2008

A Follow-Up Study of Technology Education Graduates from Old Dominion University 2002-2006

Johnny F. Mack
Old Dominion University

A FOLLOW-UP STUDY OF TECHNOLOGY EDUCATION GRADUATES FROM OLD DOMINION UNIVERSITY 2002-2006

A Research Paper

Presented to the Graduate Faculty of

the Department of Occupational and Technical Studies

At Old Dominion University

In Partial Fulfillment

Of the Requirements for the

Masters of Science Degree

by

Johnny F. Mack

January 2008

SIGNATURE PAGE

This research paper was prepared by Johnny F. Mack under the direction of Dr. John Ritz in OTED 636, Problems in Occupational and Technical Education. It was submitted to the Graduate Program Director as partial fulfillment of the requirements for the Degree of Masters of Science.

Approval By: _____ _____

Dr. John Ritz Date

Advisor and Graduate Program Director

Acknowledgements

I would like to extend special thanks to my academic and research advisor Dr. John Ritz for his assistance and guidance in the completion of this study.

Johnny Mack

TABLE OF CONTENTS

TABLE OF TABLES

CHAPTER I

INTRODUCTION

In recent years, technology has advanced rapidly having a huge impact on the lives of almost every American. However Americans are handicapped by a lack of knowledge about technology (Russel, 2005). Why can only a few Americans comprehend technological issues in the daily news…or appreciate a technological breakthrough? (Martin, 2004, p.53). Martin (2004) goes on to say, it is clear that if our society is to achieve technological literacy on a grand scale, a major effort is needed.

Because of the influence of technology, education systems throughout the nation have increasingly incorporated technology education into their curriculum. Colleges and universities are relied upon to produce teachers capable of departing technological knowledge and skills to students that allow them to be successful in a technological world.

In the United States, Standards for Technological Literacy (ITEA, 2001) have been developed for grades K – 12 that allow for the development of student skills in the areas of technology problem-solving and decision-making tools, and technology communication tools (Virginia Board of Education, 2005). The technology education teacher must be prepared for the task, possess the necessary knowledge and skills, implement flexible learning strategies, and have access to required materials and resources? Implementation is the critical step in the transference of skills and knowledge from teacher to student.

Statement of the Problem

The problem of this study was to determine the attitudes of Old Dominion University technology education graduates, who graduated from 2002-2006, whether they felt effectively prepared to assume teaching positions.

Research Objectives

Through this follow-up study, survey data were collected toward fulfilling the following objectives:

1. Determine whether graduates of Old Dominion University's Technology Education undergraduate program were adequately prepared to assume teaching positions.
2. Determine what improvements can be made to the undergraduate curriculum at Old Dominion University based upon graduate's feedback.
3. Determine whether the standards established through the Standards of Technological Literacy framework were being attained.

Background and Significance

Several follow-up studies have been conducted on the graduate's of Old Dominion University technology education program. The last follow-up study by Pei-Wen Lo (2001) was conducted on post-graduates from 1997 through 2001.

This follow-up study continues to provide feedback in the form of survey data collected from Old Dominion University's technology education graduates from 2002-2006. These data reflected the post-graduate's opinions on how well they felt Old Dominion University's Technology Education Program prepared

them for their present career and what recommendations they may have for improving program effectiveness.

The results of this study provided decision-making data for the assessment and continued improvement of Old Dominion University's undergraduate technology education program. The results of this study also acted as a lessons-learned tool as future generations of students benefited from the experiences of these graduates.

Improvements in the teaching of technological literacy on a large public scale cannot succeed without careful attention to knowledge and skill development of teachers. The teacher is the critical variable in classroom learning. The requirement is to figure out how teachers can best be prepared to teach technological literacy (Hanson & Lovedahl, 2004).

Limitation

The following limitations were recognized to have an effect on this study:

1. The study was limited to graduates of the teacher preparation program at Old Dominion University.
2. The study was limited to B.S. graduates from 2002-2006.
3. The study was limited to graduates of the technology education program.

Assumptions

The results of this study were based on the following assumptions:

1. It was assumed that technology education graduates who had become educators could provide important feedback data for Old Dominion's Technology Education Program.

2. Old Dominion University's Technology Education Program teaches content from the Standards for Technological Literacy.
3. Old Dominion University's Technology Education Program is accredited by the National Council on Accreditation of Teacher Education, the International Technology Education Association, and the Council on Technology Teacher Education.
4. Old Dominion University's Technology Education Program is recognized by the Council on Technology Teacher Education as an outstanding program.

Procedures

The survey instrument was sent to 27 students who graduated from Old Dominion's Technology Education degree program during the years, 2002-2006. The survey was accompanied by a cover letter and a stamped return envelope. The questionnaire contained open and closed questions that covered the research goals previously stated. Names and addresses of graduates were obtained from the Alumni Affair's Office at Old Dominion University, Norfolk, Virginia.

Definition of Terms

The following terms are defined to ensure that the readers of this study understand their meaning:

1. Technology education: A study of technology, which provides an opportunity for students to learn about the processes and knowledge

related to technology that are needed to solve problems and extend human capabilities (ITEA, 2000).

2. Technology education program: The curriculum followed by a university student to obtain a degree in technology education.
3. Technological literacy: To possess technology skills that support learning, personal productivity, decision making, and daily life (Board of Education, 2005)
4. Standards of Learning: educational competencies by grade level and subject.
5. Standards for Technological Literacy, Content for the Study of Technology: Specify what students should know and be able to do in order to be technologically literate (Ritz, Dugger, & Israel, 2002, p. 62).

Summary

This chapter pointed out the lack of understanding and awareness among many of what technology is and how it affects almost everyone. The Commonwealth of Virginia has addressed the need for technological literacy by adopting technology education standards. These standards are designed to develop knowledgeable and competent students capable of succeeding in a technological society.

Old Dominion University is a nationally recognized technology education program that solicits feedback on its effectiveness through follow-up studies of its graduates. Chapter II discusses national education standards that apply to Old Dominion University's technology education program. Also described are the

graduation requirements for students of Old Dominion's Technology Education Program. Chapter III details the methods and procedures used to collect and analyze data. Chapter IV presents the findings from the analysis of collected data. Chapter V summarizes the research study and makes conclusions of the study’s findings.

CHAPTER II

LITERATURE REVIEW

Chapter I of this study introduced the importance of developing teachers that have been properly prepared to teach technological knowledge. This chapter addresses teacher preparation in the following sections: 1) Standards of Technological Literacy, 2) NCATE Unit standards, 3) graduation requirements for the Technology Education Program at Old Dominion University, and 4) summary.

National Teacher Preparation Standards

A national report on the quality and preparedness of teacher education programs by the U.S. Department of Education (NCES, 1999) showed that only one in five teachers felt well prepared to teach in the classroom. Concerns about the quality of teacher education in the nation resulted in the creation of national accreditation organizations and Standards of Learning at the national and state level. The National Council for Accreditation of Teacher Education (NCATE) was developed to promote the effectiveness of teacher preparation programs in professional institutions.

The U.S. Secretary of Education officially recognizes NCATE as the national professional accrediting agency for colleges and universities that prepare teachers, administrators, and professional school personnel (NCATE, 2006). The purpose of NCATE is to improve teacher preparation and accountability by using an accreditation process for colleges and universities.

