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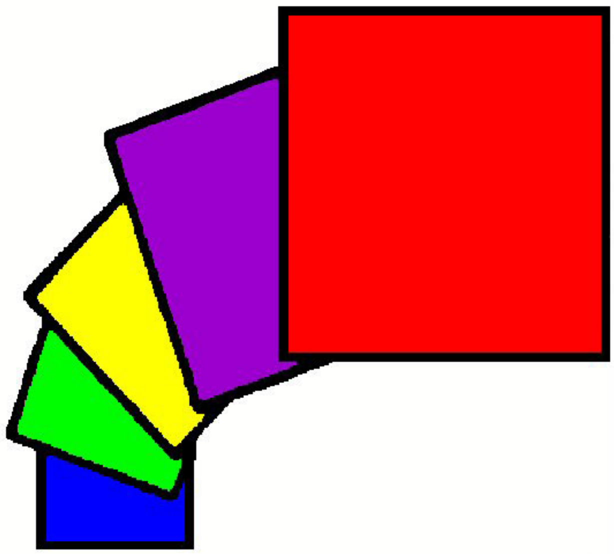

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Bits and Pieces

2009 The Year of Change

Americans are beginning this year, 2009, with a new President, and many problems. The economy, health care and energy are some of the important issues facing us today. During his campaign for president, President Obama, promised Americans "change." This change will take time and effort from many Americans. President Obama has made numerous decisions to improve this country in his first few months in office. He has brought in many new faces to Washington, but also knows the value of calling upon those with experience.

During my first three months as the editor of the Journal of Industrial Teacher Education (JITE) I have talked to many people who have extensive service and experience working with JITE. Through these conversations I realized that it seems to be the same people doing most the work for JITE year after year. As editor, I have also come to depend on the same manuscript reviewers time after time. Just like President Obama, I think it is time for "change;" we need to bring in more new people to carry the proud tradition of JITE into the future.

Before making major changes to the JITE structure, I am going to take President Obama's lead and bring in some experienced past members to help guide me in future decisions. My first act was to bring back a past editor to serve as my Associate Editor for one year. George Rogers has agreed to help me get started as Editor for one year, and will work with me to locate an Associate Editor for my second year. This new Associate Editor will assume the duties of editor at the end of my term. My second task is to build a large base of assistant editors, some with experience and some new to the job. I would then like to increase the reviewer pool, bring in new faces to carry on in the future. My last task will be to increase those authors submitting manuscripts to the Journal. I am going to call on each and every one of you to encourage new professionals and graduate students to submit manuscripts as often as they can.

Change is the one constant that we all live with and adjust to. I am very confident about the future of JITE. We have an abundance of experienced people that I will be working with during the next two years, and I am looking forward to bringing in new people (with your help) to carry on in the future.

In This Issue

This issue of the Journal presents five articles and one "At Issue" article, all with a common focus on change to make industrial teacher education a stronger discipline.
The "At Issue" article written by Edgar L. Farmer, Richard A. Walter, and Robert W. Clark, stress the need to revitalize and enhance the future for the next generation of leaders in technology education.

In an effort to retain American Indian College Students, Carsten Schmidtke states that instructors must be sensitive to students' needs by designing and delivering instruction that encourages students to stay in school and succeed. Along these same lines, O.W. Olowa tells us that the approach used by teachers is very important to help students learn more effectively. One approach studied by Olowa was the problem solving method, which is very successful with today's students.

To better meet the needs of students as related to engineering design, Todd R. Kelley and Robert C. Wicklein developed a study focused on the national status for the infusion of engineering design into technology education. Part one of the study is presented in this edition of the Journal with parts two and three to follow. With the decline of leaders in technology education due to retirement, new leaders need to be developed through curriculum leadership development programs. Julia VanderMolen and Richard Zinser write about the need to measure the importance and frequency of job tasks preformed by Career Preparation System administrators in Michigan to support the need for leadership development programs.

Change will always be with us, I hope we all learn to use it wisely.

Examination of Assessment Practices for Engineering Design Projects in Secondary Technology Education (First article in 3-part series)

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Overview

The following descriptive study was designed to determine the national status of secondary technology education curriculum content and assessment practices as they relate to engineering design. The results of this study were divided into a three-part article series. Although this study focused on the larger construct of the national status of the infusion of engineering design into technology education, three separate sub-constructs emerged. The three sub-constructs were: a) status of engineering design curriculum content; b) the status of assessment practices of engineering design projects, and c) what selected challenges are identified by secondary technology educators in teaching engineering design.

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Introduction

Educators within the field of technology education took a great leap forward in establishing a clear direction for the discipline with the publication of Standards for Technological Literacy: Content for the Study of Technology (ITEA, 2000/2002). Additionally, the professional development standards in Advancing Excellence in Technological Literacy (ITEA, 2003), and the call for technological literacy by the National Academy of Engineering and National Research Council in their document Technically Speaking: Why all Americans Need to Know More About Technology (NAE & NRC, 2002) continued to provide focus for the technology education curriculum. Each of these documents clearly established a need to teach technological literacy to all K-12 students. Although none of these documents endorsed a specific method of delivering technological literacy, many in the field of technology education as well as agencies outside of technology education (National Academy of Science) suggested engineering or engineering design as a curricular focus for technology education to achieve technological literacy (Daugherty, 2005, Lewis, 2004, NAE NRC, 2002, Rogers, 2005, Wicklein, 2006). From an engineering perspective, Douglas, Iversen, and Kalyandurg (2004) also cited the American Society for Engineering Education (ASEE) research results that indicated a strong support for teaching engineering in K-12 public schools.

However, the field of technology education has a history of experiencing curriculum reforms that generate new program titles with little curriculum changes (Akmal, Oaks, & Barker, 2002; Clark, 1989; Sanders, 2001). Considering this history of resistance to change in the field of technology education, questions arise about the current curriculum shift to move to engineering design as a content focus.

Recently, there have been new curriculums designed to infuse engineering content into technology education such as Project ProBase, Principles of Engineering; Project Lead the Way, Principles of Technology; Engineering Technology; and Introduction to Engineering (Dearing & Daugherty, 2004). Certainly, research was needed to determine the status and degree to which engineering design content was being presented within the field of technology education.

Methodology

Research Design

This descriptive study examined the degree to which technology educators are implementing elements of engineering design in their curriculums. The research collected data about the degree to which engineering design concepts were incorporated into the curriculum content in the secondary technology education. The researchers made a clear distinction between the goals of engineering design and other issues to connecting engineering concepts to the curriculum. One definition for engineering design defined by the Accreditation Board for Engineering and Technology (ABET) states: "as the process of devising a system, component, or process to meet desired needs. It is a decision making process (often iterative), in which the basic science, mathematics, and engineering sciences are applied to convert resources optimally to meet a stated objectives" (Eide, Jenison, Mashaw, & Northup, 2002, p. 79).

The research question guiding this part of the research study was:

1. To what degree does the current curriculum content of secondary technology education programs reflect engineering design concepts?

Population and Sample

A full sample was taken of secondary technology educators who were members of the International Technology Education Association (ITEA) as of September 2007. The identified population of this study consisted of a total of (N=1043) high school technology education teachers in the ITEA membership database. The original research design for this study called for an increase of the initial mailing of the survey by 48.1 percent, the average success rate of an initial mailing (Gall et al; 2007). However, after communication with ITEA personnel that revealed that ITEA survey mailings typically yield a 20-25% rate of return (Price, personal communication), the researchers determined that a full population mailing to all ITEA high school members was necessary to achieve the desired sample of 285.

Instrumentation

Data Collection Procedure

An invitation message was sent through e-mail to all ITEA members in the sample explaining specific instructions for completing the on-line questionnaire and directing participants to access a specific website to obtain and complete the survey questionnaire. The on-line questionnaire was developed using the guidelines and recommendations outlined by Dillman, Tortora, and Bowker (1999). There was a request to return the survey by a specified date. After waiting three days past the specified date of return, which was three weeks after the initial mailing, the researchers contacted non-respondents by sending a follow-up e-mail delivered letter containing the URL for the on-line survey link. The on-line survey company was Hosted Survey. This has been a proven method used by other researchers to achieve compliance from non-respondents (Gall et al., 2007).

The survey instrument gathered data relating to the degree to which engineering design concepts were incorporated into technology education curriculum content. The curriculum content items were created from the results of Childress and Rhodes (2008) study and Smith's (2006) study to create the framework for defining engineering design curriculum content in seven categories, see Table 1. Childress and Rhodes (2008) and Smith (2006) used a modified Delphi research method which requires a construct and content validation procedure, thus, providing survey items that were already tested for validity and reliability (Messick, 1989). The results of this research yielded an overall .982 Cronbach's Alpha for internal consistency. Participants were required to respond to each curriculum content item twice, for frequency of use and for time per typical use using a six-point Likert scale. See Table 2.

Table 1. The Seven Categories of Engineering Design Content

Seven Categories of Engineering Design Content
Engineering Design
Engineering Analysis
Application of Engineering Design
Engineering Communication
Design Thinking as It Relates to Engineering Design
Engineering and Human Values
Engineering Science

Table 2. Teaching Style Scale Conversion

How Often? (Frequency)			
Likert	Wording	Traditional (meets 5 days a week)	Block
0	Never	0	0
1	A few times a year	5 days	5 days
2	1 or 2 times a month	14 days (1.5*9.1)	7 days (1.5*4.6)
3	1 or 2 times a week	55 days (1.5*36.8)	28 days (1.5*18.4)
4	Nearly everyday	129 days (3.5*36.8)	64 days (3.5*18.4)
5	Daily	184 days	92 days

	How Many Minutes? (Time)		
Likert	Wording	Traditional (50 minutes per period)	Block (90 minutes per period)
0	None	0 min.	0 min.
1	A few minutes per period	5 min.	9 min.
2	Less than half the period	15 min.	30 min.
3	About half	25 min.	45 min.
4	More than half	37.5 min.	67.5 min.
5	Almost all period	50 min.	90 min.

Assumptions: Traditional schedule meets 5 days a week, 50 minute period, 184 day school year. Typical A/B and 4x4 block scheduling meets for 92 days for 90 minutes.

Results

Results from the school demographic section of the survey revealed that 62.4% of respondents worked in schools that use a traditional school schedule with classes meeting five days a week for approximately 50 minute each period; the other 37.6% of those responding to the survey work in schools that implement a block schedule to organize the school day. See Table 3. Of those responding to the survey, 27% teach in schools in a rural setting, 47.4% teach in schools in a suburban setting, and 25.6% teach in schools in an urban setting. School size was also measured in the school demographic section. A total of 14.6% of the participants from this study teach in small (less than 500 students) high schools, 45.1% teach in medium size (500-1500) high schools, and 40.3% of respondents teach in large (greater than 1500 students) size schools. See Table 3 for a detailed breakdown of the general demographics of the respondents.

Table 3. General Demographic Information

Demographic Criteria	# of responders	% of Total
Which best describes your current position?		
Middle/High school teacher	23	10.2%
High School teacher	198	87.6%
Other	5	2.2%

Years of experiences as a technology educator at the start of the 2007-2008 school year		
no prior experience	5	2.2%
Less than one year	12	5.3%
1-5 years	36	15.9%
6-10 years	31	13.7%
11-15 years	32	14.2%
16-20 years	25	11.1%
20+ years	85	37.6%
Gender		
Male	195	86.2%
Female	31	13.7%
Age at last birthday		
Under 25	7	3.1%
25-30	33	14.6%
31-35	20	8.9%
36-40	19	8.5%
41-45	31	13.7%
46-50	34	15.0%
51-55	52	23.0%
56-60	22	9.7%
61-65	7	3.1%

+65	1	0.4%

Highest college degree attained		
B.S./B.A.	73	32.3%
Masters	145	64.2%
EdS-Specialist	8	3.5%

The biographical demographic section of the survey revealed that 10.0% of the respondents teach at a middle and high school, compared with 88.0% of respondents indicating they are assigned exclusively to high schools, while 2.0% selected other to describe the grade level they teach. The majority of respondents had multiple years of experience with 62.8% possessing 11 or more years of experience; within that 62.8%, 37.6% have 20+ years of teaching experience. A total of 35.0% of the responses to the survey came from technology education teachers with one to 10 years of experience, and 2.2% of teachers who responded to the survey were in their first year of teaching; see Table 3 for further breakdown of the biographical demographic information. A total of 195 participants were male for a total of 86.3% of responders, leaving 13.7% being female. As mentioned before, the respondents were veterans of the teaching profession, thus, they were deemed as a mature group of professionals. Survey results revealed that 65.0% of the participants are over the age of 40. A total of 32.0% of the teachers who completed the survey are between the ages of 25 to 40. Only 3% of respondents are under the age of 25. The teachers who responded to this survey were not only experienced but were also highly educated with 64.2% holding a Master's degree, and 3.5% having earned an educational specialist degree. A total of 32.3% have obtained just the required B.S./B.A, a degree necessary to teach technology education in public schools.

The category Engineering Design was the highest ranked category measured by frequency with a mean score of 3.15. See Table 4 for complete list of rankings based upon frequency of use. Engineering Communication was the highest ranked category with a group mean score of 2.80 for time per typical use. See Table 5 for complete list of category rankings based upon time per typical use.

Table 4. Engineering Design Category Rankings for Frequency of Use

Rank	Engineering Design Content Category	Total Group Mean f	Total Group SD f
1	Engineering Design	3.15	1.24
2	Design Thinking Related to Eng. Design	3.00	1.28
3	Engineering Communication	2.89	1.42
4	Engineering Analysis	2.79	1.32
5	Application of Engineering Design	2.77	1.29
6	Engineering Science	2.33	1.35
7	Engineering and Human Values	2.22	1.29

Table 5. Engineering Design Category Rankings for Time Per Typical of Use

Rank	Engineering Design Content Category	Total Group Mean Time	Total Group SD Time
1	Engineering Communication	2.80	1.41
2	Design Thinking Related to Eng. Design	2.74	1.32
3	Application of Engineering Design	2.59	1.33
4	Engineering Design	2.38	1.25
5	Engineering Analysis	2.37	1.32
6	Engineering Science	2.16	1.33
7	Engineering and Human Values	2.08	1.31

Within the Design Thinking Related to Engineering Design category, thinking critically had the highest mean score measured by frequency of use 3.65. See Table 6 for a list of the top five mean scores for individual survey items based upon frequency of use.

In the Engineering Design category, the highest-ranking individual item (measured by time per typical use) use of computer-aided design to construct technical drawings with a mean score of 3.35; see Table 7 for a list of the topic five individual items based upon time per typical use. Also the item use technical drawings to construct or implement an object, structure, or process (mean score of 3.30), received a high mean score. The emphasis of CAD in technology has been discovered in other status studies (Dearing & Daugherty, 2004; Sanders, 2001; Warner & Mumford, 2004).

Another result of particular interest is that the second highest ranked item measured by time per typical use was develop basic student's skills in the use of tools with a mean of 3.32. It appears that the field of technology education has not moved far from its industrial arts roots. As a matter of fact, a similar survey item, developing skill in using tools and machines, was the highest ranked item in the Standards for Industrial Arts Program Project SfIAP project (Dugger, Miller, Bame, Pinder, Giles, Young, & Dixon, 1980) and Schmitt and Pelly study (1966) according to Sanders (2001).

Table 6. Top Five Individual Engineering Design Items Mean Scores for Frequency of Use

	Top Five Individual Items (category)	Mean f	SD f
1	think critically (Design Thinking)	3.65	1.10
2	developing basic student's skills in the use of tools (Application of ED)	3.46	1.26
3	understanding that knowledge of science and mathematics is critical to engineering (Engineering Analysis)	3.44	1.20
4	use computer-aided design to	3.39	1.52

	construct technical drawings (Engineering Communication)		
5	use technical drawings to construct or implement an object, structure, or process (Engineering Communication)	3.34	1.26

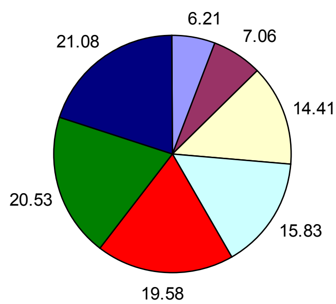
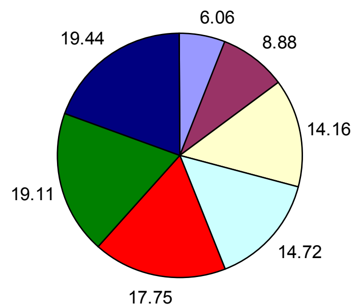
Table 7. Top Five Individual Engineering Design Items Mean Scores for Time per Typical Use

	Top Five Individual Items (category)	Mean f	SD f
1	use of computer-aided design to construct technical drawings (Engineering Communication)	3.35	1.49
2	develop basic student's skills in the use of tools (Application of ED)	3.32	1.34
3	use technical drawings to construct or implement an object, structure, or process (Engineering Communication)	3.30	1.25
4	visualize in three dimensions (Engineering Communication)	3.19	1.32
5	think critically (Design Thinking)	3.15	1.22

A composite score for total hours of teaching time dedicated to the seven engineering content categories was generated using the units of time and frequency identified in the teaching style scale conversion table (see Table 2). This composite score methodology to determine teaching time for curriculum content has been used in previous research. An advantage of using this method is to accurately capture the total instructional time dedicated to a specific curriculum content or to a specific teaching strategy employed the teacher (Mayer,1999; Mullens & Gayler,1999; Supovitz & Turner, 2000). The composite score was generated by using the units of days per school year for frequency and minutes per class period for duration or time; these numbers multiplied together to generate the final composite score. The researchers split the files; separating traditional and block scheduling results in order to accurately calculate a composite score. Splitting the file was necessary because the units of day and units of duration were different between the groups.

