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The Journal of Vocational Education Research

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Editor's Note

Joe W. Kotrlik
Louisiana State University

We have recently completed our annual meetings in Orlando and several new members of the Editing-Managing Board were elected. I am happy to say that the new members of the Board are following in the footsteps of the many outstanding Board members before them and are making outstanding contributions to the quality of *JVER*.

Just as this issue was being completed, the debate commenced on the AVERA listserv about whether to change the name of AVERA. This discussion is a follow-up to the discussions held during the AVERA meetings in Orlando in December and that have been in progress for several years. I trust that by the time you receive this issue, this decision will be history and we can move forward together.

Volume 29 Issue 1 contains articles that address varied areas of workforce, career and technical education programs. The first article by Donna Redmann and Joe Kotrlik, "Analysis of technology Integration in the Teaching-Learning Process in Selected Career and Technical Education Programs," addressed the level that instructional technology is integrated in the teaching/learning process in three secondary career and technical education (CTE) programs, namely, agriscience, business, and marketing education. They concluded that CTE teachers are most active in exploring the potential of using technology in the teaching/learning process, and in adopting technology for regular use in instruction, but are not very active experimenting with technology or with advanced technology integration. The CTE teachers did not experience substantial barriers in their efforts to integrate technology in the teaching/learning process.

The second article, "An Investigation of Student, Faculty, and Administration Perceptions of the Application of Accelerated Learning Strategies in the Wisconsin Technical College System" by Alex Birkholz, investigated the perceptions of students, faculty, and instructional supervisors involved with the use of accelerated learning strategies. Objectives guiding the investigation focused on critical dimensions of the methodology and differences in perception between accelerated and traditional students as well as faculty and instructional supervisors involved with accelerated academic programming. Students participating in accelerated courses assigned a different degree of importance to the critical dimensions of accelerated learning as compared to traditional students. Overall, experiences reported by both classifications of students did not differ. Despite meeting fewer course hours, accelerated students reported comparable learning experiences to students in traditional programs.

In their article entitled, “Emerging Educational and Agricultural Trends and their Impact on the Secondary Agricultural Education Program,” Marshall Stewart, Gary Moore and Jim Flowers identified emerging trends in education and agriculture and determined their implications on the secondary agricultural education program. This Delphi study identified 12 emerging educational issues and 6 emerging agricultural issues. They concluded that many of the educational issues have not changed dramatically over the years. Agricultural issues seemed to have broadened from a production focus to issues that deal with agriculture’s relationship to society.

And finally, Frank Linnehan studied “The Relation of Source Credibility and Message Frequency to Program Evaluation and Self-Confidence of Students in a Job Shadowing Program.” In this study involving female high school students participating in a job shadowing program, credibility of the adult moderated the relation between message frequency and student confidence. Students perceived program participation to be more useful if adults were seen as having high credibility than if adults’ credibility with the students was low. Additionally, a student’s confidence in her ability to be successful in a job was positively related to message frequency, when the adults in the program were credible.

The research reported in these articles makes a substantial contribution to our body of knowledge in vocational, career and technical education. We commend these researchers for their excellent work.

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Journal of Vocational Education Research, 29(1), pp. 3-25.

Analysis of Technology Integration in the Teaching-Learning Process in Selected Career and Technical Education Programs

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Abstract

This study addressed the level that instructional technology is integrated in the teaching/learning process in three secondary career and technical education (CTE) programs, namely, agriscience, business, and marketing education. CTE teachers are most active in exploring the potential of using technology in the teaching/learning process, and in adopting technology for regular use in instruction, but are not very active experimenting with technology or with advanced technology integration. The CTE teachers did not experience substantial barriers in their efforts to integrate technology in the teaching/learning process and perceive they are good teachers. In general, CTE teachers experienced some technology anxiety that prevents them from using technology in their instruction. Six factors (technology training, self-perceived teaching effectiveness, availability of technology, perceived barriers, technology anxiety, and teachers having a home Internet connection) combined in various ways in four multiple regression models to explain teachers' technology integration in the teaching-learning process.

Introduction

The rapid changes occurring in society and in technology have had tremendous impact on the educational community as it prepares individuals for the workplace. One of the impacts of this rapid technological change is that employers now demand employees who not only have an understanding and an appreciation of technology, but can utilize it in their jobs and in their own training in innovative ways. This does not mean that employees must have a working knowledge of all types of software and equipment. Rather, they must have a foundation that enables them to move quickly into new technology-based work environments without a heavy emphasis on on-the-job training. This emphasis on technology was noted as far back as 1991 in the Secretary's Commission on Achieving Necessary Skills (SCANS) report in which "working with a variety of technologies" was one of the workplace competencies identified as important. One way to prepare students for a technologically advanced work environment is to make technology an integral part of the teaching-learning process.

From an educational standpoint, communities, school boards, state education agencies, and the federal government have supported, mandated, or strongly encouraged an accelerated integration of technology in the educative process. For example, a strategic review by the U.S. Department of Education described in the National Educational Technology Plan listed five national educational technology goals for K-12 education (Office of Educational Technology, 2000). Three of the five goals are:

1. All students and teachers will have access to information technology in their classrooms, schools, communities, and homes.
2. All teachers will use technology effectively to help students achieve high academic standards.
3. All students will have technology and information literacy skills. (p. 4)

This emphasis on the use of technology in education is supported by the National Education Association (NEA; 2003) in their position statement on technology in schools in which it was stated that " . . . students should learn about, understand and use technology, which can enrich their lives, expand academic opportunities, and provide critical employment skills for entering the workforce of the global economy" (¶3).

Research is needed to determine the status of instructional technology integration in CTE. Several of the top rated business education research topics identified by Rader and Wilhelm (2001) are directly related to technology integration in the teaching/learning process. Career and technical educators are expected to integrate technology in the teaching/learning process; they must use technology so that it supports instruction and enables learners to use technology as an important tool to meet their information and learning needs.

Technology Integration

Technology integration was defined by the authors as "Employing the Internet, computers, CD-ROMs, interactive media, satellites, teleconferencing, and other technological means in instruction to support, enhance, inspire and create learning." Using the various technologies available, technology integration in the teaching/learning process can be accomplished by using approaches cited in a report by the National Center for Education Statistics (2000). Technology was integrated by teachers in several ways including using technology for classroom instruction, using computer applications, using practice drills, requiring research using the Internet, requiring students to use technology to solve problems and analyze data, requiring students to conduct research using CD-ROMs, assigning students to produce multimedia reports/projects, assigning graphical presentations of materials, assigning demonstrations/simulations, and assigning students to correspond with others over the Internet.

Some of the benefits of using the various approaches to technology integration were cited in the National Educational Technology Plan (Office of Technology, 2000):

1. Helping students to comprehend difficult-to-understand concepts;
2. Helping students to engage in learning;
3. Providing students with access to information and resources; and
4. Better meeting students' individual needs. (p. 25)

Factors Related to Technology Integration

Numerous factors may affect the integration of technology in the teaching/learning process. The factors specifically addressed in this study and that will be discussed below include: support for teachers' technology integration in the form of technology training, the availability of technology, and barriers to the integration of technology; technology anxiety; and teachers' perceived teaching effectiveness. These factors were identified after a review of the research literature revealed that they held the most promise for explaining teachers' technology integration.