Furthermore, NCATE's Specialty Areas Study Board has approved national standards for 20 program areas. One of these program areas is for the

field of technology education. The standards for the technology education field are outlined in the *NCATE/ITEA/CTTE Program Standards (2003) Programs for the Preparation of Technology Education Teachers,* and they are applicable to the technology education program at Old Dominion University (NCATE/ITEA/CTTE, 2003). There are ten technology education standards subdivided into the following two areas:

Subject Matter Standards for Technology Education

- Standard 1 – The Nature of Technology
- Standard 2 – Technology and Society
- Standard 3 – Design
- Standard 4 – Abilities for a Technological World
- Standard 5 – The Designed World

Effective Teaching Standards for Technology Education

- Standard 6 – Curriculum
- Standard 7 – Instructional Strategies
- Standard 8 – Learning Environment
- Standard 9 – Students
- Standard 10 – Professional Growth

Standards 1-5, relate to the subject matter content of technology found in the Standards for Technological Literacy: Content fro the Study of Technology (ITEA 2000). Standards 6-10 relate to the pedagogical knowledge required to teach technology effectively (NCATE/ITEA/CTTE, 2003). The following is a description of each of the NCATE/ITEA/CTTE Program Standards. Each standard is sub-divided into indicators of knowledge, performance, and disposition that help define the standard.

Standard 1 – THE NATURE OF TECHNOLOGY

Technology teacher education program candidates develop an understanding of the nature of technology within the context of the Designed World.

The program prepares technology teacher education candidates who can:

Knowledge Indicators:

- Explain the characteristics and scope of technology.
- Compare the relationship among technologies and the connections between technology and other disciplines.

Performance Indicators:

- Apply the concepts and principles of technology when teaching technology in the classroom and laboratory.

Disposition Indicators:

- Comprehend the nature of technology in a way that demonstrates sensitivity to the positive and negative aspects of technology in our world.

STANDARD 2 – TECHNOLOGY AND SOCIETY

Technology teacher education program candidates develop an understanding of technology and society within the context of the designed world.

The program prepares technology teacher education candidates who can:

Knowledge Indicators:

- Compare the relationships between technology and cultural, political, and economic systems.
- Assess the role of society in the development and use of technology.
- Assess the importance of significant technological innovations on the history of humankind.

Performance Indicators:

- Judge the effects of technology on the environment.
- Evaluate the relationship between technology and social institutions such as family, religion, education, government, and workforce.

Disposition Indicators:

- Demonstrate sensitivity to appropriate and inappropriate uses of technology and its effects on society and the environment.
- Make decisions based on knowledge of intended and unintended effects of technology on society and the environment.

STANDARD 3 – DESIGN

Technology teacher education program candidates develop an understanding of design within the context of the Designed World.

The program prepares technology teacher education candidates who can:

Knowledge Indicators:

- Explain the importance of design in the human-made world.
- Describe the attributes of design.
- Analyze the engineering design process and its principles.

Performance Indicators:

- Apply the process of troubleshooting, research and development, invention, innovation, and experimentation in developing solutions to a design problem.

Disposition Indicators:

- Investigate the relationship between designing a product and the impact of the product on the environment, economy, and society.

STANDARD 4 - ABILITIES FOR A TECHNOLOGICAL WORLD

Technology teacher education program candidates develop abilities for a technological world within the contexts of the Designed World.

The program prepares technology teacher education candidates who can:

Knowledge Indicators:

- Select design problems and include appropriate criteria and constraints for each problem.
- Evaluate a design, assessing the success of a design solution, and develop proposals for design improvements.
- Analyze a designed product, and identify the key components of how it works and how it was made.
- Operate and maintain technological products and systems.

Performance Indicators:

- Develop and model a design solution.
- Complete an assessment to evaluate merits of a design solution.
- Operate a technological device and/or system.
- Investigate the impacts of products and systems on individuals, the environment, and society.

Disposition Indicators:

- Assess the impacts of products and systems.
- Follow safe practices and procedures in the use of tools and equipment.
- Judge the relative strengths and weaknesses of a designed product from a consumer perspective.
- Exhibit respect by properly applying tools and equipment to the processes for which they were designed.
- Design and use instructional activities that emphasize solving real world open-ended problems.

STANDARD 5 - THE DESIGNED WORLD

Technology teacher education program candidates develop an understanding of the Designed World.

The program prepares technology teacher education candidates who can:

Knowledge Indicators:

- Analyze the principles of various medical technologies as part of the designed world.

- Analyze the principles of various agricultural and related biotechnologies as part of the designed world.
- Analyze the principles, concepts, and applications of energy and power technologies as part of the designed world.
- Analyze the principles, concepts, and applications of information and communication technologies as part of the designed world.
- Analyze the principles of various transportation technologies that are part of the designed world.
- Analyze the principles, concepts, and applications of manufacturing technologies as part of the designed world.
- Analyze the principles, concepts, and applications of construction technologies as part of the designed world.

Performance Indicators:

- Select and use appropriate technologies in a variety of contexts including medical, agricultural and related biotechnologies, energy and power applications, information and communications, transportation, manufacturing, and construction.

Disposition Indicators:

- Effectively use and improve technology in a variety of contexts including medical, agricultural and related biotechnologies, energy and power applications, information and communications, transportation, manufacturing, and construction.

STANDARD 6 – CURRICULUM

Technology teacher education program candidates design, implement and evaluate curricula based upon Standards for Technological Literacy.

The program prepares technology teacher education candidates who can:

Knowledge Indicators:

- Identify appropriate content for the study of technology at different grade levels.
- Integrate technological curriculum content from other fields of study.

- Identify curriculum and instructional materials and resources that enable effective delivery when teaching about technology.

Performance Indicators:

- Engage in long-term planning that results in an articulated curriculum based on Standards for Technological Literacy for grades K-12 or equivalent.
- Design technology curricula and programs that integrate content from other fields of study.
- Improve the technology curriculum by making informed decisions using multiple sources of information.
- Incorporate up-to-date technological developments into the technology curriculum.
- Implement a technology curriculum that systemically expands the technological capabilities of the student.

Disposition Indicators:

- Demonstrate sensitivity to cultural, ethnic, diversity, special needs, interest, abilities, and gender issues when selecting, designing, or evaluating curriculum and instructional materials.

STANDARD 7 – INSTRUCTIONAL STRATEGIES

Technology teacher education program candidates use a variety of effective teaching practices that enhance and extend learning of technology.

The program prepares technology education candidates who can:

Knowledge Indicators:

- Base instruction on contemporary teaching strategies that are consistent with Standards for Technological Literacy.
- Apply principles of learning and consideration of student diversity to the delivery of instruction.
- Compare a variety of instructional strategies to maximize student learning about technology.
- Describe a variety of student assessments appropriate for different instructional materials.

Performance Indicators:

- Apply appropriate instructional technology materials, tools, equipment, and processes to enhance student learning about technology instruction.
- Assess instructional strategies to improve teaching and learning in the technology classroom by using self-reflection, student learning outcomes, and other assessment techniques.

Disposition Indicators:

- Exhibit an enthusiasm for teaching technology by creating meaningful and challenging technology learning experiences that lead to positive student attitudes toward the study of technology.

STANDARD 8 – LEARNING ENVIRONMENTS

Technology teacher education program candidates design, create, and manage learning environments that promote technological literacy.

The program prepares technology teacher education candidates who can:

Knowledge Indicators:

- Recognize rich learning environments that provide for varied educational experiences in the technology classroom and laboratory.
- Identify learning environments that encourage, motivate, and support student learning, innovation, design, and risk taking.

Performance Indicators:

- Design learning environments that establish student behavioral expectations that support an effective teaching and learning environment.
- Create flexible learning environments that are adaptable for the future.

Disposition Indicators:

- Exhibit safe technology laboratory practices by designing, managing, and maintaining physically safe technology learning environments.

STANDARD 9 – STUDENTS

Technology teacher education program candidates understand students as learners, and how commonality and diversity affect learning.

The program prepares technology teacher education candidates who can:

Knowledge Indicators:

- Design technology experiences for students of different ethnic and socioeconomic backgrounds, gender, age, interests, and exceptionalities.
- Identify how students learn technology most effectively by integrating current research about hands-on learning and learning about the content of technology.