The lowest ranking categories based on composite scores for total instructional time were, Engineering and Human Values (6.21 hours for traditional schedule; 6.06 hours for block schedule), Engineering Science (7.06 hours for traditional schedule; 8.88 hours for block schedule), and Engineering Analysis (14.41 hours for traditional schedule; 14.16 hours for block schedule). See Figure 1.

Figure 1. Composite Score of Total Hours Dedicated to Engineering Design Categories

Traditional Schedule: Total Hours Per Engineering Design Content Categories	Block Schedule: Total Hours Per Engineering Design Content Categories
	

Key Individual Items of assessment practices for engineering design projects

1. Engineering and Human Values
2. Engineering Science
3. Engineering Analysis
4. Application of Engineering Design
5. Engineering Communication
6. Design Thinking Related to Engineering Design
7. Engineering Design

These results reveal that there is less emphasis on the use of mathematics to predict design results and a low emphasis on optimization techniques, some might question if engineering design is being properly taught when these are key engineering design elements (Hailey, Erekson, Becker, & Thompson, 2005; Hill, 2006; Gattie & Wicklein, 2007).

Limitation

In order to determine statistical significance for this population size N =1043, the Krejcie and Morgan (1970) method was to locate sample size for a given population size, the required sample size for the size of this population was set at 285 (Gay & Airasin, 2000). Again, the survey was sent out to all secondary education ITEA members in order to increase the chances of achieving an appropriate response rate. The final results of the study yielded a total of 226 respondents; therefore, the results of this study cannot be generalized to the entire population. However, the researchers comparing the demographic data results from this research to similar national status of technology education research (Gattie & Wicklein, 2007) that achieved an acceptable response rate level to generalize to the population. The demographic results of both studies were very similar, thus suggesting that these results were representative to the population. However, the researchers acknowledged that statistical significance was not achieved in this study.

Conclusion

The results of this descriptive study have yielded valuable information for the field of technology education. There has been a body of literature generated regarding the issues related to engineering design as a focus for technology education (Daugherty, 2005; Gattie & Wicklein, 2007; Hailey, Erekson, Becker, & Thompson, 2005; Hill, 2006; Lewis, 2004;

2005; Wicklein, 2006). Several research studies in technology education have investigated the appropriate outcomes for a high school level engineering design program (Childress & Rhodes, 2008; Smith, 2006). This study sought to extend the results of those prior studies by using those results to help describe the current status of technology education regarding the engineering design curriculum content. It is imperative for educational researchers in technology education to have the ability to identify where the field of technology education is, as a whole, regarding issues and needs related to an engineering design focus; this study sought to provide such information.

The evidence from this study provides rationale to conclude that technology education curriculum content currently emphasizes career and technical education skills such as CAD and general tool skills even though the field as a whole wants to assume a more general education focus. Leaders in the field of technology education should embrace these findings and use it as a way to define a clearer mission for the field of technology education, one that provides a career pathway to engineering. Technology education would be best served to embrace the idea that it can provide a logical career pathway for high school students and at the same time provide the universal skills of problem solving used in the engineering profession but which is also applicable to a variety of other important careers.

In recent years, some educators in technology education have endorsed the concept that technology education's purpose is to foster technological literacy in all students. This purpose for technology education is a noble and worthy mission; however, an equally important mission is to prepare young people to become efficient workers in a global society while at the same time become technologically literate. The U.S. Department of Labor reported that a twenty percent increase in the demand for engineers would occur before the end of the decade, and currently many engineering jobs remain unfilled because of the lack of qualified candidates (Southern Regional Education Board, 2001). Moreover, there are several commissioned reports that describe the job skills necessary for individuals to be prepared to work in a global economy (Committee on Prospering in the Global Economy of the 21 Century, 2007; National Center on Education and the Economy, 2006). Within technology education, Dearing and Daugherty's (2004) study identified the core engineering-related concepts that support a standards-based technology education curriculum. What emerged from the data were outcomes that are job related skills that are also essential skills outlined in global workforce literature. The top five ranked concepts identified were: 1) interpersonal skills: teamwork, group skills, attitude, work ethic; 2) ability to communicate ideas: verbally, physically, visually, etc. ; 3) working within constraints/ parameters; 4) experience in brainstorming and generating ideas; 5.) product design assessment: does a design perform its intended function? (p. 9).

Technology education with an engineering design focus can help equip students with necessary job skills while at the same time prepare students that are technologically literate.

Specific results of this study indicate that technology education is already providing some learning opportunities for high school students to develop necessary job related skills needed of workers in a global economy. The literary works of Friedman (2005) and Pink (2005) not only documented the changes taking place nationally and internationally regarding a global economy, but also describes some attributes of the new kind of problem solver needed to address the complex issues that will emerge from global workforce competition. Some of the highest mean score items in this study addressed these needs including thinking critically (highest mean score item measured by frequency) and worked on a design team as a functional inter-disciplinary unit. These attributes are necessary for a global worker, and, according to the results of this research, are well supported by current technology education curriculum content.

One particular area of improvement for technology education curriculum content to properly address the needs of a global workforce is the category of Engineering and Human Values (the lowest group mean scoring category by composite score). Some low mean scoring items within the Engineering and Human Values category are those outcomes related to making ethical decisions about engineering problems and outcomes that provide awareness of social, economical, and environmental impacts of technology on our society. The field of technology education would be better served by addressing these issues with improved curriculum content identified in the Engineering and Human Values category as well as implementing a systems thinking approach to problem solving in order to provide a way for students to learn how to address sustainability design issues.

One rationale for the importance of teaching technology education with an engineering design focus is that it can provide a real-world context for the application of mathematics and science (Daugherty, 2005; Wicklein, 2006). However, the results of this study indicate that there is little emphasis on the application of mathematics and engineering sciences in current technology education curriculum. As mentioned earlier, a low mean score for time per typical use was the individual item using mathematical models to optimize, describe, and/or predict results (mean of 1.72). In the engineering science category, a low mean score result of 1.58 was determined for use of trigonometry to solve problems and predict results.

If educators within the field of technology education wish to advocate that technology education helps provide a real-world context for the application of mathematics and science, then technology education curriculum must provide more and deeper learning opportunities that include the use of mathematics and science as a part of the design process. However, the results of this study indicate that analysis and optimization stages of the engineering design process are not presently emphasized in technology education curriculum content, which might cause some to question if the engineering design process is being properly implemented. It is important to note that the debate is very much alive about what are the appropriate levels of mathematics and engineering science for teaching engineering design at the secondary level, more research is needed to determine the appropriate levels.

The researcher's desire that the results of this study will be used by those in the field of technology education to help design new engineering design curriculum, assessment strategies, and professional development experiences that will help high school technology educators successfully implement engineering design focused technology programs around the country.

Recommendations for Future Research

This research study has provided great insights into the current national status of technology education regarding engineering design curriculum content, assessment strategies, and challenges facing secondary teachers seeking to infuse engineering design into their classes. From this study, those in the field of technology education will better understand what is taking place in technology education classrooms regarding engineering design. However, more information is needed to help properly inform the field about this construct.

Consequently, the following recommendations are suggested for further research to inform the field of technology education:

a. Similar descriptive research should be conducted using participants other than ITEA members to compare the results with this study. Moreover, a follow-up study using a different database could yield a larger sample size that would allow the researcher to statistically generalize to the entire population of technology education teachers. One possible database of technology education teachers that could be used for a follow-up study is the Engineering and Technology Education Division (eTED) of the Association for Career and Technical Education (ACTE).
b. Conduct descriptive research using specific curriculum programs (Project Lead the Way, Probase, etc.) as the grouping variable to examine the student outcomes addressed as they relate to engineering design competencies. A study of this design could provide valuable information about outcomes and competencies achieved by these specific curriculum projects and about curriculum deficiencies.
c. Conduct qualitative case studies of high school technology education teachers who have successfully implemented an engineering design focused technology education program in order to identify strategies necessary for infusing engineering design concepts into technology education. Furthermore, these types of studies could seek to explore the challenges and constraints facing these teachers as they implement a technology

education program focused on engineering design.

d. Conduct descriptive research using urban, suburban, and rural school settings as a grouping variable to determine if there exists a statistical difference in the challenges facing teachers seeking to infuse engineering design into technology education when grouped by school setting.
e. Replicate this study using the same instrument and a sample of ITEA members five years in the future. A comparison of the results of this study and a study five years out could help identify the progress made with the infusion of engineering design in technology education curriculum content.
f. Conduct qualitative and quantitative research to determine the levels of mathematics and engineering science that are appropriate for teaching engineering design at the secondary level in order to remain authentic to the engineering design process and remain manageable for technology education teachers.

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Effects of the Problem Solving and Subject Matter Approaches on the Problem Solving Ability of Secondary School Agricultural Education

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ABSTRACT

The approach used by teachers is very important to the success of the teaching process. This is why this study seeks to determine which teaching approaches – problem solving and subject-matter, would best improve the problem solving ability of selected secondary agricultural education students in Ikorodu Local Government Area. Ten classes and 150 students, based on Hay's (1973) cluster sampling formula for determining sample size, were selected. The classes were taught with instructional units prepared using the problem solving approach model presented in Newcomb, McCracken and Warmbrod (1993) and subject matter approach as described by Rosenshine and Steven (1986). At the conclusion of all instruction, a problem solving ability posttest and Group Embedded Figures Test (GEFT) Instruments were administered to all participants. The scores obtained from the problem solving ability posttest was analyzed using the univariate analysis of covariance and it found, among other things, problem solving approaches scored significantly higher (P=0.046) on the posttest than scores of students assigned to classes using the subject matter approach. The implication of this figure is that the problem solving ability of secondary

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school students can be accelerated with instructional approaches, such as the problem solving technique.

INTRODUCTION

The approach used by teachers is very important to the success of the teaching process. Teachers should learn how to use several teaching methods. No one method of instruction will work all of the time and under every circumstance. Thus, the selection of a teaching method is critical to the learning style of those being served by instruction.

The problem solving approach is a student-centered approach to teaching where the central and essential characteristic is solving problems (Binkley and Tulloch, 1981). Students participate in the learning process by contributing problems, analyzing the factors associated with the problems, developing possible solutions to the problems, placing the solution(s) into action, and evaluating the results of the solution. The subject matter approach is a teacher-centered approach to teaching where students are more passive participants in the learning process. Students listen to the information, participate in limited discussion, take notes, and retrieve or recall the information for evaluation purposes. With the subject matter approach the focus is more on acquisition of information than on group driven problem solving.

Odumosu (1999) explained the problem solving method as a form of the discussion and development methods in which the students set out with a wider problem to guide their study or discussion. The problems may be given by the teacher or it may be suggested through the children's own experiences in that subject or in a life situation. It is their task to find the facts that will help in solving it. The problem solving approach has been widely accepted and recommended by agricultural educators as the best method of teaching agriculture (Phipps and Osborne, 1988). Today, that approach remains the primary method of teaching offered to pre-service agriculture teachers in many teacher education programs. However, its actual use throughout the agricultural education profession is limited, with some educators questioning its validity as a superior approach to instruction. Many teachers view the problem solving approach as archaic, tied to the farm backgrounds and supervised agricultural experiences of the learners (Moore and Moore, 1984). Critics of the problem solving approach also accuse that while the approach has a sound theoretical base, it has been accepted with little empirical evidence to either defend or reject its usefulness in the classroom.

Some students may possess a style of learning which is not complimentary to the use of problem solving. Their inability to solve problems interacts with their inability to use past knowledge and experiences to help in the solution. Research on learning and teaching styles serves as a basis for selecting teaching approaches. According to Barr and Tagg (1995), two types of teaching behaviors and two different types of student learning strategies exist. They wrote that teachers educate from either an instructional paradigm that focuses on what the teacher does in the classroom, or from a learning paradigm that focuses on whether and how students learn. Most teachers teach from the instructional paradigm that is less concerned with how students learn and more about the teacher's actions (Lasley, 1998). Learning strategies refer to the different activities that students apply and by which learning is achieved (Sankaran & Bui, 2000). Two types of learning strategies have been proposed: deep, to satisfy curiosity and to understand the meaning of a task by an in-depth study of a subject; and surface, which is just to satisfy requirements by memorizing facts well enough to earn a good grade without fully mastering the material (Sankaran & Bui, 2000). For teachers to foster the deep learning strategy they must teach outside of the instructional paradigm. In other words, teachers must present information in a way that encourages students to seek their own answers using their own strategies. Gallagher and Stepien (1996) wrote that instruction which fosters higher order thinking can result in learners who can construct meaningful connections between significant pieces of information, transfer information to new settings, and are motivated to learn. By teaching students how to think and learn independently, teachers increase their power to think and to learn outside of the classroom (Kahler, Miller & Rollins, 1988). These statements support the need to determine the appropriate teaching approach different from the traditional methods of lecture and rote memorization still used today by teachers who view education from the instructional paradigm and by students who use surface learning strategies. The problem-oriented approach has been used as an educational tool for many years. Educators such as John Dewey proposed it nearly a century ago. According to Barrow (1996), problem based learning was reintroduced into medical education in the 1960s to better prepare physicians for the demands of professional practice. There is opposition to the use of the problem oriented approach as a method of education. Critics of the problem solving approach say that while the approach has a sound theoretical base, it has been accepted with very little empirical evidence to either defend or reject its usefulness in the classroom (Dyer & Osborne, 1999). Additionally, Dyer and Osborne (1999) found that problem solving instruction may not fit the learning style of some students. In fact, abstract learners may not recognize problems as such when presented to them. Problem solving instruction may be an effective instructional alternative, but little empirical evidence from school settings currently exists concerning teaching for knowledge acquisition using this approach.

The theoretical framework for this study was founded in Mitzel's Conceptual Model for the study of classroom teaching (Dunkin and Biddle,1974). The Mitzel Model suggests that the effectiveness of a teaching approach (process variable) on the problem solving ability of students (product-variable) is moderated by the learning styles of the students (context variable), even though teacher effects (presage variables) are held constant. However, student learning styles shall not be considered or included in the analyses of this study.

Few studies have attempted to address the effects of the problem solving and the subject-matter approach on the problem solving ability of secondary agricultural education (mostly foreign authors) and reported. Whereas Dawson (1956) reported an increase in problem solving ability in favor of the problem solving approach; Thompson and Tom (1957) found no difference. A study of agriculture students from Illinois which compared the effects of the problem solving approach to the subject matter approach found the problem solving approach to be no more or less effective in producing student achievement or knowledge retention (Flowers & Osborne,1988). Flowers (1986) reported no significant differences in the short-term retention of subject matter when the problem solving approach was compared to the subject matter approach. The problem solving approach was; however, effective in reducing achievement loss when compared to the subject matter approach (Dyer & Osborne, 1999; Lee, George and Donald,2001).

PURPOSE OF THE STUDY

The primary purpose of this study was to compare the effectiveness of the problem solving approach to the subject matter approach in teaching given agricultural science problem areas to subjects. The specific objectives of the study are:

- To analyze the descriptive statistics of sample students.
- To determine the effects of the problem solving and subject matter approaches on the problem solving ability of secondary school agricultural education students in Ikorodu Local Government Area.

HYPOTHESES TESTED

There is no difference in the problem solving ability of students taught by the problem solving approach and the problem solving ability of students taught by the subject matter approach.

RESEARCH DESIGN

The study was conducted using a quasi-experimental design. Since random assignment of subjects to treatment groups was not possible, intact groups were used with random assignment of treatments to the groups. The study followed a variation of the nonequivalent control group design described by Campbell and Stanley (1963), but differed in that the subject matter approach to instruction was used as the control.

POPULATION STUDIED

The population of this study consisted of all Ikorodu Local Government Area (Lagos, Nigeria) Secondary Agricultural Education Students.

SAMPLE AND SAMPLING TECHNIQUE

Ikorodu Local Government Area has about 50 Secondary Schools (both public and private together). Ten classes and 150 students taught by five teachers were selected. Cluster sampling based upon Hays (1973) formula for determining sample size was used in an attempt to ensure that instructors were capable of using each of the two teaching approaches properly.

