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ABSTRACT

A modified Delphi technique was used to identify the key factors that lead individuals to enter technology education doctoral programs focusing on teacher education. Two Delphi panels were established. The first consisted of 15 recent doctoral graduates with technology education degrees focusing on teacher education. The second panel consisted of 30 practicing technology education teachers who had master's degrees and were identified by their state vocational director as outstanding candidates for doctoral studies. The doctoral graduates' response rates for both Delphi rounds were 60.0%. The technology education teachers' respective response rates for the two rounds were 70.0% and 63.3%, respectively. The doctoral graduates rated their personal goals and desire as the top positive influence in enrolling in and completing a doctoral program in technology education. The technology education teachers also noted that their personal goals and desire would provide them the most positive influence for entering a doctoral program. Although no statistical analysis was completed on the second-round data, doctoral graduates' ratings of the importance of personal goals and desire were nearly twice as high as those of technology education teachers. It was recommended that universities with doctoral programs in technology education design flexible doctoral programs that include distance education and a reduction in time commitment. (Contains 10 references.) (MN)

What Are the Key Factors that Lead Individuals to Enter Technology Education Doctoral Programs Focusing on Teacher Education?

A Research Paper Presented

For the

Council On Technology Teacher Education

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During the last two decades, higher education has initiated a variety of educational reforms in an attempt to improve the effectiveness of teacher education. One major focus of the reform movement has been professionalization of schools that prepare educators. Metcalf-Turner and Fischetti (1996) indicated that traditional higher education approaches to teacher education were inadequate for the primary reason that there was disengagement between theory and practice. The need for context-rich educational experiences in teacher preparation is important in all teacher education, but is imperative in the field of technology education. Technology education demands a co-mingling of theory and principles with practice. Morris, Armstrong, and Price (1997) stated that the present teacher education system fails to equip pre-service teachers for the realities of the classrooms they will enter. The challenge for technology teacher educators is to embrace reform initiatives that bridge pedagogy by encouraging the profession's best teachers to enter the teacher education faculty ranks, thus keeping technology teacher education theory current with classroom practice.

However, graduate-level technology teacher education has not kept pace with the need for qualified faculty. The number of individuals seeking a doctoral degree in technology education, focusing on teacher education, is at an all time low (Bell, 2000). The technology teacher education profession is in short supply of qualified faculty, as well as doctoral prepared leadership for the profession. Coupled with the fact that the nation's secondary schools have a significant shortage of technology education teachers, the number of undergraduate technology teacher education majors has also declined. As Volk (1997) stated "the demise of technology teacher preparation programs will occur around the year 2005" (p. 69).

Statement of the Problem

Since 1975, there has been a steady decrease in the number of technology teacher education graduates (Volk, 1997). This decrease has been compounded by a significant increase in the number of technology education teachers needed across the nation (Weston, 1997). A survey of leaders in the field of technology education rated insufficient quantities of technology education teachers and the elimination of technology teacher education programs at the university level as two of the critical issues facing the profession (Wicklein, 1995).

Volk (1997) noted that one factor in the decline of university technology teacher education programs has been the lack of doctoral prepared faculty to serve as technology teacher education faculty. Buffer (1979) noted that between 1955 and 1977 over 2,500 individuals received a doctoral degree with emphasis in industrial education, the predecessor of technology education. A survey of the *Industrial Teacher Education Directory* (Dennis, 1995, 1996; Bell, 1997, 1998, & 1999) noted there were only 127 technology education doctoral degrees awarded between 1994 and 1999. A survey of the 1999-2000 graduates noted only 19 technology education doctorates for that period (Bell, 2000).

Currently, there is a lack of information as to causes of the decline in technology educators pursuing a doctoral degree. Without increasing the number of doctorates in technology teacher education, the baccalaureate degree major of technology education may vanish and, consequently, technology education courses would no longer be provided to the nation's middle school and high school students. This research was an attempt to address one of the major problems facing the technology education profession: the lack of doctoral prepared teacher education faculty.

Significance of the Problem

According to the International Technology Education Association (2000), technology education teachers prepare the nation's middle school and high school students with core technological knowledge and skills. Secondary technology education is a hands-on program of study that provides an opportunity for students to learn about communication, construction, design, manufacturing, power-energy, and transportation. Technological literacy benefits students who choose technical careers such as engineers, architecture, manufacturing, and construction, as well as students from all fields. Theoretically, a shortage of secondary technology education teachers could have an impact on the quality and quantity of students entering university engineering and technology programs.

