (Introduction to Test and Measurement), OTED 305 (Curriculum for Technology Education), OTED 306 (Methods for Technology Education), and OTED 407 (Mainstreaming Special Students Into Vocational Classes).

The first pedagogical course at Virginia Polytechnic Institute and State University is a two semester class for two credit hours in each semester. This course is called EDVT (Teaching Drafting in Technology Education), and is offered in the freshman year. The three credit-hour Virginia Polytechnic Institute and State University pedagogical courses are recommended for the senior year. The courses are: EDCI 3154 (Psychological Foundations II: School Learning), EDVT 4414 (Educational Practicum), EDVT 4424 (Curriculum in Technology Education), EDVT 4434 (Teaching Methods in Technology Education).

Virginia State University has five pedagogical courses, each worth three credit hours.

The courses are: EDUC 301 (Foundations of Instruction), IEDU 352 (Measurements in Industrial Education), EDUC 315 (Generic Teaching Skills), EDUC 427 (Reading Instruction in Subject Area), and TEDU 453 (Principles of Teaching Technology).

VIRGINIA UNDERGRADUATE TECHNOLOGY EDUCATION PROGRAMS' TECHNICAL CONTENT

The state of Virginia Licensure Regulations for School Personnel requires a minimum of 39 semester hours of technical content in technology education technical courses. The Office of Professional Licensure divides the requirements as follows:

1. Technology and culture: 6 semester hours

   Experiences shall include the historical development of technology and its present and future impact on the individual, society and environment.

2. Technological foundations: 12 semester hours

   Experiences shall include drafting, electronics, materials science and energy, and power.

3. Technological processes: 12 semester hours

   Experiences shall include material processes, manufacturing, constructing, designing, and graphic communications.

4. Technological systems: 9 semester hours

   Experiences shall include communication, production, and transportation.

Norfolk State University's four-year course schedule lists forty-five credit hours of technical content as major requirements. Old Dominion University's four-year course

schedule as well, lists forty-five credit hours required in technical content. Virginia Polytechnic Institute and State University has a total of forty-five credit hours in technical content for its technology education teacher program. Virginia State University's four-year course schedule for technology teacher education shows a total of forty-five credit hours of technical content specified. The university programs all list thirty-nine credit hours of technical content plus six hours of elective technical content, which brings the total of required credit hours to forty-five for each institution.

Technical courses are well suited to persons who like to perform technological skills and teach others to do the same. A good description of the nature of technology education technical content comes from a chapter by Scott and Buffer in the 44th CTTE yearbook. The authors state that "the technical/technological component is usually laboratory based and includes those courses unique to the discipline (or field) of technology. They include courses in technological problem solving, technology systems, and/or application of general studies (especially math and science) to technology" (Buffer & Scott, 1995, p. 450). Technical content as it relates to technology education teacher preparation can be divided into four systems of technology curriculum. "*The Jackson's Mill Industrial Arts Curriculum Theory* (Snyder & Hales, 1981) document identifies transportation, communication, construction, and manufacturing as the four major technical adaptive systems" (Komacek, 1995, p. 349).

The technical content of communication technology includes such topics as graphic communications and electronic communications. "Brusic's (1990) definition combined the definitions of communication and of technology: Communication technology refers to the tools, techniques, knowledge, choices, and decisions associated with sending and receiving

information" (Martin, 1995, p. 288). Manufacturing technology learning activities involve: "(a) how value is added to raw materials, (b) how industrial inputs become finished goods, (c) how facilities are designed for the efficient processing of materials and components, and (d) how enterprises are organized and managed" (Seymour, 1995, p. 323). Transportation technology education has been described as "an educational program that helps people develop an understanding and competence in designing, producing, and using technology products and systems for the purposes of moving passengers and freight, and in assessing the appropriateness of technological actions" (Komacek, 1993, p. 1). The last area of technical content described by the *Jackson's Mill Industrial Arts Curriculum Theory* publication is construction technology. Construction technology is defined as "a technical adaptive system designed by people to efficiently utilize resources to build structures or constructed works on a site" (Snyder & Hales, 1981, p. 30).