RESEARCH INSTRUMENT; VALIDITY AND ADMINISTRATION

The instruments used for the study were instructional units, Group Embedded Figures Tests (GEFT) and questionnaires. GEFT enumerates the degree of abstractness concreteness on a scale of 0-18. The GEFT instrument is considered to be a standardized instrument. Its validity has been established and reported by Witkin, H.A., Oltman, P.K. Rosking, E and S.A. Karp (1971). Instructional units were prepared using the problem solving approach model presented in Newcomb, McCracken, and Warmbrod (1993) and subject matter approach model as described by Rosenshine and Steven (1986). To ensure that the proper teaching approach was used, instructors were provided in-service workshops of two hours in length concerning the proper use of both teaching approaches.

Face, content and construct validity of the researcher-constructed instruments were determined by an expert panel in agricultural education and research. All instruments were pilot tested and appropriately adjusted.

Students were administered a pretest designed to measure pre-treatment problem solving ability. Normal curve equivalent (NCE) scores were also obtained to statistically control for existing ability levels. One treatment group received instruction in classes taught by the problem solving approach, the other group received instruction in classes taught by the subject matter approach. Two units of instruction were taught to each group. At the conclusion of all instruction, a problem solving ability posttest and the GEFT instruments were administered to all participants. Data collection was carried out between May and July 2008.

PROCEDURE

The data for this study were collected using a quasi-experimental counterbalance design (Campbell and Stanley, 1963). Teachers were purposefully selected for their ability to use the problem solving approach to teaching by a panel of experts consisting of three faculty members from The Federal College of Education's (Technical) Agricultural Education Department and nine staff members from the Supervisors of the Lagos State Post-primary Teaching Service. The panel of experts was selected on the basis of their knowledge of the teaching ability of the Lagos agricultural science teachers. Fifteen teachers were identified by the panel of experts, five teachers agreed to participate in the study, and all five teachers provided usable data to the researcher. Four teachers provided audio tapes of their instruction. The sampled population was150 students enrolled in agricultural science in ten comprehensive high schools. Each teacher taught two instructional units. One unit was taught using a problem solving approach and a second unit was taught using a subject matter approach. The unit plans contained an equal amount of instructional material; the only differences were related to the two teaching approaches used in the study. The problem solving approach unit plans were prepared for each of the instructional units. Equivalent unit plans were prepared for the subject matter approach to teaching, including identical information used in the problem solving unit plans. The instructional unit plans were then submitted to a panel of experts consisting of four faculty members and six graduate students from The Federal College of Education's (technical) Department of Agricultural Education to establish content validity and equality. The panel of experts was selected on the basis of their experience teaching high school agricultural science. The topic of the unit (Farm Implement and Mechanization), the timing of the unit (first or second in the instructional series), and the approach to teaching (subject matter or problem solving) were randomly assigned to each teacher. Instruction on all units was audio taped to verify the administration of the experimental levels of the treatment. Data were collected using a 40 question achievement test (Farm Implement and Mechanization unit test), a 15 item attitude toward instruction instrument (Farm Mechanization Attitude instrument), and a 14 item teaching approach evaluation instrument (Teaching Approach Instrument) developed by the researchers. The 40 achievement test questions were arranged in different ways to produce three identical forms of the exam. The three forms were used as a pretest, posttest #1 and posttest #2.

Content validity of the instruments was established by a panel of experts consisting of four faculty members and six graduate students from The Federal College of Education's (technical) Department of Agricultural Education with experience teaching high school agricultural science.

DATA ANALYSIS

Statistics such as the covariance analysis, mean and percentages were used for analyzing the data generated with the instruments.

RESULTS

Table 1.0. Numbers and Percentages of Students by Gender and Teaching Approach

GENDER	TEACHING APPROACH	
	PSA n = 102	SMA N = 48
Male Female	66 (64.7) 36 (35.3)	34 (70.83) 14 (29.17)

Note: Percentages are in parentheses.
PSA = Problem Solving Approach
SMA = Subject Matter Approach

Table 1.0 shows that 102 students (66 male and 36 females) were taught by problem solving approach while 48 (34 males and 14 females) were taught by subject matter approach. Majority of the students who completed the study were males.

Table 2.0. Mean Scores of Student Problem Solving Ability

GENDER	Problem Solving Ability Pretest		Problem Solving Ability Posttest	
	Mean	SD	Mean	SD
Male Female	6.08 3.68	2.45 1.32	8.56 6.30	3.63 2.25

Table 2.0 statistically the performance of students taught by problems solving teaching approach. The comparison revealed that male students scored significantly higher on the problem solving ability pretest than did female.

Hypothesis:- There is no difference in the problem solving ability of students taught by the problem solving approach and the problem solving ability of students taught by the subject matter approach.

Table 3.0. One–way Analysis of Variance for Problem Solving Ability.

Source	Df	Ms	F
Pretest Between groups Within group.	 6 143	 (24.10) (3.12)	 8.84**
Post test Between groups Within groups	 6 143	 (18.01) (8.35)	 1.98

* P< .01

The problem solving ability of students was measured by the numerical score obtained from analysis of the problem solving ability posttest completed by each student. All tests were scored according to the problem solving analysis form developed by the researcher. Scores on the problem solving ability pretest were used as a covariate measure to adjust for pre-existing group differences.

A one-way analysis of variance revealed significant differences (P = 0.000) across the groups. The univariate analysis of covariance testing the effects of the treatment on the problem solving ability of students indicated that the scores of students in classes taught by the problem solving approach were significantly higher (P = 0.046) on the posttest than were scores of students assigned to classes using the subject matter approach. As a result, the null hypothesis of no difference between treatment groups was rejected in favor of the problem solving approach.

CONCLUSION AND RECOMMENDATIONS

The study shows that the problem solving approach is more effective than the subject matter approach in increasing the problem solving ability of students. This finding agreed with earlier studies reported by Dawson (1956) and Chuatong (1987). The problem solving approach to teaching should be used whenever improved problem solving ability is a desired outcome of instruction. According to Witkin, et al (1997) students scoring less than 11.3 on the GEFT instrument possess little inherent ability to solve problems. They must acquire this skill. Based on the results of this study, the problem solving approach proved to be an effective tool and should therefore be used as an instructional approach to enhance problem-solving ability. In secondary schools, the ability to solve problems increases by class level. However, that ability can be accelerated with instructional approaches, such as the problem solving approach, which focuses on the solution of problems. Suffice it to say that this study, though clinical in nature, is severely limited in its ability to be generalized to other populations. Further studies should be conducted to increase the level of understanding and usability.

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"That's What Really Helped Me Was Their Teaching": Instructor Impact on the Retention of American Indian Students at a Two-Year Technical College

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Abstract

Instructors have often been pegged as the major factor in the success of American Indian college students. In addition to personal and academic relationships, instructional methods and design play a pivotal role in student retention, and instructors must be sensitive to their students' needs when designing and delivering instruction. Given that American Indian students at the South Central Institute of Technology graduated at a rate five times higher than the reported national average for programs from which students planned to enter directly into the workforce, interviews were conducted with American Indian students to learn about their perceptions of how their instructors may have played a role in their success. To help improve American Indian student retention, implications for practice and research based on student responses are being offered.

Research studies over the past two decades have repeatedly confirmed that American Indian students had the least likelihood of all ethnic groups to enter and complete college. Despite significant gains, only 17.7% of American Indians age 18-24 were enrolled in post-secondary education as opposed to 41.6% of European-Americans in the same age bracket. In fact, American Indians had the lowest college

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participation rate of all major ethnic groups (Freeman & Fox, 2005).

In addition, statistical analyses from these studies indicated that only between 4% and 18% of those American Indians who did enroll in college eventually completed their degrees (Brown & Robinson-Kurpius, 1997; Carnegie Foundation, 1999; Huffman, 1991; Jackson & Smith, 2001; Pottinger, 1990; Tierney, 1993, 1995; Wilson, 1998), although one report about NCAA college athletes went as high as 36% (Pavel, Skinner, Cahalan, Tippeconnic, & Stein, 1998). Low graduation rates are part of a predicament faced by many tribes. Leaders with college educations and advanced training are needed to help preserve tribal languages, cultures, and identities; manage tribal resources; support tribal political and economic development; and work with institutions of the mainstream society. However, the lack of qualified leaders often forces tribes to hire either non-Native outsiders or underprepared tribal members (Benally, 2004; Demmert, 1997).

Scholars have argued for many years that American Indian students have unique values, beliefs, attitudes, goals, and needs that instructors at the college level must take into account if they want their students to be successful (Jackson & Smith, 2001; James, 1992; O'Brien, 1990; Pottinger, 1990; Scott, 1986; Swisher, 1994; Wilson, 1998). However, too few faculty members have understood, respected, and acted upon these needs, and their attitude has contributed to high non-completion rates among Native students (Dodd, Garcia, Meccage, & Nelson, 1995; Pewewardy & Frey, 2004; Tate & Schwartz, 1993).

According to Benjamin, Chambers, and Reiterman

(1993), American Indian cultures have their own ways of valuing and encouraging persistence, which manifest themselves in certain preferences for learning styles and assessment methods. Consequently, if instructors are truly student-centered, they must adapt to the needs of their students and not expect students to be the ones to change (Aragon, 2002; Gilbert, 2000; Wilson, 1998). Faculty members must show an understanding of their American Indian students' unique cultural backgrounds and classroom needs and adjust their instructional methods if students are to persist. Some scholarship suggests that technical education has been particularly successful in this regard and that its pedagogy as well as its workplace connection shows promise for strategies to increase American Indian student retention (Tierney, 1995; Tippeconnic, 2000; West, 1988).

The current study, to find out about students' perceptions of how their instructors had helped them learn and persist in their studies, involved graduating American Indian students at a mainstream sub-baccalaureate technical college. This researcher was particularly interested in those instructor attitudes and teaching methods that students responded to positively and that in their estimation contributed to their success.

Literature Review

There is ample evidence in the literature that instructors have the strongest influence on American Indian student perceptions of a positive and supportive campus atmosphere and ultimately on persistence (Cole & Denzine, 2002; Dodd, Garcia, Meccage, & Nelson, 1995; Reyhner & Dodd, 1995). Instructors can have a positive effect on motivation, on how students adapt to the campus environment, and on whether students will perceive the campus as racist and themselves as victims of discrimination (Brown & Robinson Kurpius, 1997; Hornett, 1989). At the same time, significant stumbling blocks remain. Instructors' communication habits and general attitudes can impede learning (Dodd, Garcia, Meccage, & Nelson, 1995), and if the different values, beliefs, and attitudes of instructors and students remain unreconciled, the negative effect on persistence can be quite pronounced (Pewewardy & Frey, 2004). Instructors' greatest impact lies in areas of cultural sensitivity, academic and personal relationships, instructional methods and design, and sensitivity to student learning styles.

To understand how they can help their American Indian students be successful, college instructors must first become aware of the real and perceived barriers students face. The cultural conflict students experience because of their values, beliefs, and attitudes may be exacerbated by instructor ignorance. Expecting students to behave in ways that are culturally incongruent for them, using instructional methods students are unfamiliar with, and interacting with students in a manner they are unaccustomed to will be seen not only as confusing but also as downright hostile (Bowmann, 2003; Gilbert, 2000; Hornett, 1989; Huffman, 2001, 2003; Scott, 1986; Tate & Schwartz, 1993; Wentzlaff & Brewer, 1996). The perception of hostility is particularly pronounced if faculty members respond to student academic problems not with understanding, open-mindedness, or cultural sensitivity but with the advice to assimilate more into the campus culture (Huffman, 2001; Kirkness & Barnhardt, 1991).

This type of faculty reaction to student concerns is closely linked to student attitude toward their instructors. Interestingly enough, even students who are dissatisfied with their overall campus experience by and large report a positive attitude toward instructors and grant that their instructors try to be as helpful as possible (Huffman, 2001; Lin, LaCounte, &

Eder, 1988; Tate & Schwartz, 1993). Such positive attitudes, unfortunately, are easily canceled out by a lack of cultural awareness on the part of instructors. A lack of cultural awareness easily leads to perceptions of insensitivity, racism, and preferential treatment for non-Native students, even if there is no evidence for such perceptions (Pewewardy & Frey, 2004). This situation led O'Brien (1990) and Scott (1986) to ask how institutions and instructors must act not only to respond supportively but also to have their actions recognized as supportive.

Both academic and social integration (not assimilation) into the campus culture and environment are crucial if American Indian students are to be successful (Brown & Robinson Kurpius, 1997). Academic integration refers to the interaction of faculty members and students in the context of the classroom and the coursework. Students need faculty members who care about their academic progress, respond to them in a supportive manner, and are willing to help with academic problems (Lin, LaCounte, & Eder, 1988; Ortiz & HeavyRunner, 2003). Cultural interaction theory has been suggested as a framework for such exchanges. In this theory, instructors help students understand how to play a role in their own academic success, how to tend to their needs, and how to vent their feelings without developing an oppositional attitude that might lead them to withdrawal instead of persistence (Ortiz & HeavyRunner, 2003).

To facilitate building such student-instructor relationships, colleges are called upon to create opportunities for both sides to interact outside the classroom (Brown & Robinson Kurpius, 1997; Pavel & Padilla, 1993). If, in fact, faculty members can establish a relationship with students that emulates that of an extended family, students will have a greater sense of belonging and be more likely to persist in their studies (HeavyRunner & DeCelles, 2002).

In order to help their American Indian students learn and see the value in what they are learning, instructors must use instructional methods and learning activities that play to the strengths of American Indian students and are different from the ones used for non-Natives (Hornett, 1989; Kirkness & Barnhardt, 1991; Pewewardy & Frey, 2004; Wentzlaff & Brewer, 1996; Wilson, 1998). Instructional design based on student need is crucial for student learning in this context (Wilson, 1998). The cornerstone is for instructors to be aware of the holistic approach to learning preferred by American Indian students, meaning that they learn better when they have a chance to look at the whole before examining its components (James, 1992). If all new learning is built on and integrated with prior knowledge, students remain open-minded toward new knowledge instead of perceiving it as a threat and are willing and able to return to the whole and integrate the new knowledge (Gilbert, 2000; Kirkness & Barnhardt, 1991; Tierney, 1995; Wilson, 1998). Specific strategies recommended for instructors were to use examples from their own lives to illustrate how knowledge is integrated in the workplace, give students plenty of time to finish assignments, and provide detailed, positive feedback whenever warranted (Aragon, 2002; Dodd, Garcia, Meccage, & Nelson, 1995; Tierney, 1995).

As a result, the classroom focus must shift from the instructor to the student (Bowman, 2003; HeavyRunner & DeCelles, 2002). A major technique to accomplish that is to make sure students are actively involved in the learning process (Aragon, 2002; Tierney, 1995; Wilson, 1998), which can best be achieved through collaborative group activities (Aragon, 2002; Carnegie Foundation, 1999; Cole & Denzine, 2002; Gilbert, 2000; Reyhner & Dodd, 1995; Tierney, 1995) and experimental and experiential learning (Bowman, 2003; Tierney, 1995; Wilson, 1998). Students like a certain degree of freedom to learn by trial and error at their own pace, and instructors must therefore include students in the decision-making process of what will be learned and at which pace, allow students self-direction in how they move through the steps of learning, and give students the opportunity to show mastery on their own terms, not just through pre-determined assessment activities (Aragon, 2002; James, 1992). Such independence, James (1992) claimed, shows students that instructors are sensitive to their needs and also protects them from the greatest embarrassment they could possibly suffer, failure in front of their peers.

Gilbert (2000) suggested that instructors do the following to improve student learning:

1. Offer opportunities for reflection so students may develop a better understanding of their learning styles;
2. Discuss the same material repeatedly, which leads to better understanding and retention;
3. Incorporate collaborative assignments because students can learn at their own pace and understand material better by helping others;
4. Show students that completing a task is a process with a different set of skills required at each step of the process; and
5. Teach critical thinking skills and lead students to independent and creative problem solutions.

Pewewardy (2005) extended these recommendations further. Lamenting that despite all the research on teaching American Indian students, misconceptions among instructors remained persistent, he argued that rather than continuing to tinker with change and with instructors' perceptions, a radical shift was needed: "Indigenous Peoples' culture anchors them to reality and it must be the starting point for all learning" [sic] (p. 151). As a result, an effective teacher, according to

Pewewardy, is someone who uses the students' cultural context as examples; accepts tribal cultural mores; develops personal relationships with students, their families, and community members; and prepares students for a world in which their culture is not the norm and is not respected. With regard to technology, Pewewardy (2001) observed that learning it and using it in Native communities could only be accomplished if it were integrated with the American Indian worldview.

Pewewardy (2001, 2005) was not alone in this assessment. Deloria & Wildcat (2001), Dyck (2001), James (2001b), and Thomas (2001) all seconded Pewewardy's idea that education and community be integrated, that all instruction emphasize the connection to the community, and that a mechanism be created to entice graduates to return to their communities. Education was not to imbue individuals with knowledge and skills that give them an advantage over others but to shape them to become contributing members of their communities. Knowledge acquisition is never a virtue in itself but becomes beneficial only in the context of how it can help others.