Support for teachers' use of technology has evolved over the last decade from minimal or non-existent support in many schools, to a wider acceptance by administrators and communities and the belief that technology is now a necessity. This support comes in many different forms including public support, availability of technology for both teacher and student use, teacher training, release time for planning and learning, technical support, administrative support, and availability of appropriate instructional materials. The integration of technology may also be affected by the barriers encountered by both teachers and learners. These barriers include funding/cost, lack of training/expertise, lack of time, access to technology, resistance to change, teachers' attitude, and the organizational structure of schools (Budin, 1999; Fabry & Higgs, 1997; George, 2000; Glenn, 1997; Kotrlik, Harrison, & Redmann, 2000; Office of Technology Assessment, 1995; Smerdon, Cronen, Lanahan, Anderson, Iannotti, & Angeles, 2000).

Budin (1999) noted that, until recently, schools had their priorities backwards. They were more concerned with acquiring hardware and software rather than emphasizing teacher development and planning for the integration of technology. Budin questioned what will happen to the support of technology integration in the future if the results of funding technology integration fail to live up to expectations in terms of test scores, students' writing, and other measures. The use of technology needs to be reconceptualized, according to Budin, in areas such as students and teachers' roles in using technology, how technology fits into the curriculum, what teachers should know and how teachers will learn about technology, and how teachers should assess the impact of technology.

Technology anxiety may be a factor that influences technology integration. The placement of technology into classrooms without teacher preparation and curriculum considerations has produced high levels of anxiety among teachers (Budin, 1999). Many educators would agree with Budin; however, research could not be found that documents teachers' anxiety relative to implementing technology, other than just computers, in the teaching/learning process.

The relationship of technology integration to teachers' perceived teaching effectiveness has not been directly addressed in the literature. However, Bandura (2000) stated that "Unless people believe that they can produce desired effects and forestall undesired ones by their actions, they have little incentive to act" (p. 120); therefore, teachers' self-perceived teaching effectiveness may be directly or indirectly related to instructional effectiveness. This relationship between technology and teaching effectiveness is highlighted by a study by the National Center for Educational Statistics (2000) in which it was reported that only one-third of teachers felt they were "well prepared" or "very well prepared" to use technology effectively. Byron (1995) cited limitations in teacher effectiveness when using technology in instruction. These shortcomings included the lack of faculty training, classrooms that were not designed to support the use of technology, and teachers' doubts about whether technology would improve their performance.

Several models exist related to the use of technology in education; however, two models have the most direct application to this study. Sandholtz, Ringstaff, and Dwyer (1997) described an evolutionary process that teachers go through as they continue to increase their use of technology. They described five phases: 1) Entry – teachers adapt to changes in physical environment created by technology; 2) Adoption - teachers use technology to support text-based instruction; 3) Adaptation – teachers integrate the use of word processing and databases into the teaching process; 4) Appropriation – teachers change their personal attitudes toward technology, and 5) Invention – teachers have mastered the technology and create novel learning environments. Russell (1995) delineated six stages in technology adoption. He proposed the following six stages using e-mail as a foundation: 1) awareness, 2) learning the process, 3) understanding the application, 4) familiarity and confidence, 5) adaptation to other contexts, and 6) creative applications to new contexts.

Based on the evolutionary process cited by Sandholtz et al. (1997) and the stages in technology adoption proposed by Russell (1995), the following four-phase technology integration model was developed to serve as the foundation for this study:

1) Exploration - Thinking About Using Technology. Teachers seek to learn about technology and how to use it.
2) Experimentation - Beginning to Use Technology. Physical changes start to occur in classrooms and laboratories. Instructors focus more on using technology in instruction by presenting information using presentation software and doing a *few* instructional exercises using spreadsheets,

databases, word processors, games, simulations, the Internet, and/or other technology tools.

3) Adoption - Using Technology Regularly. Physical changes are very evident in the classroom and/or laboratory with technology becoming a focal point in the classroom and/or laboratory organization. Instructors employ presentation software and technology-based instructional exercises using games, simulations, spreadsheets, databases, word processors, the Internet or other technology tools as a regular and normal feature of instructional activities. Student-shared responsibility for learning emerges as a major instructional theme.
4) Advanced Integration - Using Technology Innovatively. Instructors pursue innovative ways to use technology to improve learning. Students take on new challenges beyond traditional assignments and activities. Learners use technology to collaborate with others from various disciplines to gather and analyze information for student learning projects. The integration of technology into the teaching/learning process leads to a higher level of learning.

Need for the Study

Mellon (1999) asked, "How important are teachers to the success of technology-based learning?" She observed that,

> " . . . the importance of the teacher in the teaching and learning process has been downplayed. . . . There seems to be an implicit assumption that, where technology is concerned, teachers are interchangeable. . . . The simple fact is that teachers vary in their enthusiasm toward and facility with technology. At one end of the continuum are the technology zealots who claim that most educational problems can be solved by technology. At the other end are the technology Luddites who are afraid of, or who are baffled by, the increasing emphasis on technology." (¶17, 19)

Khalili and Shashoani (1994) and Moore and Kearsley (1996) indicated that several studies document that the use of technology in the teaching/learning process has resulted in improved student learning while Moore and Kearsley also cited studies that concluded that no differences existed in student learning between technology based and traditional instructional approaches. The debate about the efficacy of technology integration continues, but Bower (1998) maintains that organizational and political realities indicate that technology-based instruction is a viable alternative and that we must " . . . continue to explore this innovative pathway to education?" (p. 65). This study addressed the level that technology, not just computers, is being implemented in the teaching/learning process in CTE programs and will contribute to efforts to allow technology integration to achieve its maximum potential effectiveness and impact.

Purpose and Objectives

This study was designed to analyze technology integration in the teaching-learning process in selected career and technical education programs, namely, agriscience, business, and marketing education. The objectives were to:

1. compare the extent to which technology has been integrated into the teaching-learning process by CTE program;
2. compare the barriers that prevent teachers from implementing technology in the teaching-learning process by CTE program;
3. compare teachers' perceptions of their teaching performance and/or effectiveness by CTE program;
4. compare teachers' technology anxiety by CTE program;
5. compare sources of technology training by CTE program;
6. compare technology available for use in the teaching/learning process by CTE program area; and
7. determine if selected variables explain a significant proportion of the variance in CTE teachers' technology integration.

The variables used in the four regression analyses that were conducted to support this objective were the teachers' perception of their instructional effectiveness, the teachers' perception of the barriers that prevented technology integration, the teachers' perceived technology anxiety level, technology training sources used, technology available for use in teaching-learning, whether the teacher had an Internet connection available in their school office, and whether the teacher had an Internet connection at home.