FIELD EXPERIENCES IN UNIVERSITY TECHNOLOGY EDUCATION PROGRAMS

Among the most important parts of technology education teacher preparation are the student field experiences. The field experience takes the student outside the university and into the secondary school technology education classroom. The first field experience a student has can cause her or him to change their mind about teaching, reinforce their desire to teach, or bring questions about teaching to their attention. Students in each Virginia technology education teacher preparation program have at least two separate field experiences. The first experience is an observation-type program, where the student sits in on actual secondary technology education classes. This field experience is the college

student's first exposure to the actual secondary classroom as an aspiring technology education teacher. This field experience is part of the requirements for a one to three credit hour course. Some programs require the student to participate in the actual instruction in the classroom and/or laboratory.

At Norfolk State University, students will normally spend ten hours in a middle school and ten hours in a high school, observing technology education classes. The course is called SED 380, and titled Fundamentals for Secondary Methods. Students sit in on technology education classes and record their experiences. The classroom teachers at the host schools evaluate the student's conduct and appearance. In addition to the observation, sometimes the classroom teacher at the host institution will allow the student observer to talk to the class or assist in some classroom functions. SED 380 also requires students to attend class three days a week to learn secondary education fundamentals.

Old Dominion University technology education students are required to perform forty hours of observation in either a in middle school or a high school. The course is titled ECI 297 and titled "Observation and Participation." Students who successfully complete the program earn one credit hour.

At Virginia State University students have forty-five hours of classroom observation for three credit hours in a course titled the Practicum Experience and called IEDU 300. For the first fifteen to thirty hours of the practicum, Virginia State students engage in observation and what is called "microteaching", or small teaching assignments as allowed by the supervising classroom teacher. The remaining 15 to 30 hours of the field experience includes observation and activities that are at the discretion of the supervising classroom teacher. The

VSU undergraduate catalog describes its practicum as an opportunity for students to observe, plan, and participate in different roles as a teacher in a school setting prior to doing student teaching (Virginia State University Undergraduate Catalog, 1995, p. 124).

Virginia Polytechnic Institute and State University has field experiences in the sophomore and junior years. The sophomore course is titled EDVT 3754 and named "Early Clinical Experience." This course is designed so that students can decide if they really want to teach. It is a one credit hour course, requiring ten hours of observation in a technology education class at the middle school level and ten hours in the high school level. The junior level requirement is a two credit hour course titled EDVT 4964 and named "Field Experience." This junior level course places the student as an assistant under an experienced technology education teacher at a secondary school. The junior student performs classroom duties as assigned by the supervising teacher.

All Virginia undergraduate technology education programs have teaching internships as a required field experience for future teachers. The internship, or student teaching experience as it is sometimes called, usually takes place in the final semester of undergraduate study. This student teaching experience lasts a whole semester, and accounts for nine to twelve credit hours of study. A normal experience lasts from fourteen to sixteen weeks, with one-half the field work at a high school and one-half at a middle school. The student teacher spends the entire school day in the classroom with the cooperating teacher and the students. During this teaching field experience, a student teacher will demonstrate ability to teach, manage and control the entire class.

The major field experience for students in the technology education teacher preparation program at Norfolk State University is named "Directed Teaching and Seminar". This description is from the NSU undergraduate catalog:

> The equivalent of 3 semester hours devoted to discipline - specific methods course work with the equivalent of nine semester hours being devoted to actual student teaching. During the two weeks preceding student teaching, extensive seminars dealing with the methods in each of the subject areas will be conducted. The seminars will continue throughout the student teaching experience on a weekly basis. Discipline -specific methods will be taught by the professors who supervise student teachers. Student teaching will occur over a 16-week period (Norfolk State University, 1994, p. 190).