Performance Indicators:

- Create technology experiences for students with different abilities, interests, and ages about the content of technology.

Disposition Indicators:

- Develop productive relationships with students so that they become active learners about technology and enhance their human growth and development.

STANDARD 10 – Professional Growth

Technology teacher education program candidates understand and value the importance of engaging in comprehensive and sustained professional growth to improve the teaching of technology.

The program prepares technology teacher education candidates who can:

Knowledge Indicators:

- Demonstrate a continuously updated and informed knowledge base about the processes of technology.
- Continuously build upon effective instructional practices that promote technological literacy.

Performance Indicators:

- Apply various marketing principles and concepts to promote technology education and the study of technology.
- Collaborate with other candidates and professional colleagues to promote professional growth and professional development activities.
- Become actively involved in professional organizations and attend professional development activities to become better prepared to teach technology education.

Disposition Indicators:

- Value continuous professional growth through involvement in a variety of professional development activities.
- Demonstrate the importance of professionalism by promoting technology organizations for students in the technology classroom.
- Reflect upon their teaching to improve and enhance student learning.

The previous ITEA/CTTE/NCATE curriculum standards describe the specialized content and knowledge that all teacher technology education programs should respond (NCATE, ITEA, CTTE, 2003). These technology education standards are the consensus of the profession of what technology education programs needed to do in order to create quality teachers in the field of technology education.

NCATE: Unit and Candidate Standards

Aside from the specialized area standards previous described, NCATE has standards that apply to all professional educational units: schools, colleges,

and departments of education, hereinafter collectively referred to as “units.” NCATE standards for units focus on results and accountability. The NCATE standards require candidates to acquire the necessary knowledge and skills to become educators, and to have demonstrated their knowledge and skill in measurable ways. The NCATE standards also require that units provide clear evidence of the competence of their candidates.

To this end, NCATE has developed six standards that assess the unit and its candidates. Each standard contains benchmarks of specific knowledge and skills that must be attained to achieve that standard. Each benchmark contains a rubric determining whether its level of achievement is “unacceptable”, “acceptable”, or “target”. Supporting explanation and accreditation decision criteria are provided in the standards.

The following list the title of each standard and their benchmarks. The evaluation criteria, unacceptable, acceptable, target, are not listed (NCATE, 2006).

STANDARD 1: CANDIDATE KNOWLEDGE, SKILLS, AND DISPOSITIONS

> Candidates preparing to work in schools as teachers or other professional school personnel know and demonstrate the content, pedagogical, and professional knowledge, skills, and dispositions necessary to help all students learn. Assessments indicate that candidates meet professional, state, and institutional standards.

Benchmarks:

- Content Knowledge for Teacher Preparation
- Content Knowledge for Other Professional School Personnel
- Pedagogical Content Knowledge for Teacher Candidates
- Professional and Pedagogical Knowledge and Skills for Teacher Candidates
- Professional Knowledge and Skills for Other School Personnel
- Dispositions for All Candidates
- Student Learning for Teacher Candidates
- Student Learning for Other Professional School Personnel

STANDARD 2: ASSESSMENT SYSTEM AND UNIT EVALUATION

The unit has an assessment system that collects and analyzes data on applicant qualifications, candidate and graduate performance, and unit operations to evaluate and improve the unit and its programs.

Benchmarks

- Data Collection, Analysis, and Evaluation
- Use of Data for Program Improvement

STANDARD 3: FIELD EXPERIENCES AND CLINICAL PRACTICE

The unit and its school partners design, implement, and evaluate field experiences and clinical practice so that teacher candidates and other school personnel develop and demonstrate the knowledge, skills, and dispositions necessary to help all students learn.

Benchmarks

- Collaboration Between Unit and School Partners
- Design, Implementation, and Evaluation of Field Experiences and Clinical Practice

- Candidates' Development and Demonstration of Knowledge, Skills, and Dispositions to Help All Students Learn

STANDARD 4: DIVERSITY

The unit designs, implements, and evaluates curriculum and experiences for candidates to acquire and apply the knowledge, skills, and dispositions necessary to help all students learn. These experiences include working with diverse higher education and school faculty, diverse candidates, and diverse students in P-12 schools.

Benchmarks:

- Design, Implementation, and Evaluation of Curriculum and Experiences
- Experiences Working With Diverse Faculty
- Experiences Working With Diverse Candidates
- Experiences Working with Diverse Students in P-12 Schools

STANDARD 5: FACULTY QUALIFICATIONS, PERFORMANCE, AND DEVELOPMENT

Faculty are qualified and model best professional practices in scholarship, service, and teaching, including, assessment of their own effectiveness as related to candidate performance; they also systematically evaluates faculty performance and facilitates professional development.

Benchmarks:

- Qualified Faculty
- Modeling Best Professional Practices in Teaching
- Modeling Best Professional Practices in Scholarship
- Modeling Best Professional Practices in Service
- Collaboration

- Unit Evaluation of Professional Education Faculty Performance
- Unit Facilitation of Professional Development

STANDARD 6: UNIT GOVERNANCE AND RESOURCES

The unit has the leadership, authority, budget, personnel, facilities, and resources including information technology resources, to prepare candidates to meet professional, state, and institutional standards.

Benchmarks:

- Unit Leadership and Authority
- Unit Budget
- Personnel
- Unit Facilities
- Unit Resources Including Technologies

NCATE utilized standards in the specialty area of Technology Education and Unit Standards to ensure teacher preparation programs produced quality teachers. NCATE has evaluated Old Dominion University's Technology Education program and has determined it to be a Nationally Recognized Program. A Nationally Recognized Program is one that has met all NCATE standards for accreditation.

The Old Dominion University Technology Education Program

One of the research goals was to determine whether the standards established through the Standards of Technological Literacy (SOTL) framework were being attained. To achieve these standards, Old Dominion University offers a 123 – hour program designed to prepare students to teach technology

education subjects in secondary and middle schools (Old Dominion University, 2006-2008).

The Technology Education Program at Old Dominion University is an approved program for meeting licensure requirements to teach technology education in Virginia. The requirements for graduating from the program involve 1) a variety of basic educational courses in several disciplines, 2) extensive subject matter coursework, and 3) a knowledge of instructional skills. See Table 1. It is a description of the lower division course requirements for Old Dominion University's technology education majors. Students begin the program by taking courses that provide basic knowledge and skills in a variety of subject areas.

Table 1
Basic Education Requirements

Title	Credits
Written Communication	6
Oral Communications	3
Mathematics	6
Foreign Language	0-6
Computer Skills (OTS251D required)	3
Fine and Performing Arts	3
History	3
Literature	3
Philosophy	3
Natural Science and Technology	11
Social Science	3

The Old Dominion University Technology Education Program requires technology majors to take 48 hours of subject matter content in a variety of

technological fields. The greater the mastery a high school teacher has of the content knowledge being taught appears to help teachers contribute to student learning (Boyd, Lankford, Loeb, et al, 2004). See Table 2.

Table 2
Technical Content

Title	Credits
OTS 112 Communication Design	3
OTS 221 Industrial Materials	3
OTS 231 Materials and Processes Technology	3
OTS 241 Energy Systems: Basic Electricity	3
OTS 242 Technological Systems Control	3
OTS 243 Energy and Power Technology	3
OTS 250 Graphic Communication Process	3
OTS 320 Manufacturing and Construction Technology	3
OTS 323 Production Technology	3
OTS 330 Medical, Agricultural, and Bio-related Technologies	3
OTS 351 Communication Technology	3
OTS 360 Transportation Technology	3
OTS 370T Technology and Society	3
OTS 382 Industrial Design	3
OTS 417 Exploring Technology and Modern Industry	3

Subject content knowledge is crucial but it is not enough; there is a need for teacher knowledge of how to develop and plan curricula and be aware of

teacher-learner needs. A teacher's knowledge on how to teach thinking skills has been shown to improve student performance (Guyton & Dangel, 2004). Table 3 lists required courses designed to provide pedagogical knowledge to prospective teachers.