Method

The population for this study was all secondary career & technical education teachers in Louisiana in three fields, namely, agriscience, business, and marketing education. These three fields were used in this study because a complete frame was available for these groups. Due to a major restructuring of career and technical education in the Louisiana Department of Education, accurate listings of teachers were not available for other career and technical education fields at the time this study was conducted. Therefore, the frame for this study included 1,288 teachers listed in the teacher directories provided by the Louisiana Department of Education, and the stratified, random sample consisted of 599 teachers. Each mailing consisted of a questionnaire, cover letter, and stamped, addressed, return envelope. After three data collection efforts (two mailings and a phone follow-up), 319 teachers returned their surveys for a response rate of 53.3%.

To determine if the responses were representative of the population and to control for non-response error, inferential *t*-tests were used to compare the grand means of the technology integration (4 subscales), barriers, and teaching effectiveness scales of those questionnaires received during the phone follow-up (n = 38) to those received by mail (n = 281), as recommended by Gall, Gall, and Borg (2002). These scales are described in the instrumentation section below. The grand means of these scales were selected because they were primary variables of interest in the study. No statistically significant differences were found between the means by response mode for the primary scales in the instrument. In addition, none of the analyses revealed effect sizes that met the minimum value for a small effect size (d = .20) according to Cohen's (1988) standards for interpreting effect sizes. It was concluded that no differences existed by response mode and the data were representative of the population. The mail and phone follow-up responses were combined for further analyses.

Instrumentation

The instrument contained three scales: technology integration, barriers to integration, and perceived teaching effectiveness. The technology integration scale contained four subscales: exploration, experimentation, adoption, and advanced integration. These scales and all demographic items used in the instrument were developed by the researchers after a review of the literature. The face and content validity of the instrument were evaluated by an expert panel of career and technical educators, both university faculty and teachers enrolled in doctoral programs. The instrument was pilot tested with 29 teachers of agriscience, business, family and consumer science, and marketing. These teachers were enrolled in a comprehensive graduate program in career and technical education. Changes indicated by the validation panel and pilot test were made. These changes occurred in the wording of items and in the instructions for completing the instrument. The standards for instrument reliability for Cronbach's alpha by Robinson, Shaver, and Wrightsman (1991) were used to judge the quality of the three scales and four subscales in the instrument. Using these standards, all scales possessed exemplary reliability. Internal consistency coefficients for the three scales and the four subscales (which were part of the technology integration scale) were as follows (Cronbach's *alpha*): Technology Integration Scale - .93; Exploration subscale - .82, Experimentation subscale - .95, Adoption subscale - .97, Advanced Integration subscale - .88, Barriers scale - .87, and Teaching Effectiveness scale - .90.

Data Analysis

Descriptive statistics, analyses of variance, and Tukey's post hoc tests were used to analyze the data for objectives 1-4. The effect sizes for the analyses of variance were interpreted using Cohen's *f* statistic and the descriptors recommended by Cohen (1988).

Descriptive statistics and Cramer's V were used to analyze the data for objectives 5-6. The magnitudes of association were interpreted using Rea and Parker's (1992) conventions for describing the magnitude of association in contingency tables.

Forward regression analysis was used to analyze the data for objective 7. The effect sizes for the multiple regression analyses were interpreted according to Cohen's (1988) standards for interpreting effect sizes for multiple regression analyses.

Findings

Respondents to this study (*N*=319) were career and technical education teachers employed by public secondary school systems in Louisiana: 116 agriscience teachers, 147 business teachers, and 56 marketing teachers. The response rates for these three teacher groups were 57%, 51%, and 52%, respectively. Their ages ranged from 22 to 73 years (*M*=44.8, *SD*=10.1) and over one-half were female (58.3%, *n*=186). The predominant gender by program area was as follows: Agriscience - 98 or 84.5% male, Business – 129 or 88.4% female, and Marketing – 39 or 70.9% female. The number of years of teaching experience ranged from 0 to 41 years (*M*=17.6, *SD*=10.4).

Objective 1 – Extent of Technology Integration

Teachers' responses to the four technology integration subscales were used to determine the extent to which technology had been integrated into the teaching/learning process. The teachers responded to 33 items using the following Likert scale: 1 = Not Like Me At All, 2 = Very Little Like Me, 3 = Somewhat Like Me, 4 = Very Much Like Me, and 5 = Just Like Me. Examples of the items from the four subscales are presented in Table 1. All items from the four subscales are not included in this manuscript to protect the copyrighted status of the instrument.

The grand means for the CTE teachers for two scales, Exploration - Thinking About Using Technology (*M* = 3.58, *SD* = .95), and Adoption - Using Technology Regularly (*M* = 3.59, *SD* = 1.04), reveal that teachers perceived the descriptions in these two subscales were "Very Much Like Me." The grand means for the other two scales, Experimentation - Beginning to Use Technology (*M* = 2.13, *SD* = 1.08) and Advanced Integration - Innovative Use of Technology (M = 2.46, SD =1.11), indicated that the teachers perceived the descriptions in the subscales were "Very Little Like Me." They are strongest in the exploration and adoption phases of the technology integration model, while they are not demonstrating strength in the experimentation and advanced technology integration phases.

The analyses of variance (ANOVA) revealed the CTE teachers differed in their integration of technology at the four levels of technology integration by program area. The ANOVA's were significant for all four subscale means by program area and Tukey's HSD test was used to identify differences by program area. The grand means for the business and marketing teachers were significantly higher than the grand means for the agriscience teachers for exploration, adoption, and advanced integration. The effect sizes calculated using Cohen's *f* indicated a large effect size for adoption and a medium effect size for both exploration and advanced integration. These results indicate that business and marketing teachers in this study are stronger in the areas of exploration, adoption, and advanced integration than agriscience teachers. However, the grand mean for the agriscience teachers were significantly higher than the grand mean for the business teachers for experimentation. The effect size was small, indicating that agriscience teachers were slightly stronger in the area of experimentation. These data are presented in Table 1.

Objective 2 – Perceived Technology Integration Barriers

A researcher-developed scale was used to determine the magnitude of barriers that may prevent CTE teachers from integrating technology into the teaching/learning process. The teachers responded to 11 items using the following Likert scale: 1 = Not a barrier, 2 = Minor barrier, 3 = Moderate barrier, and 4 = Major barrier. The items included statements such as "Having enough time to develop lessons that use technology" and "My ability to integrate technology in the teaching/learning process." The statements in the scale are presented in Table 2. The grand mean revealed that CTE teachers perceive that minor barriers exist that prevent them from integrating technology into the teaching/learning process (M = 2.15, SD = .67).

The analysis of variance data presented in Table 3 revealed that CTE teachers differ in their perceptions of the existence of barriers to technology integration by program area (F = 38.92, P <.001). The Tukey HSD test and Cohen's *f* (1988) effect size statistic indicated that agriscience teachers perceive more substantial barriers to technology integration in the teaching/learning process than the other two groups.