ODU describes its major field experience as student teaching. The ODU undergraduate catalog describes its student teaching experience as " five days per week, full semester; 12 credits" (Old Dominion University Catalog, 1996, p. 218). The ODU student teaching program places the student in the classroom under a supervising teacher. The university technology education department also supervises student progress. The ODU senior will gain practical experience in classroom teaching and management. The participating ODU undergraduate senior will spend one-half of the student teaching at a high school and one-half at a middle school.

Virginia Polytechnic and State University lists its major technology education field experience as "internship in education". The course is described as a "Planned program of clinical practice in education under the direction and supervision of a university supervisor

and a selected practitioner" (Virginia Tech, 1997, p. 264). The Virginia Tech internship course is a nine credit hour course, completed in one semester. Students at Virginia Tech must complete their professional studies requirement in order to begin the internship.

Virginia State describes its major field experience for technology education majors as a "practical teaching of technology education classes in junior and senior high schools with a master teacher. Emphasis is on student development to assume total responsibility for teaching, planning, keeping records on materials and equipment, evaluation of pupils' progress, and laboratory organization and management" (Virginia State University Undergraduate Catalog, 1995, p. 128). The Virginia State University student teaching course is an eight credit hour course, lasting one semester. In all student teaching field experiences, the student is evaluated by the cooperating teacher, principal, and university departmental supervisor.

GENERAL EDUCATION REQUIREMENTS

Regardless of the undergraduate degree a student may select to complete, the host institution requires that several courses most commonly referred to as "general studies" be finished. These are the courses every student must complete and are done for the most part in the freshman and sophomore years of study. The general studies sequence consists of from forty to fifty or more credit-hours. Some of the more common general studies courses are math, physics, English, literature, history, civilization, and the humanities. Of all the studies in the technology education teacher programs in Virginia, the general studies courses are most similar. A complete description of the general studies courses at each of the

Virginia undergraduate technology education teacher programs is in Chapter IV of this research.

SUMMARY

The differences in Virginia technology education teacher preparation programs result from the democratic nature of curriculum science in the United States. A diversity of technical courses are offered in the four Virginia technology education teacher preparation programs. Strong accreditation standards and professional organizations that stand for high values help technology education to have and keep good teachers. Finally, intense field experiences for all students in technology teacher preparation round out the undergraduate program. Virginia undergraduate technology education teacher preparation programs prepare teachers who are ready and able to educate students for a successful life in technological fields.

CHAPTER III

METHODS AND PROCEDURES

This chapter includes details on gathering data for this research, and the way the data is presented. Topics for this chapter include methods and procedures, population, instrument design, methods of data collection, statistical analysis and a summary. Information for this research was obtained from the undergraduate course catalogs of each of the four Virginia Universities offering a technology education teacher preparation program. Additional information was obtained from the four-year course of studies and internet web pages of the four Virginia university technology education teacher departments. Other details were obtained directly from instructors and administrators in the respective technology education departments at the four universities.

POPULATION

The population for this research are the four Virginia universities that offer an undergraduate technology education teacher preparation program. The Virginia universities that make up the population are: Norfolk State University and Old Dominion University in Norfolk, Virginia State University at Petersburg, and Virginia Polytechnic Institute and State University at Blacksburg. In the process of this research, departmental faculty and leadership of each technology education teacher preparation program were consulted.

INSTRUMENT DESIGN

An undergraduate catalog and a four-year program of studies in technology education teacher preparation was obtained from each of the four Virginia universities having an accredited technology education teacher program. The names of the four Virginia universities are listed in Appendix A. The undergraduate program of studies from each university appear in Appendix B. The data collected from the universities was analyzed and presented as a descriptive research study.

METHODS OF DATA COLLECTION

The undergraduate catalogs for Norfolk State University, Old Dominion University, and Virginia State University were obtained directly from the campus bookstores at the respective schools. The undergraduate catalog for Virginia Polytechnic Institute and State University was purchased by telephone. The four-year course schedules for Norfolk State, Old Dominion and Virginia Polytechnic Institute and State University were obtained from the respective internet pages of each school. The four-year course schedule for Virginia State University was obtained directly from the technology education department at Petersburg.