Table 3
Technology Education Instructional Courses

Title		Credits
ECI 408	Reading and Writing in Content Area	3
ESSE 413	Fundamentals of Human Growth and Development	3
OTED 297	Observation and Participation	1
OTED 305	Curriculum for Technology Education	3
OTED 306	Methods for Technology Education	3
OTED 408	Advanced Classroom Issues and Practices	3
OTED 450	Assessment, Evaluation and Improvement	3
OTED 485	Student Teaching	12

Summary

This chapter described two educational standards for accreditation that are applicable to Old Dominion University's Technology Education Program. It also described Old Dominion University's undergraduate requirements for the Technology Education Program. The language of these standards and the technology curriculum collectively endeavor to create professional educators who

are prepared to pass on knowledge and skills to all students. The next chapter describes the methods and procedures used to collect data for this study.

CHAPTER III

METHODS AND PROCEDURES

This chapter describes the methods and procedures used to conduct this research study. The study's focus was to ascertain if Old Dominion University's Technology Education Program graduates were adequately prepared to assume teaching positions. This was a descriptive study that used a survey to collect data. This chapter contains a description of the population, instrument design used, methods of data collection, statistical analysis, and summary.

Population

The population consisted of graduates from Old Dominion University's Technology Education Program for the years 2002 through 2006. A total of 27 undergraduates completed the technology education program during this time frame. Graduates names and addresses were provided by the Occupational and Technical Studies Department and the Office of Alumni Affairs.

Instrument Design

The measurement instrument adopted in this study was a survey administered to Technology Education graduates of Old Dominion University. The questionnaire was designed to collect data to answer the research goals of this study. Questions in this study asked the subject to state employment status, location, and job title. To address the goals in this study, questions were asked to answer the research objectives. The research objectives were as follows:

1. Determine whether graduates of Old Dominion University's Technology Education undergraduate program were adequately prepared to assume teaching positions.

2. Determine what improvements can be made to the undergraduate curriculum at Old Dominion University based upon graduate's feedback.
3. Determine whether the standards established through the Standards of Technological Literacy framework were being attained.

The survey questions were divided into two parts. The questions in Part I were multiple choice and short answer questions that sought to determine employment status and grade level taught. Questions in Part II sought to determine respondent's attitudes toward the effectiveness of the technology education program in preparing them to become teachers. In addition, respondents were asked to answer questions regarding their perceived capability of teaching the standards of technological literacy.

Questions in Part II took the form of a Likert Scale. Using this scale, respondents expressed their degree of agreement or disagreement with the question through answer selection. Answer choices were "Strongly Agree" which had a value of 5, "Agree" which had a value of 4, "Uncertain" which had a value of 3, "Disagree" which had a value of 2, and "Strongly Disagree" which had a value of 1. Numerical values were used to determine mean and percentile scores. A copy of the survey is included in Appendix A.

Methods of Data Collection

Each participant was sent a cover letter, a questionnaire, and a stamped return envelop. A copy of the cover letter is included in Appendix B. Follow-up letters with a copy of the survey were sent to participants who had not responded to the first mailing.

Statistical Analysis

Percentiles and medians were used to analyze the central tendency for data derived from Likert styled questions. The results from all questions were categorized and placed in appropriate tables for analysis.

Summary

This chapter discussed the survey design, construction, and administration. The purpose of this survey was to collect data from program graduates to answer the research goals of this study. The finding of this survey can be found in Chapter IV.

CHAPTER IV

FINDINGS

The problem of this study was to determine whether the 2002 – 2006 graduates of Old Dominion University's Technology Education Program felt effectively prepared to assume teaching positions. To address this problem the following research objectives were developed:

1. Determine whether graduates of Old Dominion University's Technology Education undergraduate program were adequately prepared to assume teaching positions.
2. Determine what improvements can be made to the undergraduate curriculum at Old Dominion University based upon graduate's feedback.
3. Determine whether the standards established through the Standards of Technological Literacy framework were being attained.

A survey instrument was designed to collect data to answer the study's research goals. This chapter presented the statistical results of that survey. The first section of this chapter described the demographic data collected. The second section of this chapter presented the findings of data collected to answer the three research goals of this study.

Responses Obtained From the Survey

Surveys were mailed to the entire population of 27 graduates of the Technology Education Program. From the initial mailing of surveys, 11 or 41%

were returned. In the follow-up mailing respondents returned 8 or 50% of questionnaires mailed. The total response rate was 70%. See Table 4.

Table 4

Responses to the Survey

	Number Surveys Mailed	Number Surveys Returned	Percent of Surveys Returned
Initial Mailing	27	11	41%
Follow-up Mailing	16	8	50%
Total	27	19	70%

Questions 1, 2, and 3 of the survey sought to determine the employment status of program graduates. Question 1 asked the respondents to indicate whether they were or had been employed as educators since graduating from Old Dominion University's Technology Education Program. It was found that 17 or 90% of respondents were educators. The data showed that 2 or 10% of those surveyed offered no response. See Table 5

Table 5

Employment in Education

	Working in Education	No Response
Responses	17	2
Percent	90%	10%

Questions 2 and 3 of the survey sought to determine the type of job held by graduates of Old Dominion University's Technology Education Program. Question 2 asked the respondents to indicate where they were employed and Question 3 asked the respondents to indicate their job title. It was found that 15 or 85% of the respondents were teachers within the public school system. The

data also showed that 1 respondent was a home school teacher and 1 respondent was a naval instructor, while 2 respondents offered no response. See Table 6.

Table 6

Type of Job Held

	Teacher	Home School	Naval Instructor	No Response
Responses	15	1	1	2
Percent	85%	5%	5%	10%

Research Objective Findings

Research Goal: Determine whether graduates of Old Dominion University's Technology Education undergraduate program were adequately prepared to assume teaching positions.

This study sought to answer this research objective by measuring how well prepared the graduates felt they were to assume teaching positions. To determine this, Question 20 asked the respondents to indicate the degree to which the Technology Education Program at Old Dominion University prepared them to assume teaching positions. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 37 percent of the respondents strongly agreed, 53 percent agreed, and 5 percent were uncertain. The mean value was 4.1, indicating the respondent agreed that they were prepared to assume technology education teaching positions. See Table 7.

Table 7

Prepared to Teach Technology Education

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	No Response	Median
Responses			1	10	7	1	4.1
Percent			5%	53%	37%	5%	

Question 21, asked the respondents to provide a written explanation for their answer choice in Question 20. It was found that 7 reasons were given for the answer choice to Strongly Agree, 8 reasons were given for the answer choice of Agree, and 1 reason was given for the answer choice to Uncertain. It was found that among the respondents who selected Strongly Agree, there were 4 general reasons for this selection. These 4 reasons are listed below in Table 8.

Table 8

Reasons for "Strongly Agree" Response

Number of Respondents Selecting This Response	Reasons Why Some Respondents Selected "Strongly Agree" for Question 20: Were you prepared to teach technology education?
3	General overall feeling of preparedness to teach technology issues
2	The importance of student teaching
2	Quality of the professors
2	Content and thoroughness of the coursework

It was found that among the respondents who selected "Agree" to Question 20, 6 general reasons emerged for this selection. The 6 reasons are listed in Table 9.