Objective 3 – Teachers Perceived Teaching Effectiveness

A researcher-developed scale was used to determine the teachers' perceptions of their own teaching effectiveness. The teachers responded to seven items using the following Likert scale: 1 = Strongly disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, and 5 = Strongly agree. All items in this scale were worded in superlative language–strongly agreeing with the statements in this scale indicated the teacher perceived they were excellent in their teaching effectiveness. The items included statements such as "I am among the very best teachers at my school" and "My

Table 1
Scale Grand Means and Example Items for the Four Technology Integration Subscales by Career and Technical Education (CTE) Teachers' Program Area

Subscales and Examples of Statements in Subscales	Ag[a] *m* *(sd)*	Bus[b] *m* *(sd)*	Mkt[c] *m* *(sd)*	CTE[d] *M* *(SD)*	*F*	*P*	Effect Size (Cohen's *f*)
Exploration- 5 statements:	3.16 (.94)	3.84 (.85)	3.78 (.95)	3.58 (.95)	19.62	<.001	Medium (.35)
Example Items: 2. I want to take a course to learn how to use technology in the teaching/learning process. 3. I talk with my principal or fellow teachers about using technology in my instruction.							
Experimentation- 9 statements:	2.38 (.84)	1.91 (1.18)	2.19 (1.18)	2.13 (1.08)	6.37	.002	Small (.20)
Example Items: 9. I am just beginning to use instructional exercises that require students to use the Internet or other computer programs. 11. I am just beginning to experiment with ways to use technology in the classroom.							
Adoption- 15 statements:	2.80 (.94)	4.09 (.74)	3.92 (.94)	3.59 (1.04)	78.55	<.001	Large (.71)
Example Items: 17. I emphasize the use of technology as a learning tool in my classroom or laboratory. 18. I assign students to use the computer to do content related activities on a regular basis.							
Advanced Integration- 4 statements:	2.05 (.94)	2.63 (1.08)	2.85 (1.24)	2.46 (1.11)	14.33	<.001	Medium (.30)
Example Items: 26. I encourage students to design their own technology-based learning activities. 29. I expect students to use technology to such an extent that they develop projects that are of a higher quality level than would be possible without them using technology.							

Note. Scale: 1 = Not Like Me at All, 2 = Very Little Like Me, 3 = Somewhat Like Me, 4 = Very Much Like Me, and 5 = Just Like Me. All items from the four subscales are not included in this manuscript to protect the copyrighted status of the instrument.
[a]*n* = 114. Ag = agriscience education teachers. [b]*n* = 144. Bus = business education teachers. [c]*n* = 155. Mkt = marketing education teachers. [d]*N* = 313. CTE = career and technical education teachers.

Table 2

Statements Included in the Scale Measuring Barriers that May Prevent Career and Technical Education Teachers from Integrating Technology in the Teaching/Learning Process

Item #	Statements	*M*	*SD*
1.	Enough time to develop lessons that use technology.	2.76	1.04
3.	Availability of technology for the number of students in my classes.	2.53	1.25
4.	Availability of technical support to effectively use instructional technology in the teaching/learning process.	2.51	1.08
2.	Scheduling enough time for students to use the Internet, computers, or other technology in the teaching/learning process.	2.28	1.06
11.	Availability of effective instructional software for the courses I teach.	2.22	1.06
9.	Reliability of the Internet at my school.	2.00	1.01
10.	Access to the Internet at my school.	1.88	1.05
7.	My students' ability to use technology in the teaching/learning process.	1.87	.80
6.	My ability to integrate technology in the teaching/learning process.	1.84	.89
5.	Administrative support for integration of technology in the teaching/learning process.	1.83	.99
8.	Type of courses I teach.	1.61	.82

Note. *N* = 317. Scale Grand Mean = 2.15 (*SD* = .67). Scale: 1 = Not a Barrier, 2 = Minor Barrier, 3 = Moderate Barrier, and 4 = Major Barrier.

students would rate me as one of the very best teachers they have ever had." The statements in the scale are presented in Table 4. The grand mean of *M* = 3.83 (*SD* = .63) revealed that CTE teachers agreed with the construct measured by this scale, which indicates that they perceive they are effective teachers.

The analysis of variance presented in Table 3 revealed that CTE teachers differ in their perceptions of their teaching effectiveness by program area (F = 15.89, P <.001). The Tukey HSD test and the Cohen's *f* effect size statistic (Cohen, 1988) indicated that business and marketing teachers' perceptions of their own teaching effectiveness is somewhat higher than agriscience teachers self-perceived teaching effectiveness.

Table 3
Analysis of Variance in Barriers to Technology Integration, Perceived Teaching Effectiveness, and Technology Anxiety by Career and Technical Education (CTE) Teachers' Program Area

Variable	CTE Program Area						
	Ag[d]	Bus[e]	Mkt[f]	CTE[g]			
	m (*sd*)	*m* (*sd*)	*m* (*sd*)	*M* (*SD*)	*F*	*P*	Effect Size (Cohen's *f*)
Barriers to technology integration[a]	2.53 (.57)	1.88 (.64)	2.04 (.59)	2.15 (.67)	38.92	<.001	Large (.50)
Perceived teaching effectiveness[b]	3.58 (.60)	3.96 (.61)	4.01 (.56)	3.83 (.63)	15.89	<.001	Medium (.32)
Technology anxiety[c]	1.87 (.85)	1.50 (.64)	1.45 (.66)	1.63 (.75)	9.98	<.001	Medium (.25)

[a]Scale: 1 = Not a Barrier, 2 = Minor Barrier, 3 = Moderate Barrier, and 4 = Major Barrier. [b]Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, and 4 = Agree, and 5 = Strongly Agree. [c]Scale: 1 = No Anxiety, 2 = Some Anxiety, 3 = Moderate Anxiety, and 4 = High Anxiety. [d]*n* = 114. Ag = agriscience education teachers. [e]*n* = 144. Bus = business education teachers. [f]*n* = 55. Mkt = marketing education teachers. [g]*N* = 313. CTE = career and technical education teachers.

Table 4
Statements in Career and Technical Education Teachers' Perceptions of Their Own Teaching Effectiveness Scale

Item #	Statements	*M*	*SD*
2.	I am highly effective in teaching the content in my courses.	4.22	.64
1.	I am among the very best teachers at my school.	3.98	.83
7.	My principal would say that I am one of the best teachers at this school.	3.94	.83
3.	My students would rate me as one of the very best teachers they have ever had.	3.81	.77
4.	The other teachers in my school would say that I am one of the best teachers at this school.	3.71	.78
6.	I am a role model for other teachers in my school.	3.63	.81
5.	All of my students would evaluate my courses as excellent.	3.55	.85

Note. *N* = 316. Scale Grand Mean = 3.83 (*SD* = .63). Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, and 4 = Agree, and 5 = Strongly Agree.

Objective 4 – Teachers Perceived Technology Anxiety

A single item was used to assess the teachers' level of technology anxiety, "How much anxiety do you feel when you think about using technology in your instruction?" The teachers responded using the following scale: 1 = No anxiety, 2 = Some anxiety, 3 = Moderate anxiety, and 4 = High anxiety. The test-retest correlation with a two week interval was .81, which indicates exemplary reliability according to the standards for reliability by Robinson et al. (1991). The analysis of the data revealed that CTE teachers are feeling some anxiety when they think about using technology in their instruction (M = 1.63, SD = .75, N=313).