Thus, if American Indian students are to persist in educational programs, their knowledge and ways of finding knowledge must be respected. Not minor changes in teaching methods and instructional design but a major epistemological shift on the part of instructors will be needed, a shift that accepts indigenous knowledge as equal and puts the community, not the individual, at the center of all learning. However, James (2001b) still called for a cautious approach. He deplored Pewewardy's (2001) suggestion to focus entirely on Native traditions and to set aside Western ideas and methods. He saw the idea as meritorious but not yet ready to be fully implemented; a possible third way to him was more promising to him than going from one extreme to the other.

Research Questions

The current study collected data on the following questions:

1. What are the perceptions that some American Indian students enrolled in sub-baccalaureate programs at a mainstream technical college have of their experiences with their instructors that facilitate their learning and encourage them to persist in their studies and complete their degrees?
2. Which themes emerge from students' interpretations of their experiences in class that may lead to more effective instruction for American Indian students?

Research Methodology and Setting

Individual, structured qualitative interviews were conducted with 17 American Indian students who were in their final semester before graduation at the South Central Institute of Technology. The purpose of this study was to fill a knowledge gap in the research and go beyond current findings to look for new evidence in the study of American Indian student success factors that could be drawn from student perceptions. After having attended a college for several semesters, graduating students were seen as more likely than freshmen to have reflected on their experiences, especially on which ones had helped them persist, and to be able to point out situations where instructors had been helpful.

The South Central Institute of Technology (SCIT) is a sub-baccalaureate technical institution in eastern Oklahoma that offers predominantly Associate of Applied Science degrees in areas such as automotive technology, construction technology, heavy equipment technology, air conditioning technology, engineering technologies, information technologies, health and environmental technologies, precision agriculture, visual communications, and culinary arts. Total student enrollment at SCIT was 2,403 for Spring 2007. Of these students, 62% were male and 38% female. 95.5% of students were from Oklahoma, 5.4% from 20 other states, and 0.1% from foreign countries. The ethnic composition of the student body was 65.8% white, 23.9% American Indian, 5.1% African American, 3% Hispanic, 0.7% Asian, and 1.5% unknown. All ethnic classification is based on student self-identification. The average student age was 24.3 years (23.6 male, 25.5 female). The average composite ACT score for new students was 18.7.

The following reasons led to SCIT's being chosen as the site for this research:

1. SCIT's average Associate's Degree graduation rate for American Indian students of 33.8% for the 1996 to 2003 student cohorts as compared to the reported nationwide rate of 6.2% (Bailey, Jenkins, & Leinbach, 2005).
2. The commitment made by SCIT in its strategic plan that the graduation rate of minority students groups will be doubled by 2012; that partnerships with Indian tribes will be expanded; and that the institution will make changes in curriculum and professional development to increase the cultural competence of all faculty, staff, and students (South Central Institute of Technology, 2007).
3. Statements by West (1988), Tierney (1995), and Tippeconnic (2000) about the potential benefits of technical education for tribal development and student motivation and retention.

Based on statements in the literature that learning about the experiences of American Indian students may lead to new findings on success factors and retention strategies (Deloria &

Wildcat, 2001; Huffman, Sill, & Brokenleg, 1986; Huffmann, 2001, 2003; Jackson & Smith, 2001), the purpose of these interviews was to elicit student perceptions, and such information is best collected through qualitative interviews as described by Rubin and Rubin (1995): "We are trying to find in detail how the conversational partners understand what they have seen, heard, or experienced" (p. 40).

Therefore, the decision to conduct a qualitative study in the first place and to take an interactionist perspective to see how student persistence was linked to their interaction with their instructors is the result of previous research findings and suggestions about the capacity inherent in qualitative research. Several studies had mentioned that there was a need for qualitative approaches to researching American Indian student retention. Jackson and Smith (2001) asserted that quantitative instruments and surveys are limited in the number of paradigms that can be used to frame a study, and Haig-Brown and Archibald (1996) even called for a rejection of positivist frameworks and empirical methods because research involving human subjects from different backgrounds and with different experiences than those of the researcher requires face-to-face interaction. A decade earlier, Huffman, Sill, and Brokenleg (1986) had already proposed that researching students' subjective experiences may reveal information on student retention that quantitative studies had missed, but Vaala (1993) and Wentzlaff and Brewer (1996) reported that little such research has occurred.

As a result, several authors recommended that the experiences of American Indian college students be explored in more depth (Deloria & Wildcat, 2001; Huffman, 2001, 2003; Jackson & Smith, 2001), and Huffman (2003) and Jackson and Smith (2001) called for qualitative interview studies that were designed to explore the experiences of students as they related to their being American Indian in a mainstream college environment. Huffman (2003) also reaffirmed his earlier prediction that the personal experiences of students would yield crucial information about how students' perceptions and experiences on campus and in class are tied to their cultural background.

All questions asked for personal impressions, not for what participants considered to be true, and the focus of several questions was the relationship of participants with their instructors. The importance of such relationships for American Indian students has been stressed repeatedly in the literature (see above). Other questions addressed instructor helpfulness, instructional methods, and testing. Questions were based on success factors mentioned in the literature and written to be open-ended to elicit more than a yes/no response.

Based on the definition given by Rossman and Rallis (2004), all interviews were standardized, meaning that all participants were asked the same set of questions. A tree-and-branch model (Rubin & Rubin, 1995) was used to allow the researcher to formulate questions for the specific branches of the tree he wished to explore without taking away his opportunity to follow up on answers and explore new branches as they came up during the interview. All interviews were recorded and transcribed in a slightly-edited format according to Powers (2005), meaning that everything was transcribed verbatim (including pauses, sounds, etc.), but standard spelling and punctuation were used. Each participant signed an informed consent form before the start of the interview. The interviewer was a faculty member at SCIT at the time of the interviews, but none of the participants were his current students, and since they were all graduating, none would be his future students.

Findings

Participant comments reflected the role instructors play in student success. Participants stated that they had learned something every day and that they had done better and learned more at SCIT than at institutions previously attended, including four-year colleges: "I've done better here or learned more here than anywhere else." The two major themes can be divided into instructor attitudes as well as teaching and learning. A positive instructor attitude for participants meant that their instructors were enthusiastic, encouraging, available for questions, focused on student need at all times, willing to help when needed, and willing to establish more than a classroom relationship with their students. As for teaching and learning, participants enjoyed collaborative work, limited self-direction, hands-on learning, step-by-step instructions, individual attention from their instructors when they were struggling, and instructors with an industry background who were well organized in class.

By far, the most vital contribution to student success appeared to be instructor attitude, mentioned by all participants. On several occasions, they spoke about the need for instructor enthusiasm, for showing clear signs that instructors enjoyed their field and enjoyed teaching the material to novices: "[It helped me that instructors were] also having a good time doing it, actually wanted to be there instead of just kind of teaching on the board and leaving." What is important to realize here is that possessing such an attitude is not sufficient in itself; instructors must also exhibit incontrovertible evidence of enthusiasm.

One indication of enthusiasm was being encouraging. Participants wanted their instructors to project a positive attitude, meaning that they told students to persist, reassured them that they could master the material, supported student ideas for projects, and were complimentary any time someone did well in class.

The second proof of enthusiasm was being available. Participants appreciated it when instructors were actually present for their office hours: "They're always there at their office hours when they say they were going to be there." However, even more important was a willingness to go above and beyond the required. Participants were grateful for instructors who were willing to stay behind after class to answer questions, who spent time outside their posted office hours to help students, and who always put student needs first, even it is was inconvenient or time-consuming for the instructor at that point: "Every time I had a question or wanted him to help me with this problem, he was willing to do it." Participants needed to know and personally experience that their instructors' focus was on them.

A corollary to student focus was a desire to have one's own insecurities and life circumstances acknowledged and respected. Participants appreciated instructors who learned student names quickly, who were proactive about continually informing students about their progress and requirements to earn a certain grade, and who showed flexibility when students had personal or family emergencies: "I feel like I'm not a typical student fresh out of high school. I do have a life outside of this place that's very important." Even if such actions on the part of instructors seemed redundant (such as repeating requirements already listed in the syllabus) or disruptive to course progress, they nonetheless indicated that instructors focused on what their students needed at that time, not what the course schedule demanded.

Finally, a willingness to help was mentioned a number of times. This success factor was stated very precisely by students—although they certainly appreciated any help, it was equally important that instructors did so willingly and gladly.

Instructors were exhorted to keep in mind that helping students was part of their job, and two behaviors favored by students were proactive help without having to be asked and tutoring outside of class to catch up those students who had fallen behind. One behavior that fascinated several participants was a willingness of instructors to help even those students not currently enrolled in their classes. One participant stated that receiving this help made her feel welcome and at home.

This last comment segues nicely into the next facet of instructor attitude, and that is a willingness to establish more than a classroom relationship with students: "[I] never had instructors that were that personable." Participants mentioned several times that being friendly and warm made instructors more approachable and students more likely to ask questions when they had not understood something. To a number of participants, knowing their instructors on a personal level and making a personal connection were important, especially because it made the other person appear more supportive: "If I needed something, I would not feel funny going to ask them for something." Examples of personal relationships were joking with students, chatting about non-class topics after class, and acknowledging students and talking with them when walking across campus. One participant even mentioned that his instructor invited him to play golf on occasion, which he gladly took advantage of.

Participants thus made a clear connection between having a personal relationship with their instructors and perceiving them as willing to help. Again, no matter how supportive and helpful instructors were, if they did not strive to develop a warm, caring relationship with students at the same time, students were less likely to ask questions, less likely to make any question asked specific, and less likely to approach the instructor with comments or concerns.

Another way for students to feel part of a community was through approaches to learning, and one of those approaches was collaborative work. Participants found study groups outside of class very popular, as they did working with and learning from classmates in class. They considered such experiences to be beneficial, and they also enjoyed the community and fellowship that collaborative work created: "The biggest thing for me that really helped me [was] when we do our group activities." At the same time, they were less enthused about graded group projects. Despite the upsides of collaboration, participants were sufficiently focused on their grades that the risk of having an irresponsible or neglectful group member lower everyone's grade was enough to make them leery of group projects.

What participants did enjoy, on the other hand, was collaboration in self-directed, hands-on learning. Both were desirable whereas only limited tolerance existed for experimental or experiential learning. A strong preference was expressed for step-by-step instructions. Participants wanted self-direction, but they did not like to be thrown into a problem-solving experience without detailed instructions and a safety net: "I liked it better whenever they went over it first and then give us some time for it to soak in, and then we got to get out there." After the instructor had introduced the work in detail and had explained what was to be learned, students were willing to learn by themselves and to solve problems on their own, but only if the instructor remained in the background and was ready to help out in a proactive fashion: "You learn as you go, but if you get stuck, the instructor will help us out just to get past that point, but then we're on our own again. For me, that's the best way to do it." There was no desire to work completely independently.

At the same time, the active involvement in learning that self-direction affords was important for participants, and as a result, lab courses or lab components of other courses received favorable comments. They liked interaction in class, meaning that they wanted the instructor to ask questions, listen to students' ideas, and give students an opportunity to be involved without letting them become frustrated with new material. Participants explained that lab courses and self-direction afforded them the opportunity to learn according to their personal styles.

The one comment that was made most often was a desire for "hands-on" learning. This was, after all, technical education, and many participants chose their fields because they could work with their hands. Having the opportunity to actually try things themselves and to work with equipment helped them meet their learning goals: "I learn best [when] I actually do something than just seeing or hearing it from somebody." To accomplish these goals, they also preferred demonstrations to explanations. If a process was shown instead of explained, participants felt that they had a better understanding of which skills were needed to accomplish a task and what the learning outcome would be: "Once they start doing it and show me how to do the stuff, I pick it up pretty easy." These demonstrations, too, needed to be conducted in step-by-step fashion.

In conjunction with the desire for hands-on learning, participants realized that sometimes explanations would be necessary, but they wanted these to be given in simple terms. It was important that complex technical information be simplified so that beginners could understand, that material be repeated several times if needed, and that instructors not move on until everyone had understood. If participants had to ask for help, they preferred that it be given in one-on-one settings. One could say that participants craved individual attention from their instructors, which is supported by their earlier statements about needing to develop a personal relationship to do well in class: "You need that one-on-one attention to be able to ask your question to be shown what you're not understanding." Participants stated that individual attention allowed them to ask questions unique to their learning problems and allowed instructors to tailor explanations to their needs and learning styles.

Two more conditions of effective teaching were mentioned. Participants needed instructors to be well organized. This meant coming to class prepared, having a lesson and semester plan, and not making any sudden changes to the curriculum or to due dates. Participants could learn best if they knew ahead of time what was expected of them and what they would have to do.

Finally, there is instructor background. Although not directly a teaching issue, several participants stated that industry experience was helpful for instructors and that students were more willing to learn if the instructor had worked in industry. Although it was mentioned that some instructors with industry background had trouble simplifying content enough, participants prized industry experience because they could learn real-world tricks and tips, instructors could illustrate content with examples from their experience, and instructors could function as a liaison to potential employers. It should be emphasized, though, that industry experience was valued not for how it might help the instructor be a better teacher but how the instructor's experience could give the students an advantage upon entering the workforce: "That's what you need. Somebody that's been there, come back, and is teaching your class. I mean, you can't get it any better than that."

Discussion

An overall assessment of participant responses reveals a pronounced desire for a modified pragmatic approach to teaching on the part of instructors. To review, educational pragmatism advocates a learner-centered approach that includes interests and experiences of students while offering them opportunities for active learning. Pragmatism tries to use experimental learning to develop problem-solving and teamwork skills, and the instructor's role is that of a facilitator helping students to integrate previous and new knowledge and experiences (Elias & Merriam, 2005). Many of these ideas were expressed by the participants, but there was a clear subtext of needing ongoing support and structure.

Implications for Instructors

The first implication for faculty members is to not only be prepared but also show preparedness. This can be accomplished through having detailed lesson plans, organizing materials needed for class, and showing preparedness in class by having everything ready and not fumbling through notes or handouts. Instructors must preview each day's lesson by telling students what the learning outcome for the day is and which skills will be used to reach it, making sure that all assignments come with detailed instructions, and following the plan announced at the beginning of class. Neither last-minute changes to schedules or test dates nor unannounced activities or exams are appreciated. Instructors might also benefit from preparing their lecture notes with several different ways of explaining the same content and using these alternate ways as needed. Further, they also need to break down new material into chunks that are as small as possible.

In addition to showing preparedness, it is equally important that instructors show enthusiasm for their chosen profession. Participants provided concrete examples of what that meant for them. They wanted instructors to be encouraging and reassuring, telling students frequently that they can handle the learning and that instructors are there to help them. Instructors must be available before, during, and after class and office hours because students pay keen attention to whether or not instructors follow through on their claims of helpfulness. Many students are reluctant to ask for help, so instructors must keep an eye on their classroom or lab and approach any student who appears to be struggling. This willingness to help is always appreciated. Finally, students need to experience that they are the center of their instructors' time on the job. That means simple things such as learning students' names quickly but also seeing students as individuals with their own life circumstances, not just a number in a crowd. In practical terms, participants wanted instructors to be understanding if they fall behind in their studies as a result of outside influences and to offer help and tutoring. Students' individual needs have to supersede the need of the class as a whole at any time.

Instructors should curtail lecture as much as possible. The preferred approach is to demonstrate a new skill in small steps and then let students try each step until they have had a chance to feel comfortable performing the task before moving on. Such a desire for hands-on learning among technical students is no surprise. According to one expert, up to 50% of secondary school students are kinesthetic learners while educational delivery is still about 80% auditory (University of Illinois Extension, 2008). Workers also tend to drift toward careers that favor their learning styles, and college students tend to choose programs of study for the same reason. Kinesthetic students often prefer technical education because of the opportunity to do something besides listen (Gray & Herr, 1998), hence the distaste for lectures and the preference for hands-on activities. Doing something instead of absorbing information seems to have a clear link to retention for some American Indian students.

Instructors must be patient, repeat new content as needed, and wait until everyone has understood before they move on. Students need the opportunity to explore new knowledge one step at a time; they become overwhelmed with multiple steps to be figured out simultaneously. Instructors must be available for one-on-one help as needed and, in fact, provide opportunities for personal attention; students crave this format, especially if they have questions or problems. Participants in this study requested time to let the new information integrate with the old before they would make an attempt at showing mastery. The implication for instructors is to emphasize the process and also to be responsive to the holistic learning style of American Indian students by always returning to the whole after each new step before proceeding.

The literature encouraged instructors to use more experimental and experiential learning (Bowman, 2003; Tierney, 1995; Wilson, 1998). Instructors could consider taking class time to have students work on small projects during which they can sit down with each student individually and offer assistance as needed, which supports student requests for self-directed, problem-solving, kinesthetic learning without letting them become frustrated when learning becomes challenging. Because of the use of equipment, technical courses tend to have a limited number of students, which can make it easier for instructors to let students work independently and give them one-on-one attention.