STATISTICAL ANALYSIS

Courses and their contents in each of the Virginia technology education teacher preparation programs are described and contrasted in tables in Chapter Four.

SUMMARY

The course requirements and course descriptions of all subject areas of study in the four technology education teacher preparation programs were collected and organized. The respective university bookstores and the faculty and administration of each Virginia technology education teacher preparation department not only submitted requested information but offered to be of any possible assistance should the need arise. The Internet pages of the four Virginia technology education departments were of substantial use in this research. The results of all the data collected are presented in Chapter IV.

CHAPTER IV

FINDINGS

The problem of the study was to determine the differences in the university curricula for Virginia undergraduate technology education teacher preparation programs. This chapter presents tables and descriptions that round out the details of courses in each of the four Virginia technology education teacher preparation programs.

OVERVIEW OF RESPONSES

An undergraduate catalog and a four-year schedule of courses was obtained from Norfolk State University, Old Dominion University, Virginia State University, and Virginia Polytechnic Institute and State University. Additional information was furnished by faculty members from the universities' technology education departments. The collected data are put in table form and presented in this chapter.

PEDAGOGICAL CURRICULUM AND FIELD EXPERIENCES

Pedagogical curriculum and field experience courses are designed to give students the professional knowledge needed to teach and discipline in the classroom setting. The field experience courses take place in an actual in-session public school classroom. The state of Virginia *Licensure Regulations for School Personnel* describes the pedagogical and field experience courses as professional studies requirements. The Virginia Department of Education requires fifteen credit hours in pedagogical and field experiences. A description of the distribution of the requirements is in Table 1.

Table 1. Professional Studies Requirements

COURSES	NSU	ODU	VSU	VA. TECH.
Human growth and development (birth through adolescence): 3 semester hours.	SED 486	ECI 412	IEDU 352	EDCI 3154
Curriculum and instructional procedures: 6 semester hours	SED 380 SED 420	OTED 407 CSSE 431 OTED 306	IEDU 355 TEDU 453	EDVT 4424 EDVT 4434
Foundations of education: 3 semester hours	SED 201	OTED 305	EDUC 301	EDCI 3024
Reading	Content area	Content area	EDUC 427	Content area
Supervised classroom experience: Minimum of 150 hours in direct teaching activities	SED 380 SED 499P SED 499	ECI 297 OTED 485	IEDU 300 EDUC 481 TEDU 459	EDVT 3754 EDVT 4754

UNDERGRADUATE TECHNOLOGY EDUCATION TECHNICAL CONTENT COURSES

Technical content courses are the core courses for the undergraduate technology education teacher program major. This table shows the technical content courses in all four Virginia technology education teacher programs.

Table 2. Technical Content Requirements

COURSES	NSU	ODU	VSU	VA. TECH.
Technology and culture: 6 semester hours	TED 170 TED 371	OTS 370U OTS 417	TEDU 130 TEDU 202	Electives
Technological foundations: 12 semester hours	TED 130 TMD 150 TMD 151 ELT 111. L TED 351	OTS 111 OTS 221 OTS 241 OTS 242 OTS 243 Elective	DRFT 160 DRFT 369 ELTC 180, L ELTC 181	EDVT 1405 EDVT 1406 BSE 2484 EDVT 4445 EDVT 4446
Technological processes: 12 semester hours	TED 131 TED 135 TED 215 ITM 353	OTS 222 OTS 231 OTS 250 OTS 321 OTS 322 Elective	TEDU 153 TEDU 250 TEDU 253 TEDU 401	EDVT 2425 EDVT 2426 ISE 2204, L EDVT 3484
Technological systems: 9 semester hours	ITM 147 TED 330 TED 350	OTS 323 OTS 351 OTS 360	TEDU 150 TEDU 402 TEDU 403	EDVT 3454 EDVT 3475 EDVT 3476 EDVT 3464 EDVT 4444

VIRGINIA UNDERGRADUATE TECHNOLOGY EDUCATION TEACHER PREPARATION GENERAL REQUIREMENTS COURSES

The Virginia *Licensure Regulations for School Personnel* specifies that all students shall complete a minimum of forty-six semester credit hours of course work in general studies requirements. The university course titles of those requirements are listed in the next table.