The analysis of variance presented in Table 3 revealed that CTE teachers' technology anxiety levels differ by program area (F = 9.98, P <.001). The Tukey HSD and the Cohen's f effect size statistic (Cohen, 1988) revealed that agriscience teachers' technology anxiety was somewhat higher than business and marketing teachers technology anxiety.

Objective 5 – Technology Training Sources

The teachers were asked to indicate the sources of their technology training (see Table 5). Four sources were listed, and the teachers were instructed to check all that applied to them. Over two-thirds of the teachers had participated in workshops or conferences (n = 281 or 88.1%) or were self-taught (n = 262 or 82.1%), while over half learned from colleagues (n = 182 or 57.1%) or had taken college courses (n = 171 or 53.6%).

The Cramer's V analyses presented in Table 5 revealed that CTE teachers' sources of technology training were associated with program area for two of the four training sources. A moderate association existed indicating that business teachers used college courses as a training source more than agriscience and marketing teachers (V = .20, P =.002), while both business and marketing teachers used the self taught approach more than agriscience teachers (V = .18, P =.007). There was no association between the teachers' CTE program area and their use of workshops/conferences and colleagues as training sources.

Objective 6 – Technology Availability

CTE teachers were asked about the availability of selected technology for their use in teaching. Most (278 or 87.1%) of the CTE teachers had home Internet access, while just over half (184 or 58.8%) had Internet access at school. Over one-half of the teachers had e-mail accounts (n = 237 or 75.7%), while few reported that their students had e-mail accounts (n = 48 or 15.3%). Other types of technology available for their use in teaching included interactive CDs (n = 114 or 36.4%) and laser disc players or stand alone CD players (n = 53 or 16.9%).

Cramer's V analyses were used to determine if an association existed between CTE program and the availability of selected types of technology. The data in Table 5 reveal that the availability of technology was significantly associated with program

Table 5
Sources of Technology Training and Technology Availability by Career and Technical Education (CTE) Teachers' Program Area

Sources of Training and Types of Technology Available	*CTE* *f* / %	CTE Program Area *Ag* *f* / %	*Bus* *f* / %	*Mkt* *f* / %	Cramer's V	*P*	Magnitude of Association
Sources of Training							
Workshops/ conferences	281/ 88.1%	100/ 86.2%	130/ 88.4%	51/ 91.1%	.05	.643	Negligible
Self taught	262/ 82.1%	85/ 73.3%	127/ 86.4%	50/ 89.3%	.18	.007	Weak
Colleagues	182/ 57.1%	69/ 59.5%	77/ 52.4/%	36/ 64.3%	.09	.248	Negligible
College courses	171/ 53.6%	50/ 43.1%	94/ 63.9/%	27/ 48.2%	.20	.002	Moderate
Technology Available							
Computer with Internet connection at home	278/ 87.1%	98/ 84.5%	128/ 87.1%	52/ 92.9%	.09	.306	Negligible
Teacher has e-mail account	237/ 75.7%	85/ 73.9%	119/ 83.2%	33/ 60.0%	.20	.003	Moderate
Computer with Internet connection in teacher's office at school	184/ 58.8%	77/ 67.0%	77/ 53.8%	30/ 54.5%	.13	.081	Weak
Interactive CDs	114/ 36.4%	46/ 40.0%	40/ 28.0%	28/ 50.9%	.18	.007	Weak
Laser disc player or standalone CD players	53/ 16.9%	14/ 12.2%	26/ 18.2%	13/ 23.6%	.11	.152	Weak
Student e-mail accounts	48/ 15.3%	19/ 16.5%	19/ 13.3%	10/ 18.2%	.06	.628	Negligible

Note. The effect sizes for the Cramer's *V* coefficients were interpreted using Rea and Parker's (1992) conventions for describing the magnitude of association in contingency tables: .00 to under .10 – negligible association, .10 to under .20 – weak association, .20 to under .40 – moderate association, .40 to under .60 – relatively strong association, .60 to under .80 – strong association, and .80 to 1.00 – very strong association.
[a]Respondents checked (√) the sources of technology training and the technology available for use in teaching. [b]N = 313-319. CTE = career and technical education teachers. [c]n = 115-116. Ag = agriscience education teachers. [d]n = 143-147. Bus = business education teachers. [e]n = 55-56. Mkt = marketing education teachers.

area for two of the six types of technology. A moderate association existed indicating that agriscience and business teachers were more likely to have e-mail accounts than marketing teachers (V = .20, P =.003). Weak associations existed for teachers having Interactive CDs, with marketing teachers being most likely to have this technology (V = .18, P =.007). No other significant associations existed.

Objective 7 – Explanation of Variance in Technology Integration

Forward multiple regression analyses were used to determine if selected variables explained a substantial proportion of the variance in the four technology integration subscale scores. The grand mean of each subscale was used as the dependent variable in these analyses. The results of these analyses are shown in Table 6.

Seven variables were used as potential explanatory variables: the grand mean of the barriers to the integration of technology scale, the grand mean of the teachers' perceptions of their own teaching effectiveness scale, the teachers' technology anxiety, the total number of types of technology available (ranged from 1-6), the number of sources of technology training used by the teacher (ranged from 1-5), whether the computer in the teachers' office at school had Internet access, and whether the teachers' home computer was connected to the Internet. The last two variables were dummy coded for use in the regression analysis (1 = yes and 2 = no). In all four regression analyses, the variance due to the CTE program of the respondent (agriscience, business, marketing) was controlled by forcing this variable into the model prior to assessing other variables.

The multicollinearity assessment revealed that multicollinearity did not exist in any of the four regression analyses. Hair, Anderson, Tatham, and Black (1998) indicated, "The presence of high correlations (generally, .90 and above) is the first indication of substantial collinearity" (p. 191). None of the independent variables had a high correlation with any other independent variable. Hair et al. also indicated that "Two of the more common measures for assessing both pairwise and multiple variable collinearity are (1) the tolerance value and (2) its inverse–the variance inflation factor (VIF). . . . Thus any variables with tolerance values below .19 (or above a VIF of 5.3) would have a correlation of more than .90" (p. 191, 193). For this study, none of the tolerance values observed was lower than .19 and none of the VIF values exceeded 5.3.