At the same time, while students practice, they should be allowed to collaborate on their skill development and training without having to worry about a grade. The literature strongly clamored for more group work and more collaborative learning (Aragon, 2002; Carnegie Foundation, 1999; Cole & Denzine, 2002; Gilbert, 2000; Reyhner & Dodd, 1995; Tierney, 1995). The implication for instructors thus would be to build more self-directed, collaborative assignments into their lesson plans. However, the lukewarm endorsement by the participants requires a degree of caution. First of all, simply putting a number of students together in groups is not collaboration. Group work can be effective if (1) it is carefully planned, structured, and supervised so that the intended outcomes are met, (2) students are prepared and trained for such interaction, or (3) students choose to collaborate on their own for their learning.

Last but not least, instructors should use their industry experience to their advantage. Dukepoo (2001) cautioned against just focusing on tips and immediate workplace application while neglecting foundational knowledge, but instructors can still inject real-world knowledge into their teaching when students can benefit. Participants stated clearly that they appreciated any type of learning that might give them an advantage once they apply for jobs.

Implications for Research

What do the findings and the suggestions for instructors mean for research? Several issues come to mind, especially with regard to the differences between participant responses and findings in the literature.

The first theme that was notably absent from participant comments was helping one's community. Not a single student mentioned his or her community as motivation to persist, despite the fact that community focus is frequently and repeatedly emphasized in the literature as a crucial element in American Indian student success (Deloria & Wildcat, 2001;

Dyck, 2001; James, 2001a, 2001b; Pewewardy, 2001, 2005; Thomas, 2001). If anything, participants tended to complain about skewed values in their communities and incompetence in their tribal administration, and the people they desired to support were their immediate nuclear families. Does this mean that community involvement as a tool for American Indian student retention is a fruitless pursuit? Not at all, but some qualifications may be in order. As most of the participants in this study did not grow up in traditional families and none in reservation environments, they may not possess the community focus that students from elsewhere bring with them. Research must remain broad enough to include all students from all different backgrounds and not focus on approaches for only those who hail from reservation communities as proposed by Mihesuah (2004). In fact, finding ways to reconnect already successful but culturally distant students with their communities may drive the retention rate even higher and may be worth further investigation.

The same as above holds true for any inclusion of Native culture into instructional content. Participants desired to learn more about their tribes and cultures in history and culture classes, but there was no urge to have Native themes included in technical classes. Again, several reasons must be investigated here. Are students disinterested because of where they are from or because they are little involved with their tribal cultures? Would adding Native themes even if not specifically requested help the retention rate even more, or is this idea useful in some programs of study or possibly at tribal colleges but not in technology? Does every American Indian student need the focus on tribal culture (this does not argue whether this focus may be desirable), or can some be successful without it? How should we define "success" when it comes to American Indian students in the first place?

Another factor is instructional methods. Although the literature once again supported culturally sensitive teaching methods, not a single participant complained about cultural insensitivity. Much of what happened in the classroom and what participants requested (demonstration, time to work on their own, further demonstration if needed, performance only after sufficient practice) very much resembles the five-step process of learning for American Indians mentioned earlier, but the question that poses itself now is if maybe this process is just something common to technical education. Does technical education pedagogy somehow correspond well to American Indian learning styles? Is the solution that what we need more of is simply good practice? What participants described about their classrooms and what they preferred simply sounded like good practice that might benefit anyone. Is this the key? Is technical education pedagogy more palatable to those students who fail in traditional instructional environments? Does technical education methodology hold some of the answers about the success of not only American Indian students but also many other students? Where is the distinction between good practice and American-Indian-specific teaching methods?

In addition, although the potential effectiveness of teamwork for American Indian students has been discussed in detail (Aragon, 2002; Carnegie Foundation, 1999; Cole & Denzine, 2002; Gilbert, 2000; Reyhner & Dodd, 1995; Tierney, 1995), further research will be needed to assess collaboration when it comes to retention and graduation rates. What exactly is the correlation between collaborative work and retention, and how do assignments have to be structured and facilitated so that students derive the most benefit? Participants enjoyed collaborative work, but only to a degree and as long as it did not directly influence their grades. Which type of collaboration exactly is desired by American Indian students and under which conditions? Participants talked about study groups, projects, and presentations, but those were often not graded efforts. Is there a difference when scores are at stake?

Finally, there is the issue of the philosophical underpinning of one's instruction. A number of authors (Alfred, 2004; Deloria & Wildcat, 2001; Grande, 2004; Mihesuah, 2004; Pewewardy, 2005; Wilson, 2004) have recommended that a critical philosophy with an emphasis on decolonization methodology be adopted to help American Indian students be successful, but what the participants in this study described very much echoed pragmatist educational ideals. Is pragmatism the overlooked approach in American Indian education? Without diminishing a need to engage in decolonization pedagogy to overcome harmful educational legacies, is this the right approach for everyone and every situation? Are educators painting themselves into a corner if they make decolonization the ultimate solution? Is it true that Native instructors who do not subscribe to decolonization "influence Native students in the wrong ways" (Mihesuah, 2004, p. 196)? How open should everyone remain to different philosophies, and in which learning contexts are certain philosophies most effective?

Summary

To which degree the success factors mentioned by participants are factors for American Indian students in particular or might apply to all technical students will have to be explored through further research. More research will also be needed to determine if good instructional practice in technical education is truly an ethnic or cultural issue. Will students from different cultural backgrounds require different instructional methods, or is there a core of good classroom practice that can help anyone be successful regardless of background? Technical education pedagogy appears to be well received by students who struggle in traditional mainstream classrooms. What exactly is the correlation between student background and instructional design and methods?

Instructors with American Indian students in any discipline might thus consider adopting some of the practices identified as success factors. Can instructors find more opportunities to demonstrate competencies or provide examples for students? Is there a way to organize some class periods as workshops where students work on their skills with help from their instructor as needed? Is there a possibility for collaboration among instructors from different departments to show students how the knowledge, skills, or attitudes they acquire in one course help them manage another, seemingly unrelated course better? Is it possible to take a pragmatist stance and allow some flexibility in course outcomes based on students' backgrounds and needs as long as certain competencies are met? Based on the responses from this study's participants, all these questions deserve some serious consideration if faculty members are truly dedicated to the success of their American Indian students.

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Integrating Engineering Design into Technology Education: Georgia's Perspective

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Abstract

This descriptive research study reported on Georgia's secondary level (grades 6-12) technology education programs capability to incorporate engineering concepts and/or engineering design into their curriculum. Participants were middle school and high school teachers in the state of Georgia who currently teach technology education. Participants completed a Likert-type online-survey which reported on technology education teacher's (a) current instructional practices to teach engineering-based instruction, (b) curricular value placed on engineering-based instruction, and (c) instructional needs to teach engineering-based topics. General demographic information was collected from all participants. The results from the study aided in informing the educational community on the perspective of the values, needs, and

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instructional practices associated with an engineering design focus for technology education. A summary of the five main recommendations are reported.

Introduction

The nation's secondary level technology education teachers are experiencing a shift in curriculum focus. Pundits have lobbied for engineering design as a focus for the curriculum (Wicklein, 2006) and according to recent research teacher's attitudes are becoming more favorable to the need and value of an engineering-based curriculum for technology education (Rogers, 2005). As of 2004, over 1000 of the nation's technology education departments were including pre-engineering education in their respective programs (Rogers & Rogers, 2005). In a study conducted by Gattie and Wicklein (2007), it was determined that the overwhelming majority (93%) of technology teachers surveyed felt that engineering design was an appropriate focus for technology education.

The receptiveness of technology educators to turn to engineering as a curricular focus does come with several caveats. Gattie and Wicklein's (2007) study revealed that many teachers have substantial needs related to (a) identifying appropriate textbooks (89.7%), (b) developing engineering fundamentals for instruction (91%), and (c) inclusion of analytical predictive analysis rigor for students (86.7%) as they work to make engineering a more significant focus of technology education. In response to the increased interest in engineering as a curricular focus for technology education, Georgia's Department of Education developed an advisory committee on engineering and technology education. The goal of the committee was to determine if engineering design should become the academic focus of Technology Education in

Georgia (Advisory Committee on Engineering and Technology Education in Georgia, 2007). This study was the investigative research sanctioned by the Georgia Department of Education to evaluate a variety of issues and concerns that are impacting the capability of technology teachers in Georgia to teach engineering related topics within the state's technology education curriculum.

Purpose of Study

The purpose of this study was to report on the current status of Georgia's technology education programs inclusion of engineering design into their current curriculum. Engineering design was defined as the following:

> Engineering design demands critical thinking, the application of technical knowledge, creativity, and an appreciation of the effects of a design on society and the environment (ITEA, 2000). The engineering design process centers around four (4) representations used to describe technological problems or solutions: (1) Semantic – verbal or textual explanation of the problem, (2) Graphical – technical drawing of an object, (3) Analytical – mathematical equations utilized in predicting solutions to technological problems, (4) Physical – constructing technological artifacts or physical models for testing and analyzing (Ullman, 2003).

This study was statewide in scope and sought to collect data with regard to four primary criteria: (1) current instructional practices to teach engineering-based instruction, (2) curricular value placed on engineering-based instruction, (3) instructional needs to teach engineering-based topics, and (4) demographic make-up of middle school (MS) and high school (HS) technology education teachers in Georgia. The objective of the study was to determine the most significant issues faced by the state's technology education teachers regarding the inclusion of engineering concepts and design. The following research questions guided the study:

1. What is the demographic breakdown of Georgia's middle school and high school technology education teachers?
2. What are the current instructional practices of Georgia's middle school and high school technology education teachers with regard to teaching engineering-based topics?
3. What is the value of engineering design for technology education programs held by Georgia's middle school and high school technology education teachers ?
4. What are the instructional needs of Georgia's middle school and high school technology education teachers related to teaching engineering design?

Benefits

The results from the study aided in informing the Georgia Department of Education, technology education teachers, and the learning community within the state of Georgia on technology teacher's perspective of the curricular values, instructional needs, and instructional practices associated with teaching an engineering design focused currciculum. The results of the study are important to the field of technology education and will help provide valuable insight into the improvement of technology education by presenting an example of one state's current status of engineering design and that respective state's plan of action to implement necessary changes. By evaluating the subsequent needs and value that technology education teachers hold in regard to an engineering design focus in Georgia, Georgia's Department of Education can make informed decisions when designing professional development and engineering focused pathways and curriculum.

Methodology

This study was descriptive in design with clearly defined independent and dependent variables. Descriptive research studies inquire about the nature, frequency, or distribution of variables and /or relationships among variables. According to Ary, Jacobs, & Razavieh (1990), descriptive studies make no attempt to manipulate variables but serve to provide descriptions of variables and/or the relationships among these variables. A descriptive study seeks to describe a construct the way it is as it naturally occurs (Huck, Cormier, & Bounds, 1974). Descriptive studies can help educators understand frequent curriculum implementation problems and other issues in current teaching practices (Gersten, n.d.).

Descriptive statistics was the primary source of data collected in this study. The independent variables for the proposed study included demographic criteria for Georgia's middle school and high school technology education teachers including (a) years of experience, (b) grade level at which they teach, (c) gender, (d) age, (e) college degree attained, and (f) college major. The dependent variables were perspectives held by Georgia's secondary level technology education teachers for the curricular values, instructional needs, and instructional practices associated with teaching an engineering design focus for the field of technology.

Participants

For the purpose of this study, the researchers intended to survey all middle school and high school technology education teachers in the state of Georgia as identified by the

State of Georgia's educational database. A census approach to sampling is very effective for small populations and eliminates sampling error while attempting to provide data on all individuals in a population. In the case of small populations, it is recommended that researchers sample the entire population in order to achieve desireable results (Israel, 1992). Permission to utilize Georgia's database was granted by the Georgia Department of Education under the authority of the Freedom of Information Act. The total population for middle school and high school teachers teaching technology education in the state of Georgia was 605 (Georgia Department of Education, 2007). From this population the researchers collected data from 252 teachers of which 214 was usable data. According to the survey results, 38 teachers started the survey and did not complete it for one reason or another. The study was able to collect data from 35% of the total population of technology education teachers in the state of Georgia.

An e-mail cover letter was meticulously developed to include a statement of confidentiality, a description of the sudy, statement of rationale for partipant's assistance, purpose of the study, and its relevance to the field of technology education. University of Georgia's Internal Review Board (IRB) procedures were carefully followed when drafting the initial letter of solicitation for participants. Initial letters of participation were e-mailed to all respective technology education teachers in Georgia, followed by a follow-up letter which was e-mailed out 2-weeks after the initial e-mail message was sent. This follow-up procedure is commonly endorsed by expert educational researchers when attempting to solicit participation from non-responders (Gall, Gall & Borg, 2007).

Survey Instrument

The researchers designed and developed a survey instrument to primarily collect quantitative data with additional items that collected narrative qualitative data. The survey was developed using standard instrument protocol culminating in content validation prior to sending the survey out for data collection. A 4-point Likert-type scale was used primarily to ascertain the perspectives of participating teachers where 4 = Extremely Satisfied, 3 = Satisfied, 2 = Dissatisfied, and 1= Extremely Dissatisfied. The survey utilized a web-based format where teachers accessed the instrument on-line and data was collected using an electronic data retrieval system. The service of Hosted Survey Company was used to construct, house, and maintain the on-line survey website where participants were prompted to complete the survey. The proposed survey instrument built upon the existing instrument utilized in the Gattie & Wicklein (2007) study. Content and construct validity were established through face validity verification performed by the Advisory Committee. Committee members were instructed to identify any items that were deemed confusing and those not addressing the intended construct. Moreover, the newly developed instrument reflected revisions suggested by the Georgia Advisory Committee on Engineering and Technology Education (2007).

Participants were prompted from an initial e-mail on August 15, 2007 to log-on and complete the survey. The e-mail message included instructions for completing the survey, as well as a specified deadline for returning the survey. Follow-up communications were sent to non-responders requesting their completion of the survey. After answering all questions on the survey, the participants electronically submitted their completed survey for computation and analysis. A follow-up e-mail was sent on August 29, 2007 to all non-responders. On September 15, 2007, data collection ceased and data files were developed based on returned survey results.

Data Analysis

Non-parametric data analysis was used to compare the varying levels of instructional practices and instructional needs with specific demographic data. Data was recorded and analyzed using SPSS (Statistical Package for the Social Services). Descriptive statistics were computed including mean, median, and standard deviation to describe group results. Specific qualitative data was reviewed, organized, and reported based on major themes that emerged from the research. Final reporting of data reflected the suggestions of the advisory committee to include a statistical breakdown of high school and middle school technology education teachers in the state of Georgia.

Findings

Personal Demographic

The total population for middle school and high school teachers teaching technology education in the state of Georgia was identified at 605 by Georgia Department of Education (Barker, personal communcation, Septemer 26, 2007). From this population, the researchers collected data from 252 teachers of which 214 was usable data (n = 214). According to the results of the survey, 38 teachers dropped out of the survey without completing the questionnaire. More than 28% of all technology teachers participating in the survey from Georgia were female (see Table 1). This is a promising statistic for an under represented population when one considers the national average is about 18% for female technology educators (Gattie & Wicklein, 2007). With 65% of the teachers with 15 years or less experience in the field, the study reveals a relatively young demographic of technology educators in the state of Georgia (see Table 2).

Table 1. Gender of Georgia's Technology Educators

Answer	Quantity	% of Total
Male	152	71.02%
Female	62	28.97%
Total	214	100.00%

Table 2. Years Experience Teaching Technology Education as of August 2007

Answer	Quantity	% of Total
Less than 1 year	16	7.47%
1-5 years	39	18.22%
6-10 years	51	23.83%
11-15 years	32	14.95%
16-20 years	24	11.22%
21-25 years	22	10.28%
26+ years	30	14.01%
Total	214	100.00%

Status of Engineering Design in Georgia's Classrooms

In comparison to a national survey (Gattie and Wicklein, 2007) which reported that 90% of technology educators in the country believed that they were currently teaching engineering design, a lower response of 76% of technology education teachers in Georgia reported that they were currently teaching content related to engineering and/or engineering design. These findings clearly represent a shift in the focus of many of the state's technology curriculums. However, only 37% of all teachers surveyed in the state of Georgia were aware of any engineering-based curriculum. This begs the question; if teachers are teaching engineering content and principles in their classroom, what curriculum and materials are they using? Table 3 represents the breakdown of high school and middle school technology teachers in the state of Georgia who identified that they do currently teach topics/courses related to engineering or engineering design. Table 4 provides a statistical breakdown of technology teacher's awareness of any local or state approved course(s) or curriculum that has a focus on engineering or engineering design.

Table 3. Do you currently teach topics/courses related to engineering or engineering design?