Table 3. General Education Requirements

COURSES	NSU	ODU	VSU	VA. TECH.
Arts and humanities: 9 semester hours	FIA 170 HUM 210 Elective	ART 121A PHIL110P	GEPI 140 Electives	Electives
Written and oral communication skills: 6 semester hours	ENG 101 ENG 102 SCM 285	ENGL 110C SPCH 101	GEEN 110 GEEN 310	ENGL 1105 ENGL 1106
Literature: 3 semester hours	ENG 207	ENGL 112L	GEEN 111	Electives
Mathematics: 6 semester hours	MTH 151 MTH 153	MATH 102M MATH 130M	GEMA 112 GEMA 113	MATH 1015 MATH 1016
History: 6 semester hours	HIS 102 HIS 335	HIST 130H HIST 131H	GEHI 122 Elective	Electives
Social sciences: 6 semester hours	Elective GST 101	GEOG 101S PSYC 201S	GESO 211 Elective	Electives
Sciences: 6 semester hours	PHY 150, L BIO100, L	PHYS 101N PHYS 102N PHYS Elective	PHYS 110, L PHYS 111, L	phys 2205, L phys 2206, L Elective
Computer sciences: 1 semester hour	CIT 150	Departmental Requirement	Departmental Requirement	Departmental Requirement
Health and physical education: 3 semester hours	HED 100 PED 100	HPE 1***	GEHE 164 GEPE 165	Elective

SUMMARY

The tables show the subjects and course titles of the accredited undergraduate technology education teacher preparation programs in Virginia. The tables indicate subjects and courses in the four programs differ. The common goal of all four programs is to train students to be public school technology education teachers according to state and national standards.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

SUMMARY

The problem of this research was to determine the differences in the university curricula for Virginia undergraduate technology education teacher preparation programs. Data was collected from Norfolk State University, Old Dominion University, Virginia State University, and Virginia Polytechnic Institute and State University. In Chapter I, research goals in the form of questions are presented as a framework and guide of this paper. The questions are:

1. How are the Virginia technology education teacher preparation programs accredited?
2. What is the pedagogical curriculum in undergraduate technology education teacher preparation at each university?
3. What is the technical content of the four Virginia undergraduate technology education teacher preparation programs?
4. What are the field experiences of the four Virginia undergraduate technology education teacher preparation programs?
5. What are the general education requirements of each program?

University undergraduate course catalogs and four-year course schedules from each university were used as a basis to describe the differences in the Virginia technology

education teacher programs. Tables offering comparisons of the courses from each of the four Virginia programs were presented in Chapter IV of this research.

CONCLUSIONS

The results of the data collected as they pertain to each research goal indicate positive relationships to the questions.

Goal 1. How are the Virginia technology education teacher preparation programs accredited?

Technology education teacher programs are accredited by the National Council of Teacher Education (NCATE), through standards it developed in consultation with the International Technology Education Association and the Council on Technology Teacher Education. All four of the Virginia technology education teacher programs discussed in this research are NCATE accredited.

Goal 2. What is the pedagogical curriculum in undergraduate technology education teacher preparation at each university?

In each university technology education teacher program students learn the skills needed to teach and discipline in the classroom environment. These skills are obtained through the pedagogical curriculum which consists of five three credit-hour courses at each university. The CTTE/ITEA/NCATE folio guidelines stipulate that "technology education teacher graduates be able to "articulate and promote technology education, and write appropriate psychomotor, affective, and cognitive objectives and use them to monitor student performance" (Israel, 1995, p. 31).

Goal 3. What is the technical content of the four Virginia undergraduate technology education teacher preparation programs?