Table 9

Reasons for "Agree" Response

Number of Respondents Selecting This Response	Reasons Why Some Respondents Selected "Strongly Agree" for Question 20: Were you prepared to teach technology education?
5	General overall feeling of preparedness to teach technology education
2	The importance of student teaching
2	Course content: instructional, curricula, pedagogy
1	Quality of professors
1	Covered latest technology in instruction and labs
1	Outdated programs: CAD; also manufacturing and construction programs are not taught in schools systems

It was found that there was one respondent who selected "Uncertain" in response to Question 20. The reason for selecting the "Uncertain" response is show in Table 10. There were 2 respondents who offered no response to Question 21. The reasons for all respondents' answer choices are listed in Table 10.

Research Goal: Determine what improvements can be made to the undergraduate curriculum at Old Dominion University based upon graduate's feedback.

Question 22 asked the respondents for recommendations to improve the Technology Education program at Old Dominion University. Of the 19 respondents, 16 replied with recommendations and 3 did not respond. See Table 11. It was found that the recommendations covered a wide variety of subjects.

Table 10

Reasons for All Answers to Question 20

Answer	Reason For Answer
Strongly Agree	1. I was prepared and had no problems with understanding any tech or educational issues. 2. I was fortunate to attend ODU, where an exploration or learning experience in all aspects of all four systems of technology was afforded. The Cluster was also a benefit; strongly recommend teaching in American society and world resource geography. **3**. The technology education program prepared me to teach technology education. Student teaching was my best learning experience. The professors in the technology education program were awesome. My experience at ODU was a great one 4. The course and content were thorough. The instructors made the course easy to understand… unintelligible 5. After completing the Technology Education Program and the Graduate Teaching Assistant Program, I was more than prepared to teach at the High School level. 6. I was exposed to theoretical and practical knowledge that helps me manage teaching
Agree	7. Preparation was primarily met through student teaching internship 8. Most of the topics covered in the program I already had a good familiarization from personal/practical experiences and research. I gained my most useful knowledge from the instructional, curriculum, and pedagogy classes 9. The courses required for the degree covered a broad range and were for the most part current with the rapidly changing pace of technology. The professors incorporated the latest technology with their instruction and labs. 10. I can only answer based on when I entered the program, as it has had a couple of modifications since. The program was very thorough and introduced me to everything I experienced during my student teaching, except bio med. 11. The program pretty much covered all the aspects of technology that I have been involved in teaching. 12. Provided basics to teach technology in Virginia school systems. 13. ODU gave me the information needed for education teacher preparation. Only hands on teaching experience can make you a teacher
Uncertain	14. Because, most students only want to do the activities without learning the knowledge or theory behind the activities.

Because of this variety it was difficult to determine a central tendency or commonality within the recommendations. However, there were 3 recommendations that referenced subjects supported by other recommendations. Below is a list of these 3 recommendations.

1. Place a stronger emphasis on classroom management skills
2. Continue improving and updating the labs (Lab 2000)
3. Strengthen instructional expertise in CAD course, and offer an Auto CAD course

Table 11

Recommendations for Improvements to the Technology Education Program

1	Work more closely with engineering and other departments that teach technology.
2	Offer program in technology education for K-5.
3	Place a stronger emphasis on lesson planning, classroom management, and development of class projects/design briefs.
4	Provide a better picture of the differences between the technology education programs among the various school systems.
5	Give future teachers a basic knowledge of technology education, as well as current and emerging technologies. Maybe a technology literacy course for older teachers on current technology and uses.
6	Include small engines and higher-level power and transportation concepts.
7	Improve and update the older labs.
8	Encourage students to budget time and cost of materials for student activities. This helps in determining lab fees and costs versus benefits.
9	The problem is you talk about standards of technological literacy but Virginia's DOE does not use them for course competencies.
10	Provide more information on classroom management skills.
11	Update the Lab 2000, and a better instructor is needed to teach the CAD.
12	Look at the CTE resource center for the courses being taught in Virginia i.e. Digital Visualization, Auto CAD, Intro to English, and Geospatial Technology

Research Goal: Determine whether the standards established through the Standards of Technological Literacy framework were being attained.

One of the research goals was to determine whether the standards established through the Standards of Technological Literacy framework were being attained. To determine this, Questions 4 through 19 of the questionnaire addressed the standards established through the Standards of Technological Literacy framework. Questions 4 through 19 asked respondents to indicate whether the Old Dominion University Technology Education Program enabled them to teach the Standards of Technological Literacy. A question was asked for each of the Standards of Technological Literacy, with the exception of Standard 5 – The Designed World. In order to adequately assess the technological components that comprised this Standard 5 – The Designed World, 7 additional questions were designed. The ten Standards of Technological Literacy and the 7 components of Standard 5 – The Designed World that were tested are listed below.

Standard 1 – The Nature of Technology
Standard 2 – Technology and Society
Standard 3 – Design
Standard 4 – Abilities for a Technological World
Standard 5 – The Designed World
- Medical Technologies
- Agricultural and Related Biotechnologies
- Energy and Power Technologies
- Information and Communication Technologies
- Transportation Technologies
- Manufacturing Technologies

Construction Technologies

Standard 6 – Curriculum

Standard 7 – Instructional Strategies

Standard 8 – Learning Environments

Standard 9 – Students

Standard 10 – Professional Growth

Standard 1 – The Nature of Technology

Question 4 referred to Standard 1– The Nature of Technology. Question 4 of the survey asked respondents to indicate if they felt the Technology Education Program at Old Dominion University enabled them to develop an understanding of the nature of technology within the context of the Designed World. A Likert scale was used where 5 represented strongly agree through 1 representing strongly disagree. It was found that 58 percent of the respondents strongly agreed, 37 percent agreed, 5 percent disagreed. The mean value was 4.5 indicating strongly agree. See Table 12.

Table 12
Standard 1 – The Nature of Technology

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses		1		7	11	4.5
Percent		5%		37%	58%	

Standard 2 – Technology and Society

Question 5 referred to Standard 2 – Technology and Society. Question 5 asked if the respondents felt the Technology Education Program at Old Dominion University enabled them to develop an understanding of technology and society within the context of the Designed World. Responses were categorized using the

Likert Scale, where 5 represented strongly agree through 1 representing strongly disagreed. It was found that 58 percent of the respondents strongly agreed, 32 percent agreed, 5 percent were uncertain, and 5 percent disagreed. The mean value was 4.4 indicating agree. See Table 13.

Table 13
Standard 2 – Technology and Society

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses		1	1	6	11	4.4
Percent		5%	5%	32%	58%	

Standard 3 - Design

Question 6 referred to Standard 3 – Design. Question 6 asked if the respondents felt that the Technology Education Program at Old Dominion University enabled them to develop an understanding of design within the context of the Designed World. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 37 percent of the respondents strongly agreed, 37 percent agreed, 21 percent were uncertain, and 5 percent disagreed. The mean value was 4.0 indicating agree. See Table 14.

Table 14
Standard 3 – Design

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses		1	4	7	7	4.0
Percent		5%	21%	37%	37%	

Standard 4 – Abilities for a Technological World

Question 7 referred to Standard 4 – Abilities for a Technological World. Question 7 asked if the respondents felt that the Technology Education Program at Old Dominion University enabled them to develop abilities for a technological world within the context of the Designed World. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 26 percent of the respondents strongly agreed, 53 percent agreed, 11 percent were uncertain, and 11 percent disagreed. The mean value was 3.9 indicating agree. See Table 15.

Table 15
Standard 4 – Abilities for a Technological World

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses		2	2	10	5	3.9
Percent		11%	11%	53%	26%	

Standard 5 – The Designed World: Medical Technologies

Question 8 referred to the medical technologies component of Standard 5 – The Designed World. Question 8 asked if the respondents felt that the Technology Education Program at Old Dominion University enabled them to analyze the principles of various medical technologies as part of the designed world. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 5 percent of the respondents strongly agreed, 21 percent agreed, 32 percent were uncertain, 26 percent disagreed, and 16 percent strongly disagreed. The mean value was 2.7 indicating uncertain. See Table 16.