Answer	Quantity	% of Total
Yes	93 HS/ 78 MS = 171	80.00%
No	14 HS/ 29 MS = 43	20.00%
Total	214	100.00%

* Note HS= high school teachers, MS=middle school teachers

Table 4. Are you aware of any local or state approved course(s) or curriculum that has a focus on engineering or engineering design?

Answer	Quantity	% of Total
Yes	63HS/ 16MS = 79	36.92%
No	67HS/ 68MS = 135	63.08%
Total	214	100.00%

Needs of Technology Teachers in Georgia

In assessing the needs of middle school and high school technology teachers in Georgia regarding the teaching of engineering design content, the study revealed that 88% of the teachers surveyed identified needs in the area of integrating the appropriate levels of mathematics and science into the instructional content (See Table 10). Table 5 provides a breakdown of the instructional needs identified by the Georgia teachers.

Table 5. My instructional needs to teach engineering design include:

Instructional Need	Mean	SD
integrating the appropriate levels of mathematics and science into the instructional content	3.07	1.036
having the appropriate types of tools and test equipment to teach engineering design	3.20	1.122
identifying appropriate instructional content	2.99	1.077
having the appropriate type of laboratory layout and space to teach engineering design	3.15	1.122
developing additional analytical (math) skills to be able to predict engineering results	3.01	1.085

Administrative Support for Engineering Design Based Curriculums

The study determined that approximately 93% of technology teachers surveyed felt there were no administrative (local or state) constraints to limit/exclude engineering design content in their curriculum. Table 6 provides a summary of perceived constraints and/or limitations to implement an engineering designed based curriculum for secondary level technology teachers. Budgetary restrictions were not identified as an overwhelming hindrance in relation to the inclusion of engineering or engineering design content in the technology curriculums. The survey revealed that 42% of technology teachers in Georgia believed that they were under budgetary restrictions while 55% of the teachers felt that there were no budgetary restrictions that would limit the inclusion of engineering content into the technology education curriculum. Table 7 provides a statistical breakdown of the teacher's perceived budgetary restrictions.

Table 6. Are you under any administrative (local or state) constraints to limit/exclude engineering or engineering design instructional content in your technology education curriculum?

Answer	Quantity	% of Total
Yes	12HS/ 4MS = 16	7.48%
No	118HS/ 80MS = 198	92.52%
Total	214	100.00%

Table 7. Are you under any budgetary restrictions that limit/exclude engineering or engineering design instructional content in your technology education curriculum?

Answer	Quantity	% of Total
Yes	52HS/ 37MS = 89	41.59%
No	73HS/ 45MS = 118	55.14%
Other	5HS/ 2MS = 7	3.27%

Answered	214	100.00%

Value of an Engineering Design Curriculum

In calculating group mean scores, collected data was collapsed using the category Value of an Engineering Design Curriculum revealing that teachers indicated that infusing engineering design into curriculum would elevate the status of their program, the profession, and standing among faculty while providing a platform for math and science integration (Group Mean 2.97, Group SD 1.08). Table 8 provides a statistical breakdown of the participants' responses to the Value of an Engineering Design Curriculum listing the mean and standard deviation for each portion of the stem. According to the data, the only value that did not produce a mean score approaching 3 on a 4-point Likert-type scale was the stem; elevate the technology teacher as a more valued member of the faculty. In reporting this data, the Georgia Advisory Committee on Engineering and Technology Education (2007) suggested that the low score on this particular stem can be attributed to an already high value that technology educators feel they have among faculty; however, this is an unproven theory. With that being said, the survey does seems to suggest to researchers that technology teachers in Georgia believe that an engineering design focused curriculum would elevate their program beyond its current status and that there is autonomy within their curriculum to facilitate such a shift in paradigm without many administrative constraints.

Table 8. An engineering design curriculum would:

Curricula Value	Mean	SD
elevate technology education to higher academic levels	3.10	1.06
elevate the technology teacher as a more valued member of the faculty	2.75	1.21
increase student interest and appreciation for mathematics and science	2.93	1.10
provide a platform for integration with other school subjects	3.03	0.99
elevate technology education to higher academic levels	3.09	1.06

Discussion

Teachers in the state of Georgia are becoming more favorable to a focused engineering-design based curriculum as evident by the study which revealed that 70% (see Table 9) of the teachers believed that infusing engineering design into technology education curriculum would elevate the status of their program, the profession, and standing among faculty while providing a platform for mathematics and science integration (Group Mean 2.97, Group SD 1.08). Teachers in the state of Georgia indicated that they are currently teaching engineering related content in their classrooms with 76% of teachers surveyed identifying that they are already teaching content related to engineering and/or engineering design. However, many Georgia technology teachers indicated they were having problems locating appropriate engineering-based curriculum material with 63% of teachers in the state of Georgia reporting that they are unaware of any engineering-based curriculum. This lack of awareness is important to consider when creating professional development workshops designed to produce curriculum material. In regards to professional development, teachers identified that there is need for instruction in the area of subject integration with 88% of the teachers surveyed revealing their need to locate appropriate levels of mathematics and science into the instructional content (see Table 10). In relation to administrative support, 93% of teachers felt there were no administrative (local or state) constraints to limit/exclude engineering instructional content in their curriculum.

Table 9. An engineering design curriculum would:

elevate the technology teacher as a more valued member of the faculty

Answer	Quantity	% of Total	Mean	SD
No Opinion	11HS/ 1MS=12	10.28%	2.75	1.21
Strongly Disagree	4HS/ MS=8	3.74%		
Disagree	23HS/ 11MS=34	15.89%		
Agree	47HS/ 40MS=87	40.65%*		
Strongly Agree	45HS/ 18MS=63	29.44%*		
Answered	214	100.00%		

* 70% of participants Agree or Strongly Agree

Table 10. My instructional needs to teach engineering design include:

integrating the appropriate levels of mathematics and science into the instructional content				
Answer	Quantity	% of Total	Mean	SD
No Opinion	7HS/ 9MS=16	7.48%	3.07	1.04
Strongly Disagree	0HS/ 1MS=1	0.47%		
Disagree	5HS/ MS=8	3.74%		
Agree	66HS/ 49MS=115	53.74%*		
Strongly Agree	52HS/ 22MS=74	34.58%*		
Answered	214	100.00%		

* 88% of participants Agree of Strongly Agree

Lack of proper training, resources, and curriculum awareness has seemingly precluded technology educators in the state of Georgia from infusing engineering design and content into their technology education curriculums. Professional development will help address many issues of curriculum awareness and consensus among technology teachers. However, a more concerted effort to develop technology teachers with the capacity to teach engineering design in their classroom while integrating math and science principles within their instructional content should be a key focus of professional development according to the research results.

The lack of appropriate text and materials coupled with limited awareness of adequate engineering focused curriculum by the teachers seems to suggest a lack of curriculum resources and professional development support for teachers in the state of Georgia. Statewide there seems to be support from administrators for infusing engineering-design into technology education curriculums; however, the engineering design initiative will have to come from technology educators at the local level to facilitate such a shift. The lack of consensus for a statewide curriculum endorsing the inclusion of engineering content seems culpable for the lack of curriculum awareness on the part of technology teachers.

Recommendations

Based on the findings from the research and other qualitative data collected, a list of recommendations was provided to the Georgia Department of Education. These recommendations were presented as a response to the growing challenges that have become inherent when attempting to infuse engineering education into Georgia's traditional technology education curriculum. The following recommendations are based on the findings from this research study.

1) State program specialists from Engineering and Technology Education and other Career, Technical and Agricultural Education (CTAE) program areas should review course content of all courses within current pathways and those in varying stages of development. This is a result of an overwhelming percent of the teachers who identified that they were

not aware of any state approved courses or curriculum with a focus on engineering design (see table 4).

2) Professional development opportunities for current Engineering and Technology Education instructors should be provided. This came as a result of eighty-eight percent of the teachers identifying instructional needs in the area of math and science in order to effectively integrate engineering design into their classrooms (see table 10).
3) Georgia State Department of Education staff (program specialists and personnel designated by CTAE state director) should work closely with Professional Standards Commission and teacher educator institution personnel to review certification issues related to Engineering and Technology Education. As recommended by the Advisory Committee, it was suggested that the Georgia State Department of Education work collaboratively with identified personnel in order to develop a plan of action that would allow for teachers to receive certification for the integration of Engineering into the curriculums.
4) Comprehensive marketing plans for Engineering and Technology Education should be developed. (Georgia Advisory Committee, 2007, pp. 10-11). As suggested by the Advisory Committee and based on data collected in addition to this study, it was recommended that a marketing plan be developed that would clearly articulate the purpose and merit of infusing Engineering Design into current Technology Education curriculum.

Moreover, it was recommended that the state of Georgia's Engineering and Technology Program specialist, with support of the state CTAE Director, convene a team (including instructors, university faculty and administrators) to design/plan and write the curriculum for all Engineering and Technology Education pathways and courses. This plan would include course descriptions, outlines, guides, and lesson plans for middle and high school as well as recommendations for lab facilities applicable for both middle and high school Engineering and Technology Education programs. Members of Georgia's advisory committee should carefully assess procedures utilized by previous state developed curriculum projects in order to retain effective procedures and to identify methods that were ineffective in the past. Budgets should be provided by State Department of Education, CTAE Division, for activities and stipends related to this task (Georgia Advisory Committee on Engineering and Technology Education in Georgia, 2007).

It is imperative to develop a plan of action to address concerns and challenges facing teacher practitioners when seeking to incorporate an engineering-designed focus into technology education programs. The research presented here is an example of using practice to inform research and in turn it is the hope of the researchers that these findings, results, and conclusions will further inform the practice of technology teachers. In closing, the results of this study will likely have its greatest impact upon future professional development endeavors designed and implemented by teachers and teacher educators as they continue to clearly identify specific teacher's needs in the area of infusing engineering design into technology education programs.

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JOB TASKS PERFORMED BY CAREER PREPARATION SYSTEM ADMINISTRATORS IN ONE MIDWESTERN STATE: IMPLICATIONS FOR LEADERSHIP DEVELOPMENT

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ABSTRACT

There is a need to prepare new leaders in Career and Technical Education due to retirements and because the job demands have changed over the years. In order to verify the curriculum for leadership development programs, a study was conducted to measure the importance and frequency of job tasks performed by Career Preparation System administrators in the state of Michigan. A mailed survey based on a previous Developing a Curriculum (DACUM) study generated a 72% response rate. The analysis illustrates the job priorities and time commitments of these leaders. Significant differences were observed in the perceptions among administrators from various types of organizations. A relationship between the frequency and importance of job tasks was also revealed. The results of the study support the need for structured leadership development programs for Career and Technical Education administrators.

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Introduction

This study examined the importance and frequency of job tasks performed by Career Preparation System (CPS) administrators by quantifying their perception of the duty areas based on previous Developing a Curriculum (DACUM) studies (Norton, 1977; Woloszyk & Manley, 2001). Shibles (1988), reporting for the American Association of Colleges of Teacher Education (AACTE) Subcommittee on the Preparation of School Administrators, indicated that school administrators will become rapidly outdated "if their preparation programs in colleges and departments of education do not respond to the calls for change in preparing them for professional leadership functions." (p. 1).

As the educational leader, the principal can establish an environment that is acceptable to change, or one that impedes the change initiative. According to Evans and Teddie (1993) many research studies point to the building principal as the most critical leadership determinant in educational change. Evans and Teddie noted that the building principals are the change facilitators. The role of the high school principal has expanded to include the responsibilities of designing, managing, and implementing curricular change efforts (Praisner, 2003). Due to their leadership role, principals' perceptions and attitudes about a new curriculum could either result in increased educational opportunities for students or in limited efforts to introduce curricular change (Praisner, 2003). When implementing curricular change, "a principal's leadership is seen as the key factor for success." (Praisner, p. 135).

From a national perspective, the problem of providing effective administrative skills in Career and Technical Education (CTE) is not new. Over a decade ago, Moss and

Liang (1990) reported that vocational education programs did not have the number of leaders that were urgently needed then nor was there a systematic effort to develop additional leaders. At the local level, few school systems have made it a priority to identify and groom potential leaders despite a wave of impending retirements and chronic difficulties in available candidates (Olson, 2000). This crisis in administrative development of CTE leaders is an issue at the local, state, and federal levels. Yet limited educational research has been done to determine the relevance of CTE leadership development programs. Sustainability can also be a problem: innovative programs are frequently started but then fail due to the lack of instructors and sufficient funding (Chenoweth, 2002; Hess, 2005; Jackson, 2001).

The purpose of this study was to investigate and determine the necessary components to develop and improve leadership development programs for CTE leaders. Today's CTE leaders should be prepared to handle a host of responsibilities and challenges such as academic integration and accountability emphasized in Perkins (Perkins, 2006). The 2006 Carl D. Perkins Act has been authorized for six years and is expected to allocate approximately 1.3 billion dollars in federal aid to CTE programs in all 50 states (ACTE, 2006). This legislation places greater accountability on integration of academic standards, which is aligned directly with the "No Child Left Behind" (NCLB) movement. Perkins IV is ultimately intended to strengthen the focus on responsiveness to the economy; while tightening up the accountability statement in regards to the integration of academics and technical standards. Current initiatives on CPS administrators' agendas include business and financial management, facilities and equipment management, integration of academic and CTE programs, instructional management, organizational improvement, personnel management, professional staff development, program planning, development and evaluation, recordkeeping, school-community relations, and student services (Western Michigan University, 2006).

Literature Review and Conceptual Framework for the Study

Shortage of CTE Administrators

The shortage of CTE administrators has been described as a complex, imminent, and far-reaching problem (Zirkle & Cotton, 2001). Administration has been and continues to be a topic within the realm of education for a number of years and controversy surrounds the ever-growing shortage of school administrators. Numerous studies have documented the nationwide shortage of public school administrators (Gilman & Lanman-Givens, 2001; Growe, Fontenot, & Montgomery, 2003; Lashway, 2003; Potter, 2001; Schults, 2001). Whether due to stress, increased workload, salary issues, or increased accountability, the recruitment and retention of qualified candidates for administrative positions continues to be a problem (McNeil & Wilmore, 1999). The purpose of the study was not to document the shortage but rather to validate a list of professional development skills needed by CPS administrators today and in the near future.

Needed Skills and Competencies for CTE Administrators

A number of definitions have been used to describe the responsibilities of CTE administrators. The functions of administration within a vocational setting included curriculum and program planning; management of instruction; student development services; personnel administration; fiscal and physical planning and management; building and constituency; and evaluation, accountability, and research (Wenrich & Wenrich, 1974). Bentley (1977) explained the different areas that vocational administrators should pay attention to for operating a successful vocational education program. According to Bentley, vocational administrators need to be able to

> organize an advisory committee, determine community needs, prepare facilities, purchase and install equipment, locate and obtain funding, prepare proposals, evaluate, recruit, and train vocational personnel, develop or select curriculum, establish rapport with teachers, develop budgets and fiscal management strategies, perform periodic program evaluation, and promote and update programs. (p. 96).

Baker and Selman (1985) cited Swanson, who defined CTE administration as follows.

> It is the process of planning, organizing and operating an educational activity for achieving the objective of the activity. There must be some organized manner for allocating the financial, material, and personnel resources which are available to an activity. There must be some method of developing policy, coordinating activities, and assessing the achievement of the use of these resources in relation to the goals of the activity. This process is administration. (p. 47).

Valentine (1979) clarified and determined the responsibilities for administrative tasks performed by local vocational education administrators in Colorado. The data were collected from local vocational school directors and their superintendents, as well as from two- and four-year postsecondary deans/directors of occupational education and their presidents. Valentine's results indicated that the key duties for vocational administrators included the following: "(a) business and financial management, (b) facilities and equipment, (c) program planning, development and evaluation, (c) instructional management, (d) student services, (e) personnel management, (f) community-school relations, (g) professional relations." (p. 152).

A study by Savio (1981) examined the competencies needed by local administrators of Michigan vocational education programs. Savio utilized the Administrators Inventory, an instrument developed by Norton (1977). This instrument was administered to 28 Michigan vocational administrators at the secondary, postsecondary, and career-education-planning district levels to verify the importance of 191 CTE administrative tasks, as well as to determine the level of training required for each task. The participants ranked evaluation of instructional programs effectiveness as the most important task of CTE administrators. Other highly rated task areas included professional relations and self-development, as well as business and financial management.

Finch and McGough (1991) reported that, for vocational administrators to be effective, they have to effectively perform administrative, supervisory, and leadership activities and responsibilities that are central to vocational education. The authors defined the roles of vocational education leaders from a three-dimensional standpoint: the human dimension, the environmental dimension, and the task dimension. Finch and McGough identified the four basic elements of the task dimension as planning, development, management, and evaluation.

In summary, several earlier studies based on leadership theory identified the duties and tasks, and therefore the skills and competencies needed, for vocational administrators. Those studies were used as the framework for the current research which sought to advance the current practice of vocational leadership. Table 1 shows a summary of the needed management skills and competencies for CPS or CTE administrators.