The technical content in the Virginia programs consists of the core courses in the major study area. Each of the Virginia technology education teacher programs require thirty-nine credit hours plus six elective credit hours in technical content courses. The Virginia Licensure Regulations specify that applicants seeking an endorsement in technology education complete a minimum of thirty-nine semester hours in technical content courses. The technical content curriculum is a result of collaboration between the CTTE, ITEA, and NCATE, with NCATE as the ultimate accrediting organization for teacher education programs.

Goal 4. What are the field experiences of the four Virginia undergraduate technology education teacher preparation programs?

Virginia Licensure Requirements includes field experiences under a sub-section titled "supervised classroom experience". The clause specifies that the student teaching experience should provide for the prospective teacher to be in classrooms full-time for a minimum of two-hundred clock hours. Field experiences are the courses of study that take place away from the university campus environment. The first part of the field experience in the four programs consist of an observation and participation course of two to three credit-hours. The final stage of the undergraduate work is a student teaching field experience that lasts for one-semester and is valued from eight to twelve credit hours. The field experience part of the teacher preparation curriculum is also a result of the work of the CTTE, ITEA and NCATE, with NCATE as the supreme accrediting agency.

Goal 5. What are the general education requirements of each program?

The general studies courses are sometimes referred to as the core curriculum requirements. The general studies courses are required of all students entering the university. The general studies curriculum is designed to give students the opportunity to acquire the general knowledge and skills necessary to peruse further college studies. The requirements for the technology education teacher preparation general studies curriculum are set by NCATE in association with the ITEA and the CTTE. The general studies courses lay the groundwork for studies in the chosen major. The general studies courses range from forty to more than fifty credit-hours of study, depending on the curriculum designs at the respective institutions. The Virginia Licensure Requirements stipulate a minimum of forty-six semester credit hours of course work in the general studies area. Dr. John M. Ritz, Old Dominion University Department Chair and Graduate Program Director, commented on the Virginia Licensure Requirements in July of 1997. Dr. Ritz stated "that since Virginia operates on an approved program concept, universities may vary from these requirements if their programs meet the intent of the licensure requirements".

RECOMMENDATIONS

The following recommendations are made based on the data collected from the four accredited Virginia undergraduate programs of technology education teacher preparation:

1. Undergraduate technology education teacher preparation programs at each university should continue to strive for originality and quality within guidelines established by governmental and professional organizations.

2. Graduates of technology education teacher preparation programs should perpetuate, support and strengthen the ITEA and CTTE through membership in each organization and participation in their respective activities.
3. Technology education teachers should follow the recommendations in the *Technology for All Americans: A Rationale and Structure For the Study of Technology* "to develop and implement standards for technology education by realizing their potential as key people who can increase awareness of the need for technology education within their local school system" (1996, p. 44).
4. Technology education professionals should strive to "develop high-quality technology curricula and programs, to prepare teachers, and to assess whether or not students are meeting the standards" (Technology for All Americans: A Rationale and Structure For the Study of Technology, 1996), by studying the innovations and trends in the field of education, especially technology education.

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APPENDIX A

THE UNIVERSITIES PARTICIPATING IN THIS STUDY

NORFOLK STATE UNIVERSITY

OLD DOMINION UNIVERSITY

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

VIRGINIA STATE UNIVERSITY

APPENDIX B

COURSE SCHEDULES OF THE PARTICIPATING UNIVERSITIES

NORFOLK STATE UNIVERSITY-TECHNOLOGY EDUCATION

First Year	**Credit Hours**
CIT 150 Computer Principles	3
ENG101 Communications Skill	3
ENG 102 Communications Skills II	3
GST 101 Colloquium	2
HED 100 Personal/Community Health	2
IMT 105 Industrial Safety & Management	3
ITM 147 Introduction to Manufacturing	3
MTH 151 College Algebra	3
MTH 153 College Algebra/Trigonometry	3
PED 100 Fundamentals Fitness for Life	1
TED 130 Materials Technology	3
TED 170 Technology and Society	3
TMD 150 Engineering Graphics	3
TOTAL	35
Second Year	
BIO 100 Biological Science	3
BIO 100L Biological Science Lab	1
ELT 111 Basic Electronics	3
ELT 111L Basic Electronics Lab	1
ENG 207 Literature of the Western World	3
HIS 102 U.S. History	3
HIS 335 African-American History	3
SED 201 American Schools/Teaching Profession	3
TED 131 Materials Processing	3
TED 135 Construction Technology	3
TED 215 Graphic Communication	3
TMD 151 Introduction to CAD	3
TOTAL	32
Third Year	
FIA 170 African-American Art/Equivalent	3
HUM 210 Humanities	3
ITM 353 Computer	3
PHY 150 General Physics	3