Table 16
Standard 5 – Medical Technologies

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses	3	5	6	4	1	2.7
Percent	16%	26%	32%	21%	5%	

Standard 5 – The Designed World: Agricultural and Related Biotechnologies

Question 9 referred to the Agricultural and Related Biotechnologies component of Standard 5 – The Designed World. Question 9 asked if the respondents felt that the Technology Education Program Old Dominion University enabled them to analyze the principles of various agricultural and related biotechnologies as part of the designed world. Responses were categorized using the Likert scale, where 5 represented strongly agree, through 1 representing strongly disagree. It was found that 16 percent of the respondents strongly agreed, 32 percent agreed, and 5% percent were uncertain, 26 percent disagreed, and 21 percent strongly disagreed. The mean value was 2.9 indicating uncertain. See Table 17.

Table 17
Standard 5 – Agricultural and Related Biotechnologies

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses	4	5	1	6	3	2.9
Percent	21%	26%	5%	32%	16%	

Standard 5 – The Designed World: Energy and Power Technologies

Question 10 referred to the Energy and Power Technologies component of Standard 5 – The Designed World. Question 10 asked if the respondents felt

that the Technology Education Program Old Dominion University enabled them to analyze the principles, concepts, and applications of energy and power technologies as part of the designed world. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 47% percent of the respondents strongly agreed, 47% percent agreed, and 5% disagreed. The mean value was 4.4 indicating agree. See Table 18.

Table 18
Standard 5 – Energy and Power Technologies

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses		1		9	9	4.4
Percent		5%		47%	47%	

Standard 5 – The Designed World: Information and Communication Technologies

Question 11 referred to the Information and Communication Technologies component of Standard 5 – The Designed World. Question 11 asked if the respondents felt that the Technology Education Program Old Dominion University enabled them to analyze the principles, concepts, and applications of information and communication technologies as part of the designed world. Responses were categorized using the Likert scale, where 5 represented strongly agree, through 1 representing strongly disagree. It was found that 53 percent of the respondents strongly agreed, 42 percent agreed, and 5 percent disagreed. The mean value was 4.4 indicating agree. See Table 19.

Table 19
Standard 5 – Information and Communications Technologies

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses		1		8	10	4.4
Percent		5%		42%	53%	

Standard 5 – The Designed World: Transportation Technologies

Question 12 referred to the transportation technologies component of Standard 5 – The Designed World. Question 12 asked if the respondents felt that the Technology Education Program at Old Dominion University enabled them to analyze the principles of various transportation technologies that are part of the designed world. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 42 percent of the respondents strongly agreed, 47 percent agreed, and 11 percent were uncertain. The mean value was 4.3 indicating agree. See Table 20.

Table 20
Standard 5 – Transportation Technologies

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses			2	9	8	4.3
Percent			11%	47%	42%	

Standard 5 – The Designed World: Manufacturing Technologies

Question 13 referred to Standard 5 –The Designed World. Question 13 asked if the respondents felt that the Technology Education Program at Old Dominion University enabled them to analyze the principles, concepts, and

applications of manufacturing technologies as part of the Designed World. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 47 percent of the respondents strongly agreed, 47 percent agreed, and 5 percent were uncertain. The mean value was 4.4 indicating agree. See Table 21.

Table 21
Standard 5 – Manufacturing Technologies

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses			1	9	9	4.4
Percent			5%	47%	47%	

Standard 5 – The Designed World: Construction Technologies

Question 14 referred to the construction technologies component of Standard 5 – The Designed World. Question 14 asked if the respondents felt the Technology Education Program at Old Dominion University enabled them to analyze the principles, concepts, and applications of construction technologies as part of the designed world. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 53 percent of the respondents strongly agreed, 42 percent agreed, and 5 percent were uncertain. The mean value was 4.5 indicating strongly agree. See Table 22.

Table 22
Standard 5 – Construction Technologies

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses			1	8	10	4.5
Percent			5%	42%	53%	

Standard 6 - Curriculum

Question 15 referred to Standard 6 – Curriculum. Question 15 asked if the respondents felt the Technology Education Program at Old Dominion University enabled them to design, implement, and evaluate curricula based upon Standards of Technological Literacy. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 47 percent of the respondents strongly agreed and 53 percent agreed. The mean value was 4.5 indicating strongly agree. See Table 23.

Table 23
Standard 6 – Curriculum

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses				10	9	4.5
Percent				53%	47%	

Standard 7 – Instructional Strategies

Question 16 referred to Standard 7 – Instructional Strategies. Question 16 asked if the respondents felt that the Technology Education Program at Old Dominion University enabled them to use a variety of effective teaching practices that enhance and extend learning of technology. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 47 percent of the respondents strongly agreed and 53 percent agreed. The mean value was 4.5 indicating strongly agree. See Table 24.

Table 24
Standard 7 – Instructional Strategies

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses				10	9	4.5
Percent				53%	47%	

Standard 8 Learning Environments

Question 17 referred to Standard 8 – Learning Environments. Question 17 asked if the respondents felt that the Technology Education Program at Old Dominion University enabled them to design, create, and manage learning environments that promote technological literacy. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 47 percent of the respondents strongly agreed, 47 percent agreed, and 5 percent were uncertain. The mean value was 4.4 indicating agree. See Table 25.

Table 25
Standard 8 – Learning Environment

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses			1	9	9	4.4
Percent			5%	47%	47%	

Standard 9 – Students

Question 18 referred to Standard 9 – Students. Question 18 asked if the respondents felt that the Technology Education Program at Old Dominion University enabled them to understand students as learners, and how commonality and diversity affect learning. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly

disagree. It was found that 47 percent of the respondents strongly agreed, 42 percent agreed, 5 percent were uncertain, and 5 percent disagreed. The mean value was 4.3 indicating agree. See Table 26.

Table 26
Standard 9 – Students

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses		1	1	8	9	4.3
Percent		5%	5%	42%	47%	

Standard 10 – Professional Growth

Question 19 referred to Standard 10 – Professional Growth. Question 19 asked if the respondents felt that the Technology Education Program at Old Dominion University enabled them to understand the value and importance of engaging in comprehensive and sustained professional growth to improve the teaching of technology. Responses were categorized using the Likert scale, where 5 represented strongly agree through 1 representing strongly disagree. It was found that 21 percent of the respondents strongly agreed, 68 percent agreed, and 11 percent disagreed. The mean value was 4.0 indicating agree. See Table 27.

Table 27
Standard 10 – Professional Growth

	1 Strongly Disagree	2 Disagree	3 Uncertain	4 Agree	5 Strongly Agree	Median
Responses		2		13	4	4.0
Percent		11%		68%	21%	

The mean scores obtained for the Standards of Technological Literacy were summarized in Table 28. The mean score for all 10 Standards of Technological Literacy was found to be 4.1 indicating agreement. See Table 28.

Summary

In this chapter the findings from the survey of graduates from Old Dominion University's Technology Education Program were presented in the form of percentage and mean score data. These findings represented a measurement of the respondent's ability to teach the standards established through the Standards of Technological Literacy framework and Council on Technology Teacher Education. The findings also represented a direct measurement of the effectiveness of Old Dominion University's Technology Education Program to implement the standards as established the International Technology Education Association and the Council on Technology Teacher Education. The chapter that follows utilized these findings to draw conclusions and makes recommendations based upon the research objectives of this study.