Table 1

Summary of Needed Management Skills and Competencies for CTE Administrators

Management Skill	Author/Researcher
Business & Financial Management	Bentley; Finch and McGough; Woloszyk and Manley; Savio; Valentine; Wenrich and Wenrich
Facilities & Equipment	Bentley Finch and McGough; Woloszyk and Manley, Savio; Wenrich and Wenrich
Instructional Management	Woloszyk and Manley; Savio; Valentine
Personnel Management	Bentley; Finch and McGough; Woloszyk and Manley; Valentine; Wenrich and Wenrich
Professional & Staff Development	Bentley; Finch and McGough; Woloszyk and Manley; Savio; Valentine
Program Planning, Development, & Evaluation	Baker and Selman; Bentley; Finch and McGough; Woloszyk and Manley; Savio; Valentine; Wenrich and Wenrich
School-Community Relations	Baker and Selman; Bentley; Woloszyk and Manley; Valentine

Student Services	Finch and McGough; Woloszyk and Manley Valentine; Wenrich and Wenrich
Organizational Management	Woloszyk and Manley
Integration of Academic and CTE Programs	Woloszyk and Manley
Recordkeeping	Woloszyk and Manley

Context of the Study

Based on the need for current administrators and the need to update the leadership development curriculum, the State of Michigan should prepare quality Career Preparation System (CPS) leaders with the ability to handle today's challenges and opportunities along with the flexibility to adapt to future directives. To organize this study of leadership development of local CPS administrators, the researcher utilized the findings of a DACUM panel developed by Woloszyk and Manley (2001), which examined the importance and frequency of job tasks performed by CPS administrators. From an analysis of job descriptions of current CPS administrators, the DACUM panel established 11 general duty areas: Business and Financial, Facilities and Equipment Management, Integration of Academic and CTE Programs; Instructional Management; Organizational Improvement; Personnel Management; Professional and Staff Development; Program Planning; Development and Evaluation; Recordkeeping; School-Community Relations, and Student Services (Woloszyk & Manley, 2001). These 11 duty areas were used as a framework for this study and the development of the survey instrument.

Research and Design

Research Questions

The purpose of this study was to investigate the importance and the frequency of job tasks performed by CPS administrators in the State of Michigan as a conceptual basis for leadership development programs. The study was comprised of questions derived from 11 duty areas by a DACUM study developed by Woloszyk and Manley (2001). The 11 duty areas were further divided into 51 specific job tasks. The DACUM process provided a framework for research design to identify what skills CPS administrators needed. The following research questions were formulated from the DACUM process outcomes:

1) What are the job titles, organization type, and years of experience of the CPS administrators?

2) What are the important job tasks and frequencies of those tasks identified and performed by CPS administrators?

3) Are there significant differences on the importance and frequency of job tasks between job categories?

4) Is there a significant relationship between administrators' number of years of experience and their perceptions of the importance and frequency of the job tasks they perform?

Population

The entire population of CPS administrators within the state of Michigan was invited to participate in the study, therefore representing a census of the population of interest rather than a sample. The Michigan Department of Career Development (MDCD) was contacted to obtain a current list of CPS administrators from the state of Michigan. The list contained 120 administrators from the 2002-2003 academic year. The list was divided into five distinct groupings or job categories. The first group consisted of all Area Center Director/Principal from the K-12 school systems. The second group consisted of all the CTE directors from local K-12 school systems including technical centers and K-12 consortiums. The third group consisted of all the occupational deans from Michigan community colleges. The fourth group consisted of all the shared-time CTE administrators from the K-12 system. The final group consisted of other CTE administrators (which includes one blank returned survey) (i.e., vice-president academic affairs, assistant principal and regional CTE administrator, career preparation coordinator, intermediate school district (ISD) administrator, ISD superintendent, assistant superintendent, assistant superintendent-CTE, regional administrator, regional/county ISD-CTE administrator). Shared-time and the "other" category were not defined in the original census. However, it should be noted that participants returned the survey with these additional job types. The census consisted of 120 (n = 120) CPS administrators.

Instrumentation

A nationwide instrument developed in 1977 by Norton et al. and modified in 1987 by Norton identified competencies needed by vocational administrators at both secondary and postsecondary institutions. This instrument, the Job Task Survey for CPS Administrators, came about as a result of the realization that the effective training of local administrators had been disadvantaged by the limited knowledge of the necessary skill sets needed by local administrators and by limited availability of competency-based materials specifically designed for the preparation of vocational administrators

(Norton, 1983). The current study modified the Job Task Survey for CPS Administrators to include task categories identified by a 2001 DACUM study conducted by Manly and Woloszyk.

A mailed survey was used to collect data. The survey was constructed in two parts for data collection. Part I included a collection of demographic data on participants. Part II was made up of 11 duty areas with 51 job tasks to solicit participants' perceptions on the importance and the frequency of job assignment information. A graphic rating scale was used to improve on the vagueness of numerical rating scales: (level of importance of a job task ranged from 4-Very Important to 1-Not Important and the frequency with which they performed a job task within a duty area ranged from 5-Daily to 2-Yearly). A graphic rating scale describes each of the characteristics to be rated and places them on a horizontal line on which the subject is to place a check. (Fraenkel, 2000).

Data Collection

A survey packet was mailed to Michigan's CPS administrators. Each mailed survey packet contained a cover letter requesting the administrators' participation in the study, the survey instrument, and a timeframe reminder sheet on the return of the survey instrument. The survey took approximately 20 minutes to complete. A self-addressed, stamped envelope was also included in the packet for return of the completed survey.

The survey instrument contained a code in the upper right corner and was matched with an administrator's name in the database from the MDCD. Once the survey was returned, the name was removed from the database, which ensured confidentiality of the respondent. This method of coding also helped to ensure that no respondent was mailed a second survey. The returned surveys were then checked off against the database. A second survey mailing was sent to administrators who had not responded to the first mailing after 4 weeks. Out of the 120 CPS administrators who were mailed the survey, 86 or 72% returned the surveys.

Findings

Research Question 1: Demographics

This research question elicited information on demographic data (job title, organization type, and years of experience) of 86 CPS administrators within the state of Michigan or 72% of the administrators participating in the study. Descriptive statistics were used to summarize the collected data.

Table 2
Responses by Job Type

Job Type	Total in Census	Frequency (Total Number Returned)	Percent Response Rate	Percent of Responses
Area Center Director/Principal	49	27	55	31
Local CTE Director	43	22	51	26
Community College Dean	28	21	75	24
Shared-Time CTE Director		3		4
Other		13		15
Total	120	86		100

Note Job title represents 50% or more of the job assignment

Hammond, Muffs, and Sciascia (2001), in a national survey, found that the majority of active elementary and secondary school principals, whose median age was 50, planned to retire by 57. Forty-eight (57%) of Michigan CPS administrators in this study had 10-14 and 15 or more years of experience. Based on typical career stages this may indicate that participants with 15 years or more of administrative experience may also soon be retiring. The demographic data showed that local CTE Directors and Area Center Directors and Principals will be the groups with the largest number of retirements in coming years. Among community college deans, the years of experience were spread more evenly. Table 2 illustrates the distribution of the census of the study.

Research Question 2: Importance and Frequency

This research question sought to determine the level of importance and frequency of the 51 job tasks within the 11 duty areas, as perceived by the CPS administrators. The duty areas are shown in Tables 3 and 4.

Within each duty area, the CPS administrators' perceptions of the level of importance of a job task ranged from 4 (Very Important) to 1 (Not Important) on the Likert type Scale. The frequency with which they performed a job task within a duty area ranged from 5 (Daily) to 2 (Yearly). Those who responded that the duty area did not apply (1 on the survey form) were coded "missing" and left out of the calculations. The actual number of CPS administrators who responded often varied from question to question within each duty area.

Importance. The duty areas were generally rated "Very Important" to "Important" by CPS administrators. The duty areas that were most important to CPS administrators were I:

Recordkeeping (M = 3.5); F: Personnel Management (M = 3.4); and J: School-Community Relations (M = 3.36). The overall means of importance in descending order by duty area are reported in Table 3.

Table 3

Overall Means of Importance in Descending Order by Duty Area

Duty Area	M	SD
Duty Area I: Recordkeeping	3.50	0.76
Duty Area F: Personnel Management	3.40	0.61
Duty Area J: School-Community Relations	3.36	0.61
Duty Area B: Facilities and Equipment Management	3.35	0.65
Duty Area E: Organizational Improvement	3.33	0.53
Duty Area A: Business and Financial Management	3.30	0.81
Duty Area G: Professional and Staff Development	3.26	0.50.
Duty Area D: Instructional Management	3.24	0.58
Duty Area K: Student Services	3.23	0.63
Duty Area H: Program Planning, Development, and Evaluation	3.15	0.78

Duty Area C: Integration of Academic & CTE Programs	2.95	0.88

Note Means for duty areas were rounded to the Likert scale 4 (Very Important) to 1 (Not Important).

Frequency. The duty areas that were rated as Daily, Weekly, Monthly, and Yearly are also ranked in descending order. The three duty areas that were performed most frequently were H: Program Planning, Development and Evaluation (M = 3.8); C: Integration of Academic and CTE Programs (M = 3.7); and K: Student Services (M=3.7). The overall means of frequency in descending order by duty area are illustrated in Table 4.

Table 4

Overall Means of Frequency in Descending Order by Duty Area

Duty Area	M	SD
Duty Area H: Program Planning, Development and Evaluation	3.80	0.50
Duty Area C: Integration of Academic and CTE Programs	3.70	0.81
Duty Area K: Student Services	3.70	0.77
Duty Area A: Business and Financial Management	3.60	0.56
Duty Area D: Instructional Management	3.60	0.52

Duty Area F: Personnel Management	3.60	0.64
Duty Area G: Professional and Staff Development	3.40	0.40
Duty Area E: Organizational Improvement	3.30	0.61
Duty Area I: Recordkeeping	3.30	0.09
Duty Area B: Facilities and Equipment Management	3.20	0.88
Duty Area J: School-Community Relations	3.20	0.72

Note Means for duty areas were rounded to the Likert scale 5 (Daily) to 2 (Yearly).

Differences. Duty Areas I and J ranked in the top three for importance but ranked in the bottom three for frequency; Duty Areas H, C, and K all ranked in the bottom three for importance but ranked in the top three for frequency. Thus there appears to be an inverse relationship between importance and frequency for some duties, which is discussed below.

Research Question 3: Job Categories

The third research question asked whether and how the importance and frequency of job tasks differs among job categories (Area Center Director/Principal, Local CTE Director, Community College Dean, Shared-Time CTE Director and Other).

Analysis of variance was conducted on the CPS administrators' ratings of how important and how frequent a job task was within various duty areas. The duty area revealing a difference for importance among job categories was H: Program Planning, Development, and Evaluation. The duty areas revealing significant differences for importance and frequency by job type (Area Center Director/Principal, Local CTE Director, Community College Dean, Shared-Time CTE Director and Other) were B: Facilities and Equipment Management; D: Instructional Management; E: Organizational Improvement; F: Personnel Management; G: Professional and Staff Development; H: Program Planning, Development, and Evaluation; I: Recordkeeping; and K: Student Services. Therefore, eight out of the 11 duty areas were perceived to be different.

The duty areas revealing significant differences between job categories for the importance and frequency were Duty Areas B: Facilities and Equipment Management; D: Instructional Management; E: Organizational Management; F: Personnel Management; G: Professional and Staff Development; I: Recordkeeping; and K: Student Services. In regard to the pattern of differences among the groups, Community College Deans revealed the majority of the difference for the importance and frequency of job tasks within a number of the duty areas. Duty Area K: Student Services, with eight job tasks, revealed six job tasks with significant differences. The job tasks of K1: Manage student recruitment and admissions and K6: Implement classroom management systems, were the only two job task revealing Community College Deans with greater means than the other CPS administrators within the study.

Research Question 4: Years of Experience

The fourth research question set out to determine if a significant difference existed among CPS administrators' years of experience and their perceptions of the importance and frequency of a job task within a given duty area.

ANOVA procedures were used to determine whether differences existed among CPS administrators with different years of experience on importance and frequency of various job tasks based on their years of experience. The duty area revealing differences for importance and frequency was G: Professional and Staff Development. The duty areas revealing significant differences for frequency only were A: Business and Financial Management; F: Personnel Management; and H: Program Planning, Development, and Evaluation.

The duty areas revealing significant differences among CPS administrators' years of experience and their perceptions for either importance, frequency, or both to the years of experience were Duty Areas A: Business and Financial Management; F: Personnel Management; G: Professional and Staff Development; and H: Program Planning, Development, and Evaluation.

Tukey post-hoc tests revealed the mean level of frequency for the job task of A2: Identify financial resources. CPS administrators with 15 years or more of experience (M=3.7) was significantly higher than CPS administrators with 0-3 years of experience (M=3.0), p=0.021. However, other post-hoc comparisons were nonsignificant, p=0.05. The post hoc Tukey HSD of Frequency of Duty Area A: Business and Financial Management by Years of Experience is illustrated in

Table 5.

Post Hoc Tukey HSD of Frequency of Duty Area A: Business and Financial Management by Years of Experience

Dependent Variable	(I) Years of Experience	M	(J) Years of Experience	M	Mean Difference (I-J)	Std. Error	Sig
A2. Identify financial resources							

for CPS							
	15 years or more	3.7	0-3 years	3.0	.6765	.2274	.032

The results revealed that the mean frequency of the job task F5: providing a mentoring system for new teachers and staff of CPS administrators with 6-9 years (M=40) was significantly different from the CPS administrators with 10-14 years of experience (M=2.7), p=0.022. However, the other years of experience did not reveal a significant difference among the other groups, p=0.05. The post-hoc Tukey HSD of Frequency of Duty Area F: Personnel Management by Years of Experience is illustrated in Table 6.

Table 6

Post Hoc Tukey HSD of Frequency of Duty Area F: Personnel Management by Years of Experience

Dependent Variable	(I) Years of Experience	M	(J) Years of Experience	M	Mean Difference (I-J)	Std. Error	Sig.
F5. Provide mentoring system for new teachers and staff							
	6-9 Years	4.0	10-14 years	2.7	1.333	.41	.016

An ANOVA was computed to determine if a significant difference existed among the years of experience of CPS administrators to the frequency of job tasks within Duty Area H: Program Planning, Development, and Evaluation. Results of the Tukey post hoc revealed CPS administrators with 6-9 years of experience (M = 4.23) had a higher mean score than CPS administrators with 10-14 years of experience (M = 3.11) for the job task of H7: Participate in risk management activities, p=.012. Results also revealed a significant difference among CPS administrators with 15 or more years (M = 4.03) of experience than administrators with 10-14 years (M = 3.11) of experience for the same job task. Results of the Tukey post-hoc of Frequency of Duty Area H: Program Planning, Development and Evaluation by Years of Experience are shown in Table 7.

Table 7

Post Hoc Tukey HSD of Frequency of Duty Area H: Program Planning, Development, and Evaluation by Years of Experience

Dependent Variable	(I) Years of Experience	M	(J) Years of Experience	Mean	Mean Difference (I-J)	Std. Error	Sig.
H7: Participate in risk management activities							
	6-9 years	4.23	10-14 years	3.11	1.1197	.3248	.008
	15 years or more	4.03	10-14 years	3.11	.9201	.2826	.015

For this research study, a 2 x 2 matrix was developed to illustrate the relationship between mean importance and mean frequency of duty areas as viewed by CPS administrators. As can be seen in Figure 1, none of the duty areas were deemed not important, making that side of the four-square essentially empty. Important and very important duty areas were roughly split on the timeline, but clustered around monthly and weekly. This illustrates that all of the duty areas were important to perform by current CPS administrators, but some were not done frequently.