Using the CTE Program as a control variable, a total of four variables explained 22.5% of the variance in the grand mean of the exploration scale grand mean, namely, the CTE Program (R^2 = .115), technology training (additional R^2 = .070), the grand mean of the Teachers' Perceptions of Their Own Teaching Effectiveness scale (additional R^2 = .021), and technology availability (additional R^2 = .020). As the sources of technology training, teachers perceived teaching effectiveness, and the number of types of technology available increased, teachers' exploration scores increased. According to Cohen (1988), a regression model that explains 22.5% of

Table 6
Multiple Regression Analyses of Variables Explaining Variance in Career and Technical Education Teachers' Responses to the Technology Integration Subscales

Subscale Grand Mean Explanatory Variables	F	P	R^2	R^2 Change	F Change	P *of* F Change	Effect Size[a]
Exploration	17.5	<.001					Moderate
Controlled for CTE Program			.115	.115	19.7	<.001	
Technology training			.185	.070	25.9	<.001	
Perceived teaching effectiveness			.206	.021	8.0	.005	
Technology availability			.225	.020	7.6	.006	
Experimentation	6.8	<.001					Small
Controlled for CTE Program			.039	.039	6.2	.002	
Technology anxiety			.071	.032	10.4	.001	
Barriers to technology integration			.083	.012	4.0	.047	
Adoption	52.7	<.001					Large
Controlled for CTE Program			.340	.340	78.5	<.001	
Barriers to technology integration			.440	.099	53.7	<.001	
Perceived teaching effectiveness			.495	.056	33.2	<.001	
Technology anxiety			.538	.043	27.7	<.001	
Technology availability			.562	.025	16.8	<.001	
Home Internet connection			.578	.016	11.2	.001	
Technology training			.586	.008	5.7	.018	
Advanced Integration	18.4	<.001					Large
Controlled for CTE Program			.087	.087	14.5	<.001	
Barriers to technology integration			.171	.084	30.8	<.001	
Perceived teaching effectiveness			.244	.072	28.9	<.001	
Technology availability			.275	.031	12.9	<.001	
Technology anxiety			.289	.014	6.0	.015	
Home Internet connection			.301	.012	5.1	.025	

[a]Cohen (1988): $R^2 > .0196$ = small effect size, $R^2 > .13$ = moderate effect size, and $R^2 > .26$ = large effect size.

the variance represents a moderate effect size. The other variables did not explain a substantial proportion of the variance.

Again, using the CTE Program as a control variable, a total of three variables explained 8.3% of the variance in the grand mean of the experimentation subscale grand mean, namely, the CTE Program (R^2 = .039), technology anxiety (additional R^2 = .032), and the grand mean of the barriers to technology integration scale (additional R^2 = .012). As teachers' technology anxiety and their perceived barriers to technology integration increased, their experimentation scale scores decreased. According to Cohen (1988), this model has a small effect size. The other variables did not explain a substantial proportion of the variance. See Table 6 for the ANOVA table for this regression analysis.

For the adoption subscale, the CTE Program was again used as a control variable. A total of seven variables explained 58.6% of the variance in the grand mean of the adoption scale grand mean, namely, the CTE Program (R^2 = .340), barriers to technology integration scale training (additional R^2 = .099), perceived teaching effectiveness (additional R^2 = .056), technology anxiety (additional R^2 = .043), technology availability (additional R^2 = .025), having a home Internet connection (additional R^2 = .016), and technology training (additional R^2 = .008). Teachers' technology anxiety and their perceived barriers to technology integration had a negative relationship with their technology adoption, while their perceived teaching effectiveness, technology availability, availability of a home Internet connection, and technology training all had a positive relationship with their technology adoption. This model represents a large effect size (Cohen, 1988). The other variables did not explain a substantial proportion of the variance. The ANOVA table for the regression analysis is presented in Table 6.

In the last subscale, advanced integration, the CTE Program was again used as a control variable. A total of six variables explained 30.1% of the variance in the grand mean of the advanced integration scale grand mean, namely, the CTE Program (R^2 = .087), barriers to technology integration scale training (additional R^2 = .084), perceived teaching effectiveness (additional R^2 = .072), technology availability (additional R^2 = .031), technology anxiety (additional R^2 = .014), and having a home Internet connection (additional R^2 = .012). Again, teachers' technology anxiety and perceived barriers to technology integration had a negative relationship with advanced technology integration, while their perceived teaching effectiveness, technology availability, and having a home Internet connection had a positive relationship with their advanced technology integration. According to Cohen (1988), this model represents a large effect size. The other variables did not explain a substantial proportion of the variance (see Table 6).

Conclusions

The phases of technology integration in which CTE teachers are most active are in exploration of the potential of using technology in the teaching/learning process and in adopting technology for regular use in instruction; they are showing some strength in both phases. They are not very active in either the experimentation phase or in the advanced integration phase. Marketing and business teachers have substantially more strength in the adoption phase and are stronger in the exploration and advanced integration phases than agriscience teachers, while agriscience teachers have slightly more strength than business teachers in the experimentation phase. This level of technology integration may be related to the availability of technology for use in the teaching/learning process. Some have not had access to the latest technology for use in their classrooms and labs; however, it appears that some CTE teachers are using the available technology. Even though most CTE education teachers have computers, Internet access, and other technology, they have not integrated technology into their instruction at the highest level.

CTE teachers do not experience substantial barriers in their efforts to integrate technology in the teaching/learning process. This conclusion does not support the review of meta-analyses conducted by Fabry and Higgs (1997), and the national study conducted by the National Center for Education Statistics (Smerdon et al., 2000), in which they concluded that teachers were encountering barriers in their efforts to integrate technology in instruction. Agriscience teachers experience substantially more barriers than business and marketing teachers. In general, CTE teachers are experiencing some technology anxiety that prevents them from using technology in their instruction. Agriscience teachers experience more technology anxiety than business and marketing teachers when they attempt to integrate technology in the teaching/learning process.

CTE teachers perceive they are good teachers regardless of whether or not they demonstrated strength in integrating technology at the advanced level of the teaching/learning process. Teachers' perceptions of their own teaching effectiveness is related to their exploration, adoption, and advanced integration of technology. The advanced integration of technology by CTE teachers is minimal and may be reflective of many educational leaders such as Budin (1999) who voiced concerns about how technology fits into the curriculum, what teachers should know, and how the impact of technology should be assessed. Business and marketing teachers self-perceived teaching effectiveness was somewhat higher than agriscience teachers' self-perceived teaching effectiveness.

Teachers continue to use traditional sources for technology training such as workshops/conferences, college courses, colleagues, and self-directed learning, with workshops/conferences and self taught being the most used. However, teachers are using workshops/conferences at a higher level than self-directed learning. This conclusion contrasts with the conclusions by Kotrlik et al. (2000) in which they reported that self directed learning was the top rated source of computer training for vocational teachers, followed by workshops and conferences. Business teachers are more likely than marketing and agriscience to use college courses as a source of technology training and business and marketing teachers are slightly more likely to use self-directed or self taught approaches as a source of technology training when compared to agriscience teachers.

Technology training, self-perceived teaching effectiveness, and the availability of technology combine to make a moderate contribution to a CTE teachers' decision to learn about technology and how to use it in the teaching-learning process. However, as CTE teachers begin to experiment with technology, two limiting factors, technology anxiety and perceived barriers to technology integration, unite to provide a small impediment to experimenting with the use of technology in the teaching-learning process. When one considers technology adoption in the teaching-learning process, all of these factors--technology training, self-perceived teaching effectiveness, availability of technology, perceived barriers, and technology anxiety, plus teachers having a home Internet connection, come together to explain a large part of teachers' decisions to adopt technology in the teaching-learning process. Perceived teaching effectiveness, availability of technology, technology anxiety, barriers to technology integration, and having a home Internet connection coalesce to explain teachers advanced technology integration. This study supports the review of several meta-analyses by Fabry and Higgs (1997) and the research by Smerdon et al. (2000), in which they found that some of the major issues in integrating technology into instruction included training, access to technology, and various other barriers to the integration of technology.