PHY 150L General Physics Lab	1
SED 233 Educational Assessment/Evaluation	3
SED 380 Fundamentals for Secondary Methods	3
TED 330 Communication Technology	3
TED 351 Energy and Power	3
TED 371 Current Trends in Technology Education	3
TOTAL	28

Fourth Year

Cultural Elective	3
SCM 285 Principles of Speech	3
SED 486 Educational Psychology & Behavior Management	3
SED 499 Directed Teaching	12
SED 499P Directed Teaching Seminar	0
TED 350 Transportation Technology	3
TED 485 Methods of Teaching Technology	3
TOTAL	27

SUMMARY OF GRADUATION REQUIREMENTS

General Education Requirements	48 credit hours
School Requirements	38 credit hours
Major Requirements	39 credit hours
Electives	3 credit hours
TOTAL	122 credit hours

OLD DOMINION UNIVERSITY-TECHNOLOGY EDUCATION

University General Education Requirements (52 Hours)	**Credit Hours**
ENGL 110C English Composition	3
ENGL 112L Enjoying Literature	3
ART 121A, 122A, MUSC 203A, 213A, TART 185A, or 241A	3
PHIL 110P Intro to Philosophy	3
HIST 130H American Civilization in a World Setting	3
HIST 131H American Civilization in a World Setting	3
PSYCH 201S Introduction to Psychology	3
GEOG 101S Environmental Geography	3
MATH 102M College Algebra	3
MATH 130M Elementary Statistics	3
PHYS 101N Elementary Physics	4
PHYS 102N Elementary Physics	4
SPCH 101 Public Speaking	3
HPER (Any Activity)	2
OTS 370U Technology and Society	3
Upper Division Electives (6 Hours)	
(OTS 382U, GEOG 305U, HIST 304U)	3
Upper Division Elect (Second Area)	3
Professional Courses 15 Hours	
ECI 412 Fundamentals of Adolescent Development	3
CSSE 431 Tests and Measurements	3
OTED 305 Curriculum for Technology Education	3
OTED 306 Methods for Technology Education	3
OTED 407 Vocational Education for Special Needs Students	3
Foreign Language Requirements (0-6 hours)	0-6
Technical Content (39 hours plus 6 hours electives)	
Communication Technology	3
OTS 111 Drafting and Design	3
OTS 222 Communication Design	3
OTS 250 Graphic Communication Processes	3
OTS 351 Communication Technology	3
Production Technology	3
OTS 221 Industrial Materials	3
OTS 231 Materials and Processes Technology	3
OTS 321 Manufacturing Technology	3
OTS 322 Construction Technology	3
OTS 323 Production Technology	3
Transportation Technology	3

OTS 241 Energy Systems: Basic Electricity	3
OTS 242 Energy Systems: Electronic Communication	3
OTS 243 Energy and Power	3
OTS 360 Transportation Systems	3
Technical Electives (5-7 Credits)	
OTS 417 Exploring Technology and Modern Industry	3
OTS 386U Architecture	3
MET 230 Computer-aided Drafting	3
MET 360 Computer Numerical Control	3
Physics Elective (recommend HE 220)	3
Field Based Experience (13 Hours)	
ECI 297 Observation and Participation	2
OTED 485 Student Teaching	12
TOTAL CREDIT HOURS REQUIRED FOR GRADUATION	120