A foundation to having qualified and interested high school graduates entering university engineering and technology programs is a sufficient number of university technology teacher education faculty to prepare secondary technology education teachers. The number technology teacher education graduates from the nation's universities has reached a critical stage. As Volk (1997) noted, "if we do not address the issues, soon we will be going ... going ... gone" (p. 70).

Volk (1997) further stated that "the corresponding decrease in doctoral degrees granted and diminished new professional opportunities in technology education teacher preparation programs does not afford the incentive or opportunity for new ideas to be promoted" (p. 69).

Purpose of the Study

The purpose of this research was to identify the factors the positively affect technology education teachers to enroll in doctoral programs and also to identify the barriers that hinder these teachers' entrance into doctoral programs. Both technology education doctoral program graduates and technology education teachers assisted in identifying these factors. The following research questions were developed for examination:

1. What factors do doctoral program graduates identify as providing the greatest positive influence for their enrollment into a doctoral program?
2. What factors do technology education teachers indicate would provide the greatest incentive to enroll in a doctoral program?
3. What factors do doctoral program graduates identify that provided the strongest barriers for their enrollment in a doctoral program?
4. What factors do technology education teachers identify as providing the strongest barriers for their enrollment in a doctoral program?

Methodology

This study utilized a modified Delphi technique as noted by Paige, Dugger, and Wolansky (1996) and Wicklien (1995) to identify and analyze what factors lead individuals to enter doctoral programs focusing on technology teacher education. Additionally, the factors that hinder individuals from entering doctoral programs were assessed.

Population

Two Delphi panels were established. The first group consisted of recent doctoral graduates (1994-1999) whose degrees were in technology education focusing on teacher

education as indicated in the *Industrial Teacher Education Directory* (Dennis, 1995, 1996; Bell, 1997, 1998, & 1999). The *Directory* noted that 127 doctoral degrees were graded during this five-year timeframe. Institutions that had graduated five or more doctorates during the five-year time span were contacted and asked to provide the names and address of their technology education doctoral graduates. This resulted in a population of 15 doctoral graduates whose location could be identified. These 15 individuals comprised the population and sample for one panel of this modified Delphi study.

The second panel consisted of practicing technology education teachers. Technology education directors from six states were asked to identify five technology education teachers who currently held a master's degree and the director would categorize as "an outstanding candidate for doctoral studies." This second panel consisted of 30 technology education teachers having earned a master's degree and were identified by their state director as a leader in the profession.

Procedure

The first-round of this modified Delphi study consisted of an open-ended survey mailed to all participants, doctoral graduates and technology education teachers. Doctoral graduates were asked to identify the factors that positively influenced their decision to enter and complete a doctoral program, and list those barriers that they were able to overcome in order to earn a doctoral degree. Technology education teachers were asked to list the factors that would positively influence them to enter a doctoral program, and also identify the barriers that have hindered them from entering a doctoral program. Response rates for the first Delphi round were 60.0% for the doctoral graduates and 70.0% for the technology education teachers. Because of institutional human subject board stipulations, names of respondents/non-respondents were not recorded. Therefore, a follow-up of the non-respondents was not conducted.

These first-round responses were then categorized into similar factor groupings for the second-round review. Each panel's listings, doctoral graduates and technology education teachers, were grouped into ten common factors for both positive influences and barriers. Each Delphi panel was then mailed a set of second-round instruments on which they were asked to rank-order the ten factors from one (1 = greatest) to ten (10 = weakest). Each participant received two ranking surveys, one noting positive influences and the other instrument listing barriers. The response rate for the second-round of this modified Delphi study was 60.0% (n = 9) for the doctoral graduates and 63.3% (n = 19) for the technology education teachers. However, two of the teachers' returned surveys were unusable; therefore the number of ranking examined for technology education teachers was 17.

Findings

Doctoral graduates rated their personal goals and desire as the top positive influence in enrolling and completing a doctoral program in technology education (M = 2.00, SD = 1.94) (see Table 1). Technology education teachers also noted that their personal goals and desire would provide them the most positive influence for entering a doctoral program (M = 3.76, SD = 3.17) (see Table 2). Even though no statistical analysis was completed on the second-round data, doctoral graduates' personal goals and desire were rated nearly twice as important when compared to the technology education teachers' ranking.