Table 28

Standards of Technological Literacy

Standards	Mean
Standard 1- Nature of Technology	4.5
Standard 2 – Technology and Society	4.4
Standard 3 – Design	4.0
Standard 4 – Abilities for a Technological World	3.9
Standard 5 – The Designed World	
Medical Technologies	2.7
Agricultural Technologies	2.9
Energy and Power Technologies	4.4
Information and Communication Technologies	4.4
Transportation Technologies	4.3
Manufacturing Technologies	4.4
Construction Technologies	4.5
The Designed World - Mean	**3.9**
Effective Teaching Standards	
Standard 6 – Curriculum	4.5
Standard 7 – Instructional Strategies	4.5
Standard 8 – Learning Environments	4.4
Standard 9 – Students	4.3
Standard 10 – Professional Growth	4.0
Standards of Technological Literacy Mean	**4.1**

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

To determine if the graduates from Old Dominion University's Technology Education Program felt prepared to assume teaching positions questionnaires were mailed to the entire population. Data derived from questionnaires were used to answer the studies research objectives.

The research objectives of this study were to:

- Determine whether graduates of Old Dominion University's Technology Education undergraduate program were adequately prepared to assume teaching positions.
- Determine what improvements can be made to the undergraduate curriculum at Old Dominion University based upon graduate's feedback.
- Determine whether the standards established through the Standards of Technological Literacy framework were being attained.

The population of this studied consisted of graduates from Old Dominion University's Technology Education Program from 2002 through 2006. For a study to be 100 percent accurate it must receive survey responses from the entire population. Due to limitations this is rarely possible. This study had three such limitations, which are listed below:

1. The population of this study was limited to the graduates of the Technology Education Program at Old Dominion University.
2. The study was limited to students who graduated between 2002 and 2006.

3. The study was limited by the response rate to survey questionnaires.

Survey instruments were mailed to the entire population of 27 graduates of Old Dominion University's Technology Education Program between 2002 and 2006. Of the 27 survey instruments mailed to these graduates 19 were returned for a response rate of 70%. A 70% return rate is sufficient to validate survey data. To more easily manage the size of the population percentiles and means were used to analyze data.

Conclusions

Research Objectives: Determine whether graduates of Old Dominion University's Technology undergraduate program were adequately prepared to assume teaching positions.

Questions 20 and 21 gathered data from graduates representing their views on how well the Technology Education Program at Old Dominion University prepared them to teach technology education. Question 20 asked respondents to indicate if they felt the program adequately prepared them to teach technology. An analysis of the data found that 37 percent of respondents strongly agreed, 53 percent agreed, 5 percent were uncertain , and 5 percent did not respond that Old Dominion University's Technology Education Program adequately prepared them to teach technology education. Therefore, 90 percent of respondents either strongly agreed or agreed that they were adequately prepared to teach technology education. The mean was 4.1 indicating agree.

Question 21 was a follow-up question to Question 20. Question 21 asked respondents to explain the answers they gave in Question 20. It was found that

there were four main areas in which the respondents focused on as being reasons for stating the technology education program adequately prepared them to teach technology. The four areas given as reasons for feeling the program adequately prepared them to teach technology education are listed below.

1. Student teaching
2. Quality of professors
3. Curriculum
4. Technological content of coursework

It can be concluded from the data that the respondents felt adequately prepared to assume teaching positions based upon the Technology Education program curricula at Old Dominion University.

Research Goal: Determine what improvements can be made to the undergraduate curriculum at Old Dominion University based upon graduate's feedback.

Question 22 asked the respondents to provide recommendations to improve the Technology Education Program at Old Dominion University. Due to the wide variety of responses and lack of commonality in the responses it is difficult to conclude which recommendation is more important or should be given more weight than another. However, it was found that two recommendations: 1) Place a stronger emphasis on classroom management and, 2) Continue improving and updating the labs including Lab 2000 were recommended by two respondents.

Based on the variety of this data, it is concluded that all suggested recommendations for curricula improvement may be viable and should be

considered. Table 11 includes all the recommendations for Improvements to the Technology Education Program.

Table 11

Recommendations for Improvements to the Technology Education Program

1	Work more closely with engineering and other departments that teach technology.
2	Offer program in technology education for K-5.
3	Place a stronger emphasis on lesson planning, classroom management, and development of class projects/design briefs.
4	Provide a better picture of the differences between the technology education programs among the various school systems.
5	Give future teachers a basic knowledge of technology education, as well as current and emerging technologies. Maybe a technology literacy course for older teachers on current technology and uses.
6	Include small engines and higher-level power and transportation concepts.
7	Improve and update the older labs.
8	Encourage students to budget time and cost of materials for student activities. This helps in determining lab fees and costs versus benefits.
9	The problem is you talk about standards of technological literacy but Virginia's DOE does not use them for course competencies.
10	Provide more information on classroom management skills.
11	Update the Lab 2000, and a better instructor is needed to teach the CAD.
12	Look at the CTE resource center for the courses being taught in Virginia, i.e., Digital Visualization, Auto CAD, Intro to Engineering, and Geospatial Technology

It should be noted that the Technology Education Program relocated to new facilities in 2004. The curricula was also updated to include a course on Medical, Agricultural, and Bio-related Technologies. Some of the recommendations for improvement are also out of the realm of technology education.

Program philosophy is that small engine and Auto CAD are courses that are part of trade and industrial education, not technology education.

Research Goal: Determine whether the standards established through the Standards of Technological Literacy framework were being attained.

In this section, each of The Standards of Technological Literacy was evaluated to determine if the research goal was achieved.

Standards 1- The Nature of Technology

Standard 1 – The Nature of Technology received a mean score of 4.5 indicating that respondents felt adequately prepared to teach this standard.

Standard 2 – Technology and Society

Standard 2 – Technology and Society received a mean score of 4.4 indicating that the respondents felt adequately prepared to teach this standard.

Standard 3 – Design

Standard 3 – Design received a mean score of 4.0 indicating that respondents felt adequately prepared to teach this standard.

Standard 4 – Abilities for a Technological World

Standard 4 – Abilities for a Technological World received a mean score of 3.9 indicating that respondents felt adequately prepared to teach this standard.

Standard 5 – The Designed World

Standard 5 – The Designed World received a mean score of 3.9 indicating that respondents felt adequately prepared to teach this standard.

Standard 6 – Curriculum

Standard 6 – Curriculum received a mean score of 4.5 indicating that respondents felt adequately prepared to implement this standard.

Standard 7 – Instructional Strategies

Standard 7 – Instructional Strategies received a mean score of 4.5 indicating that respondents felt adequately prepared to implement this standard.

Standard 8 – Learning Environments

Standard 8 – Learning Environments received a mean score of 4.4 indicating that respondents felt adequately prepared to implement this standard.

Standard 9 – Students

Standard 9 – Students received a mean score 4.3 indicating that respondents felt adequately prepared to implement this standard.

Standard 10 – Professional Growth

Standard 10 – Professional Growth received a mean score of 4.0 indicating that respondents felt adequately prepared to implement this standard.

The findings indicated that on average the respondents had a high degree of satisfaction and confidence in their ability to implement the Standards of Technological Literacy.

The accumulative mean score for all 10 Standards of Technological Literacy was 4.1. The mean score for Standard 5 – The Designed World was 3.9 indicating agreement. The Medical Technologies component of Standard 5 received a mean score of 2.7, indicating uncertain. The Agricultural and Related Biotechnologies component of Standard 5 received a mean score of 2.9 indicating uncertain. A course has been added to the curricula that carries this content.

Recommendations

Based upon the findings and conclusions of this study, the following recommendations are made:

1. Old Dominion University's Technology Education Program should place an increased emphasis on agricultural and related biotechnologies. It should be noted that OTS 330 Medical, Agricultural and Bio-related Technologies is now a required course for undergraduates.
3. The curriculum of Old Dominion University Technology Education should include courses that place an increased emphasis on classroom management skills.
4. The Technology Education Program at Old Dominion University should continue to improve and update the labs including Lab 2000.