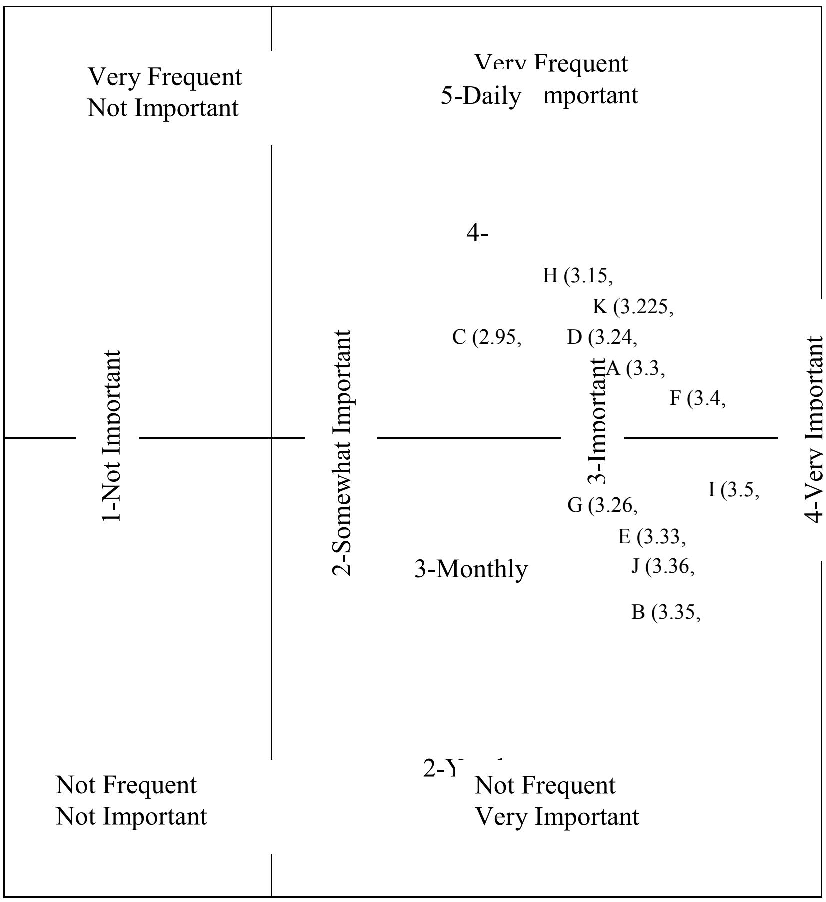

Figure 1. 2 x 2 Matrix of Mean Importance and Frequency of Duty Areas

CONCLUSION AND DISCUSSION

The main findings of this study were based upon information from 86 CPS administrators in Michigan who participated in the study. By collecting demographic information (i.e. job title and years of experiences) from survey respondents the study provides a detailed description of CTE administrators. According to the literature, a shortage of administrators in CTE is undeniable. In this study 37 CPS administrators (43%) indicated they had 15 or more years of experience, representing a large number of CPS administrators who could potentially retire in the next few years. With these impending retirements, Michigan could face a shortage of CPS administrators. These potential retirees add to the already diminishing pool of administrators. As these numbers historically illustrate, a principal's longevity seems limited by a lack of awareness during the early stages in their teaching career. If teachers were recruited at an earlier age to become an administrator, perhaps this may expand the current seven-year tenure of a principalship as stated by Hammond et al.(2001). School systems also face the challenges of recruiting and finding qualified candidates for principalship (Olson, 2000). Few school systems have made it a priority to identify and groom potential leaders despite a wave of impending retirements.

Examining the importance and frequencies of job tasks identified and performed by CPS administrators was the second research question. The three most important duty areas indicated by CPS administrators were Recordkeeping, Personnel Management, and School-Community Relations. The three most frequently performed duty areas were Program

Planning, Development, and Evaluation; Integration of Academic and CTE Programs, and Student Services. Similar findings by Combrink (1983) identified program planning, development; and evaluation, school/employer/community relations; business and financial management; facilities and equipment management; and instructional management as categories that both secondary and postsecondary administrators in Arizona vocational education perceived to be areas of greatest need for training.

ANOVAs were used to compare means among the job types of CPS administrators and the importance and frequency of a job tasks within the duty areas. As expected, there were significant differences between the mean value for Community College Deans and CPS administrators in the K-12 system. The findings for research question 3 are consistent with past research by Baker and Selman (1985), Bentley (1977), Finch and McGough (1991), Savio (1981), Valentine (1979), and Wenrich and Wenrich (1974). The following duty areas for CPS administrators could be added to the needed management skills and competencies for CPS Administrators from the literature review: Recordkeeping, Integration of Academic and CTE Programs, and Organizational Management.

The ANOVAs revealed significant differences within the following K-12 job types: Area Center CTE Directors/Principals and Shared-Time Directors. Area Center CTE Directors/Principals and Shared-Time Directors showed differences in the duty areas of Organizational Improvement and Personnel Management. This too presents a rationale as to why there were differences between these two groups of administrators. Shared-Time Directors will normally take on the job task responsibility that is delegated by the CTE Director. This makes sense because of the nature of the work between shared-time directors and an Area CTE director/principal.

A comparison of the job type category of "Other" to Area CTE Director/Principal shows a majority of the differences in the following duty areas: Facilities and Equipment; Instructional Management; Personnel Management; and Professional and Staff Development. This could be due to the number of different job titles within the "Other" category which contained a vice-president of academic affairs, assistant principal and regional CTE administrator, career preparation coordinator, intermediate school district (ISD) administrator, ISD superintendent, and regional/county ISD-CTE administrator. In this type of research, having a category of "Others" is a potential drawback because this category presents vastly different perspectives or viewpoints to particular job tasks within each duty area.

Very few duty areas were perceived differently according to the number of years of experience of a CPS administrator. The duty areas revealing differences were Business and Financial Management; Personnel Management; Professional Development; and Program Planning, Development and Evaluation. The duty areas revealed consistent differences between administrators with 10-14 years of experience to administrators with 6-9 years of experience. It is important to note that the literature did not reference the number of years of experience of administrators or the age of administrators but discussed the age of retirement. Although it can be inferred that the years of experience is related to career stages, this study is inconclusive on the issue of how different categories of experience may influence administrators' views of job tasks.

Figure 1 illustrates that none of the duty areas were deemed not important, making that side of the four-square essentially empty. Important and very important duty areas were roughly split on the timeline, but clustered around monthly and weekly. This illustrates that all of the duty areas were important to perform by current CPS administrators, but some were not done. The quadrant I and quadrant II show the duties areas as begin important to CPS administrators. Quadrant II reveals duty area A, C, D, F, H and K as being both important and done frequently. Quadrant II reveals duties areas B, E, G, I and J as being important but not performed frequently.

In summary, some of the findings corroborate earlier studies and other results provide an updated framework for leadership in CTE. The study also served to validate the DACUM research of Woloszyk and Manley (2001) by surveying 86 current CPS administrators. These insights could be used renovate the curriculum for leadership development programs.

Implications for Leadership Development Programs

There are several implications for leadership development involving the importance and frequency of job tasks performed by CPS administrators within the state of Michigan. The reexamination of the duty areas Recordkeeping, Organizational Improvement, and Facilities and Equipment Management should be undertaken, because they did not rank as important; it begs the question as to why these particular duty areas would rank so low with regards to frequency. Intuitively duty areas such as Recordkeeping contain one job task, which could explain its frequency ranking, but is still rated important possibly because of today's accountability requirements for schools.

This study revealed a number of differences between community college deans and K-12 CPS administrators. This is understandable as community college deans have access to other departments in their institutions to handle job tasks such as managing student recruitment and admissions, student placement, and crisis management and security programs. The possible division of the community college deans and K-12 CPS administrators can be considered for the improvement of a leadership development program. By potentially providing two distinct leadership development tracks, the needs of the two groups could be met.

In-service training for leadership development programs could be designed to help new CPS administrators make the transition from the classroom to administration with fewer wrinkles. Recommendations should be made to encourage state agencies and professional organizations to provide leadership development activities such as recordkeeping, personnel management, and school-community relations as these duty areas ranked the three most important in this study. Additionally, organizations should provide additional training on Program Planning, Development and Evaluation; Integration of Academic and CTE Programs; and Student Services as these duty areas ranked as being performed the three most frequently by current CPS administrators.

Implications for Further Research

Since this study used a DACUM study conducted in 2001-2002 for the development of a leadership program, the perceptions of the study were limited to the state of Michigan. Therefore, it is recommended that this study be replicated in other states for a better understanding of the perceptions and roles of a CPS or CTE administrator in a broader context. This could help to determine the similarities and difference between states. Michigan's education and certification for teachers and administrators has some differences from other states. Therefore, administrators might have different backgrounds or different job descriptions than Michigan CPS administrators. By examining the different backgrounds, a common denominator could be presented and potentially added to an LDP program.

Results of this study can be used to improve or add to existing course structures of leadership development programs. With a focus on duty areas that ranked important by CPS administrators, curriculum can be modified to be in the best interest of the participants.

Conducting a study in which multiple methods are used would allow the opportunity to clarify issues that may be difficult to grasp with a self-report survey. The chosen research method in this study, which was a survey that generated quantitative data, could be improved with a triangulation approach to data gathering. The introduction of a qualitative method, with the opportunity to interview CPS administrators and to conduct focus groups, could add to the literature base. Figure 1's matrix makes clear there are disconnects between and importance and frequency of some job areas, but it is unclear how CPS administrators feel about a particular duty area. A qualitative study may help to fill in some of these unanswered questions.

This study could be replicated with individuals in the position of career-technical education administrators who do not have CTE backgrounds to determine their professional development needs and challenges. The rationale behind this statement stems from the shortage of overall administrators and more importantly the shortage of CTE administrators. It is recommended that higher education institutions evaluate the preparation of non-career-technical individuals to fill the job positions that will arise in the future. It is speculated that administrators without CTE or vocational education backgrounds may have different needs and hold different viewpoints regarding their administrative duties.

New administrators will need to be competent in various job tasks to meet the challenges for future CTEs. Because of the challenges facing CPS administrators, and the diminishing pool of administrators for secondary and postsecondary vocational education institutions, there is a need to examine the priorities in preparing CPS leaders. This research may help inform that process.

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A Clarion Call for the University Council to Serve as a Specialized Professional Association (SPA) for Higher Education Institutions with Programs in Workforce and Human Resource Education

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The words of Charles Dickens have profound meaning for higher education institutions in America, especially those that prepare personnel for career positions in workforce and human resource education. As Dickens so eloquently writes in the 1859 Tale of Two Cities, "it was the best of times, it was the worst of times" for those of us in the profession. These are the best of times for the University Council to seize the moment to serve as a specialized professional association (SPA) or board for existing and future Career and Technical Education (CTE) and Workforce Education programs, yet on the other hand, these are the worst of times for programs in career and technical education that have been retrenched and in many cases eliminated from higher education institutions.

As we journey further into the millennium, there is a need to take action to revitalize our profession; to enhance the future for the next generation of leaders in education; and .reverse the trend of program retrenchment and elimination. More importantly, as leaders in the field, we need to actually lead by providing leadership to realign the mission, purpose and values of our organization to sustain national credibility. Other professional organizations have reinvented themselves, why not the University Council for Workforce and Human

Resource Education (UCWHRE). The University Council, as it is commonly called, consists of 18 doctoral granting institutions in career and technical education, workforce education, and human resource development programs. The current membership consists of the following institutions: 1) Auburn University, 2) Clemson University, 3) Colorado State University, 4) University of Arkansas, 5) University of Georgia, 6) University of Idaho, 7) Louisiana State University, 8) University of Illinois at Urbana-Champaign, 9) University of Minnesota, 10) University of North Texas, 11) Ohio State University, 12) Oklahoma State University, 13) Penn State University, 14) Southern Illinois University, 15) Texas A&M University, 16)Valdosta State University, 17) Virginia Tech University, and 18) Western Michigan University.

The UCWHRE can provide tremendous benefits for member institutions including: certifying accreditation as being among the best programs in the field, providing opportunities to collaborate or network with resource persons who are leading scholars in the global community, pursuing grant opportunities through collaborative partnerships among council members, and generating ideas to improve curriculum and faculty development, etc. The University Council members are active leaders and recognized scholars who provide professional service to the U.S. Department of Education, National Center for Research in Career and Technical Education, Association of Career and Technical Education, and International Vocational Education and Training Association, as well as many other organizations.

Other professional organizations have found themselves at similar crossroads as the University Council finds itself today. You may recall that counseling education was once a component of vocational education under the auspices of vocational guidance, and later referred to as guidance counselors, but now, they are called counselor educators.

Moreover, their organizational metamorphosis has been more than a name change as evidenced by the National Council for Accreditation of Teachers (NCATE), as well as the Council for the Accreditation of Counseling and Related Educational Programs (CACREP).

The CACREP approach is a good prototype or model for the UCWHRE to emulate because of its mission to promote professional competence through the development of preparation standards, encouragement of excellence in program development, and accreditation of professional preparation programs (CACREP 2009). As a result of the organization's commitment to the profession, the CACREP core curriculum is used as the basis for the educational requirements of most state licensing regulations and represents the comprehensive foundation of the testing questions used in the National Counselor Exam for Licensure and Certification. CACREP standards are centered on the following areas:

- The Learning Environment: Structure and Evaluation
- Professional Identity
- Professional Practice
    - Addiction Counseling
    - Career Counseling
    - Clinical Mental Health Counseling
    - Marriage, Couple, and Family Counseling
    - School Counseling
    - Student Affairs and College Counseling
- Doctoral Standards: Counselor Education and Supervision
    - The Learning Environment
    - Professional Identity
    - Professional Practice
    - Doctoral Learning Outcomes

Technology Education is another example of a professional organization that reinvented themselves from the traditional industrial arts programs by moving out of the shadows of trade and industrial education. A similar argument can be made with special education programs. Consequently, we believe that the stage is being set for the UCWHRE to wake up and recognize the social and economic values that exist in serving as a special accreditation agency for higher education institutions with programs in workforce and human resource education. Specialized Professional Associations represent the highest levels of professional performance and are charged with accrediting member institutions in areas of program standards and quality. The importance of accreditation cannot be understated in professional fields. According to Webster (2009), accredit means "to give official authorization to or approval of; to provide with credentials; to recognize as maintaining standards that qualify the graduates for admission to more specialized institutions or for professional practice." UCWHRE has the opportunity to greatly serve the members by adopting standards of professional practice and becoming an accrediting body of excellence for its members. Accordingly, we propose that UCWHRE consider establishing a set of standards which an educational institution or program submits to a voluntary, non-governmental review to determine whether it meets those accepted standards of quality.

Other professional organizations within the field of education have made similar changes and offer established methods of credentialing or accrediting their institutional members. In addition to CACREP, another professional organization that can serve as a model for UCWHRE is the American Veterinary Medical Association (AVMA). The AVMA, established in 1863, is a not-for-profit association representing more than 78,000 veterinarians working in private and corporate practice, government, industry, academia, and uniformed services. The AVMA is designated by the United States Department of Education as the accrediting body for the

28 colleges of veterinary medicine in the United States. According to the AVMA website, the AVMA educational standards of excellence are recognized worldwide as the "gold standards" in veterinary education. Many foreign veterinary schools use the AVMA model for their veterinary school curricula (AVMA 2009). Within veterinary medicine the AVMA Council for Education develops standards for and conducts reviews of Doctor of Veterinary Medicine programs in schools of veterinary medicine. An institution is considered fully accredited when it is found to meet these standards. Accreditation by the AVMA Council of Education and Committee on Veterinary Technician Education and Activities represents the highest standards of achievement for veterinary medical education in the United States. Institutions that earn accreditation confirm their commitment to quality and continuous improvement through a rigorous and comprehensive peer review.

The authors of this paper propose a similar arrangement for UCWHRE. The criteria and/or standards for assessment or accreditation can be developed using the standards and accreditation models from NCATE, CACREP, or AVMA as prototypes to initiate the process. Following the AVMA format, UCWHRE could establish a similar Council on Education with an amendment to the organization bylaws or constitution. Similarly, the UCWHRE Council could establish standards for accreditation that might be developed through a rigorous and high-quality peer review accreditation process of member institutions utilizing the same philosophical approach as the AVMA Council on Education.

Like CACREP, the AVMA has established standards for accreditation. The AVMA Council on Education's accreditation standards are based on the following areas:

- Organization
- Finances

- Facilities and Equipment
- Clinical / Practical Resources
- Library / Information Resources
- Students
- Admission
- Faculty
- Curriculum
- Research Programs
- Outcomes Assessments

These areas are germane to veterinary medicine, they will need to be adapted to meet the needs of UCWHRE in establishing standards for accreditation.

To implement the accreditation process, perhaps institutions that are members of the University Council would be expected to conduct a self-study to show evidence of compliance with UCWHRE standards and prepare for an on-site visit to verify written information in their respective self-studies. Each institution would be expected to pay a modest annual fee of approximately $2,000 with full site visits every seven years. The visiting team would consist of three University Council members who are also members of the Council of Education with experience in program evaluation and assessment. The visiting team would spend two to three days for each on-site visit to verify information and submission of final report to UCWHRE and the institution seeking accreditation.

Another consideration for the membership of the University Council might be to expand the membership to include institutions with quality CTE teacher education, leadership, or human resources development at the master's level. These institutions could bring valuable perspective to the organization, while broadening the capacity of the council to oversee the adoption or implementation of the accreditation criteria at less than doctoral granting institutions. An accreditation process and national recognition of their programs may be highly motivational to these institutions towards becoming members of UCWHRE.

We have shared our concerns, now it's your turn to discuss this issue with others and take action. What is your position (pro or con, but not both) concerning the UCWHRE serving as a specialized professional association for higher education institutions with programs in both workforce and human resource education? Also, what is your position (pro or con, but not both) concerning expanding UCWHRE membership to master's level institutions with programs in both workforce and human resource education?

We need to hear from you. More importantly, your constructive comments are welcomed and appreciated.

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