Recommendations and Implications

As indicated in the need for the study, the debate about the efficacy of technology integration continues, but organizational and political realities indicate that technology-based instruction is a viable alternative (Bower, 1998). More must be done to encourage and support CTE teachers in the integration of technology in the teaching/learning process and we must continue to explore and expand technology based teaching and learning in CTE programs. Local school systems, the Louisiana Department of Education, and college and university faculty must continue to take a leadership role and responsibility for making major improvements in CTE teachers' effective use of technology in the teaching-learning process.

At the same time, the teachers themselves must be proactive and continue to embrace available learning opportunities to support this effort. Teachers must not only attend workshops, conferences, and college courses, but they must also engage in self-directed learning to stay current with the use of technology in the teaching-learning process. These efforts on the part of teachers should result in decreased technology anxiety. School systems must take major responsibility for providing training and technology, and work to reduce or eliminate barriers to technology integration. Teachers and school systems must collaborate to pursue technology integration at the highest level where innovative technology-based approaches to teaching-learning are highly valued and integrative in the total learning environment. The National Technology Education Plan (Office of Educational Technology, 2000) emphasized that:

> Ensuring that the nation has effective 21st-century teachers requires more than just providing sufficient access to technology for teaching and learning. We should improve the preparation of new teachers, including their knowledge of how to use technology for effective teaching and learning; increase the quantity, quality and coherence of technology-focused activities aimed at the professional development of teachers; and, improve the instructional support available to teachers who use technology. (¶12)

Leaders must find or develop models that will result in faster and better integration of technology in the teaching/learning process in CTE programs. In addition to making teachers "better" users of technology, they must be convinced that technology will improve the quality of their instruction and ultimately, student learning. Also, studies should be conducted to determine if the integration of technology as an instructional tool is truly making a difference in learning in career and technical education programs. The process should involve all stakeholders in CTE programs and must be aggressively pursued. This recommendation has implications for local school boards, the Louisiana Department of Education, and university teacher education programs.

The career and technical education field must further its research efforts to help teachers and schools integrate technology at the highest level. It is recommended that researchers examine various factors to determine their impact on learning in a technology supported learning environment, whether individually or collectively, e.g., the efficacy of specific technologies, effect of learner type, types of learning tasks (cognitive, affective, or psychomotor), instructional approaches, interdisciplinary activities, and technology barriers. Related research should be conducted to build on this study and identify other factors that explain teachers' technology integration in addition to those identified in this study. Additional research could address the optimal approach for teacher training for technology rich environments. Questions that may be asked include: What should the future structure of teacher education look like? What is the appropriate level of technology integration for teachers in each of the career and technical education programs? What combination of resident, distance, and web-based learning is most effective? Does CTE teachers' technology proficiency affect their teaching self-efficacy? Does teachers' learning style play a major role in their acquisition of technology integration knowledge and skills? What impact do philosophical, political, and other local realities have on technology integration and how should these realities be addressed? The answers to these questions should help build a high performance future for CTE programs in terms of a higher level of learning, efficiency in learning, and, ultimately, a higher level of worker competence.

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An Investigation of Student, Faculty, and Administration Perceptions of the Application of Accelerated Learning Strategies in the Wisconsin Technical College System

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Abstract

The Wisconsin Technical College System (WTCS) engaged in an educational reform initiative by implementing the use of an accelerated instructional methodology. Rather than strictly compressing course meeting times, the WTCS required that courses identified as "accelerated" incorporate brain-based instructional tools and delivery methods. This study investigates the perceptions of students, faculty, and instructional supervisors involved with the use of accelerated learning strategies. Objectives guiding the investigation focused on critical dimensions of the methodology and differences in perception between accelerated and traditional students as well as faculty and instructional supervisors involved with accelerated academic programming. Students participating in accelerated courses assigned a different degree of importance to the critical dimensions of accelerated learning as compared to traditional students. Overall, experiences reported by both classifications of student did not differ significantly. Despite meeting fewer course hours, accelerated students reported comparable learning experiences to students in traditional programs.

Introduction

In the late 1980s and early 1990s, a profound change was occurring in the post-secondary education system of the United States. Barr and Tagg (1995) noted that where colleges were once in the business of delivering instruction, they now needed to be in the business of producing learning. The implementation of this change would be gradual and guided by the ongoing results of institutional assessment processes.

Bransford, Brown, and Cocking (2000) cited new developments in the science of learning as altering current theoretical conceptions. While more traditional methods of instruction emphasized the instructor as manager of the learning environment, new research highlights the importance of helping students learn to take control of their own learning processes. "The emerging science of learning underscores the importance of rethinking what is taught, how it is taught, and how learning is assessed" (p. 13).

The Wisconsin Technical College System (WTCS) was one of many post-secondary systems to answer the call for change. The WTCS is a post-secondary organization of 16 member colleges serving students through 47 campuses. Tracing its origins back to 1907, the WTCS offers Associate of Applied Science degrees, technical diplomas, and continuing education courses for those seeking new employment or broadening their skills in an existing job.

The WTCS engaged in a reform effort by offering accelerated degree programs as early as 1986. Accelerated learning is an educational delivery method and philosophy utilizing brain research to design optimal learning opportunities. Accelerated learning definitions vary by author. In reality, the definition has blurred as more people use and add techniques to the process (Zemke, 1995). According to Wlodkowski (2003), ". . . accelerated learning programs are structured for students to take less time than conventional (often referred to as traditional) programs" (p. 6). While many programs labeled as accelerated simply operate courses in condensed formats, the WTCS imposed additional requirements.

The WTCS issued its own guidelines for member colleges seeking to offer accelerated instruction at the Associate of Applied Science degree level. According to Cullen (1999), these guidelines included: establishment of competency-based curriculum, use of a prescribed course sequence, formation of a cohort of students that agree to complete the entire degree together, application of the knowledge acquired in the degree program to a work setting, employment of accelerated learning strategies, participation of instructors in specific training in the use of the accelerated instructional methodology, participation by students in out of class study groups, and student engagement in activities outside of the classroom. In exchange for following these guidelines, Wisconsin colleges may reduce the class time required of students by up to one half.

Purpose

As noted by Wlodkowski (2003), ". . . accelerated programs are one of the fastest-growing transformations in higher education" (p. 5). Those making decisions with regard to the expansion and improvement of accelerated programming have had limited information from which to draw. The purpose of this study was to: investigate the perceptions of the three key parties: students, faculty, and instructional supervisors involved with the use of accelerated learning strategies. The areas of concentration included instruction, academic programming (administrative), and professional development. It was envisaged that knowledge derived from the study would help stakeholders in academic programs to make data-driven decisions regarding the expansion and improvement of accelerated academic programming in Wisconsin and beyond. The research objectives of the study were to:

1. Determine the perceptions of students, faculty, and instructional supervisors in regard to the critical dimensions of accelerated instructional methodologies utilized in the Wisconsin Technical College System.
2. Discover to what extent accelerated and non-accelerated students differ in their perceptions of the critical dimensions of accelerated learning.
3. Ascertain what the perceptual differences are between faculty and instructional supervisors with respect to accelerated academic programming.
4. Document the absence or existence of differences among student perceptions and those of faculty and instructional supervisors with respect to the critical dimensions of accelerated learning.
5. Determine the perceptions of faculty and instructional supervisors with respect to the professional development necessary for the implementation of accelerated learning strategies.