5. The Technology Education Program at Old Dominion University should strengthen instructional expertise in the CAD course and consider including Auto CAD in the course.

BIBLIOGRAPHY

American Federation of Teachers (AFT). 2000. Report of the K-16 Teacher education task force, Building a Profession: Strengthening Teacher Preparation and Induction.

Board of Education. (2005). Computer Technology Standards of Learning for Virginia's Public Schools, Commonwealth of Virginia.

Boyd, D., Lankford, H., Loeg, S., & Wyckoff, J. (2004). The Preparation and Recruitment of Teachers, A labor market framework. In Hess, F., Rotherham, A., Walsh, K. (Eds.) *A* Qualified Teacher in Every Classroom? Appraising Old Answers and New Ideas, (pp. 149-171). Cambridge: Harvard Education Press.

edweek.org., (2007). Teacher Quality, Issues, edweek.org. Http://www2.edweek.org/re/issues/teacher-quality/, Retrieved on 5 March 2007.

Guyton, E. & Dangel, J. (Eds.). (2004). Research Linking Teacher Preparation and Student Performance: Teacher Education Yearbook XII. Kendal. Dubuque, Iowa: Hunt Publishing Company.

Hansen, J.W., & Lovedahl, G.G. (2004). Developing Technology Teachers: Questioning the Industrial Tool Use Model, Journal of Technology Education,15 (2), 30.

ITEA, 2000. Standards for Technological Literacy: Content for the Study of Technology. Reston: ITEA.

Martin, G. (2002). Rationale and Structure for Standards of Technological

Literacy. In Ritz, J., Dugger, W., Israel, E., (Eds.). Standards for Technological Literacy, The Role of Teacher Education: 51st Yearbook, Council on Technology Education (pp. 47-58), New York: Glencoe McGraw Hill.

NCATE. (2006). Professional Standards for the Accreditation of Schools, Colleges, and Departments of Education, NCATE.

NCATE/ITEA/CTTE (2003). Program Standards (2003), Programs for the Preparation of Technology Education Teachers, NCATE.

Old Dominion University (2007-2008). Undergraduate Catalog 2006-2008.

Ritz J., Dugger W. & Israel E. (2002). Ed. Standards for Technological Literacy, The Role of Teacher Education: 51st Yearbook, Council on Technology Education. Glencoe McGraw-Hill, New York.

Russel, J. (2005). Evidence Related to Awareness, Adoption, and Implementation of the Standards for Technological Literacy: Content for the Study of Technology.

APPENDIX A

Old Dominion University

Technology Education Follow-up Study

Purpose: This questionnaire is intended to obtain your perspective on the effectiveness of the Technology Education Program at Old Dominion University in preparing you to teach technology.

Instructions: Questions 1 through 3 refer to your employment status. Simply fill in the blanks with the appropriate information.

Questions 4 through 20 contain closed-form questions. Please rate how strongly you disagree or agree with each question by circling the number that best represents your response. Questions 21 and 22 are open-form closed form questions that ask for your written response.

Please do not write you name on this questionnaire. A number is on the survey for follow-up if needed.

1. Are you currently or have you been employed as an educator since graduation? If your answer is no, please go directly to Question 4.

   Yes_____ No_____

2. Where are you employed?

   Institution/School_____

   Other employment_____

4. What is your job title? _____

5. Do you feel that the technology teacher program at Old Dominion University enabled you to develop an understanding of the nature of technology within the context of the Designed World?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

5. Do you feel that the technology teacher education program at Old Dominion University enabled you to develop an understanding of technology and society within the context of the Designed World?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

6. Do you feel that the technology teacher education program at Old Dominion University enabled you to develop an understanding of design within the context of the Design World?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

7. Do you feel that the technology teacher education program at Old Dominion University enabled you to develop abilities for a technological world within the context of the Designed World? (For example, can you select design problems and include appropriate criteria and constraints for each problem, and evaluate a design, assessing the success of a design solution, and develop proposals for design improvements?)

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

8. Do you feel that the technology teacher education program at Old Dominion University enabled you to analyze the principles of various medical technologies as part of the designed world?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

9. Do you feel that the technology teacher education program at Old Dominion University enabled you to analyze the principles of various agricultural and related biotechnologies as part of the designed world?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

10. Do you feel that the technology teacher education program at Old Dominion University enabled you to analyze the principles, concepts and applications of energy and power technologies as part of the designed world?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

11. Do you feel that the technology teacher education program at Old Dominion University enabled you to analyze the principles, concepts and applications of information and communication technologies as part of the designed world?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

12. Do you feel that the technology teacher education program at Old Dominion University enabled you to analyze the principles of various transportation technologies that are part of the designed world?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

13. Do you feel that the technology teacher education program at Old Dominion University enabled you to analyze the principles, concepts and applications of manufacturing technologies as part of the designed world?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

14. Do you feel that the technology teacher education program at Old Dominion University enabled you to analyze the principles, concepts and applications of construction technologies as part of the designed world?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

15. Do you feel that the technology teacher education program at Old Dominion University enabled to design, implement, and evaluate curricula based upon Standards of Technological Literacy?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

16. Do you feel that the technology teacher education program at Old Dominion University enabled you to use a variety of effective teaching practices that enhance and extend learning of technology?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

17. Do you feel that the technology teacher education program at Old Dominion University enabled you to design, create, and manage learning environments that promote technological literacy?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

18. Do you feel that the technology teacher education program at Old Dominion University enabled you to understand students as learners, and how commonality and diversity affect learning? (For example, do you feel that you can create technological experiences for students with different abilities, interests, and ages about the content of technology?)

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

19. Have you become actively involved in professional organizations and attend professional development activities to become better prepared to teach technology education?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

20. Do you feel the Technology Education Program at Old Dominion University adequately prepared you to teach technology education?

1	2	3	4	5
Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree

21. Please explain the answer you gave in Question 20.

22. What recommendations do you have for improving the Technology Education Program at Old Dominion University?

Thank you for your contribution in enhancing the effectiveness of the Technology Education Program at Old Dominion University.

APPENDIX B

Cover Letter

June 19, 2007

Dear _____:

As a graduate from Old Dominion University's Technology Education Program, we seek your assistance in completing a survey aimed at maintaining the effectiveness of this program in producing quality educators. The feedback you provide is important and valuable in the education of technology teachers to follow in your footsteps.

The enclosed questionnaire consists of 22 questions where you can express your personal attitude on the effectiveness of Old Dominion's Technology Education Program. Space is also provided for you to write any recommendations for program improvements that you may have. All of your responses will be taken seriously. Although we appreciate your cooperation in completing this survey, your participation in this study is voluntary.

Your honest professional opinion is very important is this study. Furthermore, your timely completion of this questionnaire is requested in order for this study to be completed. After completing the questionnaire please return it in the self-addressed stamped envelope by June 29, 2007. The results of the study will be made available to you upon request. However, personal information collected in this study and information that link your responses to your identity will be considered confidential and private in nature and will not be available to the public.

Thank you for your cooperation.

Sincerely,

Johnny F. Mack
Graduate Teaching Assistant

John M. Ritz
Chair

Attachments: Survey

APPENDIX C

Follow-up Cover Letter

August 22, 2007

Dear_____,

A short time ago we sent you a survey to assess the Technology Education program as Old Dominion University. We have not received your response, so we are sending you an additional survey. It is important for us to get a response from each graduate. We have almost all of the surveys back, but we have not received yours as yet.

We hope you are enjoying success since you graduated from Old Dominion University. As an effort to continue providing the best education we can for Technology Education teachers, we need your help by you completing our survey.

Thank you for your help.

Sincerely,

John M. Ritz
Chair

Enclosure