Doctoral graduates ranked the doctoral program's quality and reputation along with its faculty's' quality and reputation as the second and third most important factors (M = 3.33, SD = 1.89; M = 3.89, SD = 2.33). While technology education teachers viewed the quality and reputation of the program and faculty much lower, ranking them at seven and eight (M = 5.12,

SD = 3.08; M = 5.47, SD = 2.66). Technology education teachers viewed distance education and flexibility in the program as their second and third ranked factors. It is noteworthy that the teachers ranked their interest in research as the least most influence factor in pursuing a doctoral degree (M = 6.94, SD = 3.15).

Doctoral graduates indicated that financial constraints and time commitment were the two barriers that hindered their doctoral progress the most (M = 2.33, SD = 2.49; M = 2.89, SD = 2.18) (see Table 3). While technology education teachers noted that time commitment (M = 2.53, SD = 1.94) and financial constraints as barriers one and three, with the geographical location of the university ranked second (see Table 4). Program residency requirements, writing skills, and the Graduate Record Examination did not appear to provide barriers to either panel.

Implications

The data provided by the two panels of this modified Delphi study indicated that universities that prepare doctoral graduates in technology education focusing on teacher education should implement the following strategies:

1. Promote the quality of the university, the program, and its faculty
2. Design a flexible doctoral program that includes distance education and a reduction in time commitment
3. Increase the financial benefits for graduate assistantships
4. Capitalize on technology education teachers' personal goals and desire to recruit qualified individuals into doctoral programs
5. Institutions that offer master's degree programs for technology education teachers must increase the emphasis that is placed on conducting and valuing research

As noted by Paige, Dugger, and Wolansky (1996) "doctoral-granting institutions must provide the leadership. This leadership must come in the form of providing programs that have a research focus directed toward contributing to the body of knowledge and that are aimed at developing and providing future leaders with the background and experiences that are needed to move the profession forward into the 21st century" (p. 20). If the universities do not increase their production of technology education doctoral graduates focusing on teacher education, Volk's (1997) doomsday is rapidly approaching.

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Table 1

Doctoral Graduates' Positive Influences (N = 9)

Factor	Mean	SD
Personal goal/desire	2.00	1.94
Quality and reputation of program/university	3.33	1.89
Quality and reputation of the faculty	3.89	2.33
Support of family	4.22	3.39
Financial support/scholarships/assistantships	4.44	2.22
Support of advisor/faculty	4.89	2.28
Interest in research	5.22	3.42
Flexibility of the program	5.33	2.58
Short residency period	7.44	3.30
Sabbatical leave	8.11	3.14

Table 2

Technology Education Teachers' Positive Influences (N = 17)

Factor	Mean	SD
Personal goal/desire	3.76	3.17
Distance education	4.29	3.14
Flexibility of the program	4.35	1.68
University's close geographic location	4.65	3.34
Financial support/scholarships/assistantships	4.82	3.07
Credit for prior coursework/experiences	5.00	3.33
Quality and reputation of program/university	5.12	3.08
Quality and reputation of the faculty	5.47	2.66
Direct communication with advisor/mentor	6.59	2.14
Interest in research	6.94	3.15

Table 3

Doctoral Graduates' Barriers (N = 9)

Factor	Mean	SD
Financial	2.33	2.49
Time commitment	2.89	2.18
Lack of quality doctoral programs	4.56	2.41
Uncertainty about employment after graduation	4.67	3.40
Geographic location of university	5.33	3.09
Lack of flexibility in the program	5.56	2.67
Writing skills	5.56	3.20
Graduate Record Examination (GRE)	5.56	3.47
Lack of information about the faculty	5.89	3.25
Program's residency requirement	6.33	3.27

Table 4

Technology Education Teachers' Barriers (N = 17)

Factor	Mean	SD
Time commitment	2.53	1.94
Geographic location of university	3.41	1.94
Financial	3.82	2.36
Family responsibilities	4.12	2.25
Lack of flexibility in the program	4.65	2.42
Lack of quality doctoral programs	5.41	2.66
Program's residency requirement	6.24	3.08
Graduate Record Examination (GRE)	6.53	2.87
Age	6.82	2.89
Uncertainty of employment after graduation	8.06	3.13

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