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Freshman	**Credit Hours**
ENGL 1105, 1106 Freshman English (Core Area 1)	6
MATH 1015, 1016 College Math (Core Area 5)	6
CS_____ Computer Elective	3
EDVT 1405, 1406 Teaching Drafting in Technology Education	4
_____, _____ , _____ Free Electives	6
_____ _____ Core Area 3 Elective	3
PSYC 2004 Introductory Psychology	3
Sophomore	
EDVT 2425, 2426 Materials and Processes I* and II	6
_____, _____, _____ Core Area 2 Electives	6
EDVT 2604 Introduction to Technology Education	3
EDVT 3754 Early Clinical Experience	1
BSE 2484 Engines and Power Train Technology	3
PHYS 2205, 2206 Physics (Core Area 4)	6
PHYS 2215, 2216 Physics Lab (Core Area 4)	2
ISE 2204 Manufacturing Process	2
ISE 2214 Manufacturing Process Lab	1
_____ _____ Lab Science/Mathematics Electives	4
Junior	
EDCI 3024 Social Foundations of Education	2
_____ _____, _____ Free Electives	6
EDVT 3454 Technology Education Production: Manufacturing	3
EDVT 3475, 3476 Graphic Communication I and II	6
EDVT 3484 Technology Education Production: Construction	3
EDVT 4445, 4446, Technology Education Electronics	6
EDVT 4964 Field Experience	2
_____ _____ Energy Elective	3
BSE 2094 Introduction to Metal Fabrication	1
Senior	
EDCI 3154 Psyc. Foundations II: School Learning	3
EDVT 3464 Power and Transportation Technology	3
EDVT 4414 Technology Education Practicum	3
EDVT 4424 Curriculum in Technology Education	3
EDVT 4434 Teaching Methods in Technology Education	3
EDVT 4444 Communication Technology	3
EDVT 4464 Advanced Problems in Technology Education	3
EDVT 4754 Internship in Education	9
Total Needed for Graduation	**127 Credit Hours.**

VIRGINIA STATE UNIVERSITY

Technology Education Endorsement

Freshman Year	**Credit Hours**
GEEN 110, 111, Freshman Writing and Reading and Writing About Literature I	6
GEMA 112, 113, Basic Mathematics	6
DRFT 160, Mechanical Drawing	3
TEDU 130, Technology and Society	3
TEDU 150, Production: Materials and Processes	3
GEHE 164, Personal Health	2
GEHI 122, United States History	3
DRFT 261, Computer Aided Drafting	3
TEDU 153, Construction Technology	3
TOTAL	32
Sophomore Year	
PSYC 212, Human Growth and Development	3
PHYS 110, 111, Introductory Physics/Laboratory	8
ELTC 180, Basic Electronics	3
TEDU 250, Manufacturing: Materials and Processes	3
GE Humanities Elective	3
GEPE 165, Personal Fitness	1
GEPI 140, Philosophy	3
TEDU 202, Principles of Technology	3
ELTC 181, Fundamentals of Electronic Circuits	3
GESO 211, Introduction to Social Science	3
GEPE Elective	1
TOTAL	34
Junior Year *(Admission to Teacher Education)*	
ECON 210, Principles of Microeconomics	3
GEEN 310, Advanced Communication Skills	3
TEDU 402, Transportation Technology	3
DRFT 369, Architectural Drafting	3
IDU 300, Practicum	3
TEDU 355, Student Organizations	2
EDUC 301, Foundations of Instruction	3
IEDU 352, Measurements in Industrial Education	3
TEDU 253, Manufacturing Technology	3
GE Humanities Elective	3
EDUC 315, Generic Teaching Skills	3
TOTAL	32

Senior Year	
GE Social Science Elective	3
EDUC 427, Reading Instruction in Subject Area	3
TEDU 401, Graphics Communication Technology	3
TEDU 403, Communication Technology	2
TEDU 453, Principles of Teaching Technology	3
EDUC 401, Student Teaching Seminar	1
TEDU 459, Student Teaching	8
TOTAL	23
TOTAL CREDIT HOURS REQUIRED FOR GRADUATION	**121**