Literature Review

A review of related literature focusing on adult learners, learning theory, brain research, instructional theory and practice, and learning styles was conducted to provide a foundation for the investigation. The literature associated with the accelerated learning methodology itself was emphasized in order to investigate the perceptions of students, faculty, and instructional supervisors regarding the application of accelerated learning strategies.

Origins of Accelerated Learning

Accelerated learning traces its roots to Bulgaria. In the 1960s, a Bulgarian educational psychiatrist, Dr. Georgi Lozanov, was experimenting with non-traditional methods of teaching English to Bulgarian students (McKeon, 1995). Specifically, Lozanov discovered that the use of Baroque music could bring his students into a state of relaxed attentiveness. Today, similar to the effects of commercial advertising, this technique is referred to as “suggestopedia” (Russell, 1999, p. 186). The use of these techniques can increase the speed at which students learn. The increase in learning efficiency, as compared with traditional teaching methods, is achieved through engaging the whole body in the learning process (Lozanov, 1978).

In the 1970s, Lozanov’s work received the attention of Sheila Ostrander, Lynn Schroeder, and Nancy Ostrander (1979). Their book, *Superlearning*, discussed the use of Baroque music to relax and make positive suggestions to improve the progress of student learning. This book was the catalyst to start the use of these teaching methods at Iowa State University. In 1975, The Society for Accelerative Learning and Teaching was formed (Meier, 2000). In 1994, this group became known as the

International Alliance for Learning (2003). The International Alliance for Learning (2003) identified 10 elements of accelerated learning. The elements included:

1. Knowledge about the human brain,
2. Emotional state,
3. The learning environment,
4. The role of music and the arts,
5. Personal motivation,
6. Multiple intelligences and learning styles,
7. Imagination/metaphors,
8. Suggestion,
9. Team learning and cooperation, and
10. Improvement and results.

These elements are to serve as guidelines for practitioners in both corporate training and educational settings.

Accelerated learning definitions vary by author. According to Clement (1992), accelerated learning can be defined as:

> . . . a research-based technology and an innovative philosophy that, for every style of learning and behavior, uses learners' holistic natural talents to provide them the highest probability of maximizing their learning, retention, and performance. An Accelerated Learning system does this by creating a stress-free, positive, joyful, and psychologically and physically healthy environment that enhances self-esteem and focuses on the needs of the learner. This attribute is learner-centeredness. (p. 529)

Madden (1995) defined accelerated learning according to its use of the multiple intelligences, learning styles, and whole brain.

> . . . a system of learning that uses a "multisensory' approach, combining music, games, relaxation, movement, and interaction in a classroom setting. Traditional teaching methods rely primarily on the sequential, logical aspects of learning, often ignoring physical involvement, visual contribution, and musical input. (p. 3)

Accelerated Learning Research Studies

Anecdotal evidence of the impact of accelerated learning techniques as defined in this investigation was plentiful. Published research on the concurrent use of multiple accelerated learning techniques was limited. The majority of the available research concentrated on reducing the time spent in the classroom rather than enhancing instructional delivery strategies.

Meier (2000) emphasized the importance of using collaboration in accelerated learning environments. That collaboration takes the form of students progressing through an educational program as a cohort group as well as cooperative learning work within classes. Johnson and Johnson (1999) noted that, ". . . structuring situations cooperatively results in students interacting in ways that promote each other's success, structuring situations competitively results in students interacting in ways that oppose each other's success and structuring situations individually results in no interaction among students" (p. 31).

The research on cooperative learning is abundant. Johnson and Johnson (1989) outlined over 550 experimental studies that had been conducted to compare cooperative, competitive, and individual learning situations. Over 375 studies had investigated the impact of the three aforementioned learning situations on the promotion of efficiency and achievement. According to Johnson and Johnson (1999), ". . . working together to achieve a common goal produces higher achievement and greater productivity than does working alone. This is confirmed by so much research that it stands as one of the strongest principles of social and organizational psychology" (p. 31).

Slavin (1990) reviewed 60 studies. "Overall, the effects of cooperative learning on achievement are clearly positive: forty-nine of the sixty-eight comparisons were positive" (p. 18). It was determined that the incorporation of group goals and individual accountability were critical to increasing student achievement. Much of the research utilized pre- and post-tests of academic material as well as attitudinal scales measuring the experience of the learner.

van Boxtel et al. (2002) recommended the use of concept maps to reinforce understanding of curriculum. The term concept map is linked to the work of Novak (1998). According to Chang, Sung, and Chen (2002), concept maps rank among the spatial learning strategies of graphic organizers and knowledge maps. Novak and Musonda (1991) discovered that cognitive developmental changes could be attributed to the use of concept maps in science courses. Rose and Nicholl (1997) recommended concept maps as useful in practicing accelerated learning.

Research on the use of concept maps included application in specific disciplines. As previously noted, practitioners of science education had taken special interest in concept mapping. Nicoll, Francisco, and Nakhleh (2001) described the use of concept maps in chemistry courses. In their study, the complexity of student concept mappings was considered a positive indicator of the ability to solve complicated science problems.

The International Alliance for Learning (2003) identified music as being one of 10 key components of accelerated learning. The use of music to enhance the learning process is closely associated with Rauscher and Shaw at the Center for Neurobiology of Learning and Memory at the University of California, Irvine (Rauscher, Shaw et al., 1993). The research methodology included having college students listen to a recording of a Mozart sonata for 10 minutes. Later, a written, abstract reasoning test was administered. The results of the test indicated that listening to the music improved performance on a spatial reasoning task. This later became known as the “Mozart effect.” Researchers were eager to test this theory. Steele, Brown, and Stoecker (1999), in a study to test the findings with regard to Mozart’s music, were unable to replicate the results.

Bodner, Muftuler, Nalcioglu, and Shaw (2001) conducted another study comparing the effect of Mozart’s music with other musical pieces. This study employed magnetic resonance imaging to obtain images of brain region activation. “The preferential activation by the Mozart Sonata of the DPC, occipital cortex, and the cerebellum all suggest the activation of an underlying neural network spanning multiple cortical areas and overlapping with networks crucial in spatial-temporal reasoning” (p. 687).

Erland (1999) undertook an experiment to determine the results of applying a combination of accelerated learning techniques to subjects in grades four through eight. Two Midwestern parochial schools were used as sites for this research. Interactive video and audio technology were used to deliver cognitive skills and memory training. Accelerated learning techniques were used in the production of the media. “Students were trained to strengthen their visual, auditory, tactile, and kinesthetic modalities and learn successfully through several primary styles rather than being limited to only a few modalities or styles” (p. 3).

A total of 269 students received exposure to the accelerated methodology for 10 weeks. An additional 71 students served as a control group. A pre- and post-test process using a nationally recognized test of basic skills was the primary method for measuring the results of the exposure to accelerated learning techniques. The experiment resulted in 58 statistically significant improvements in 13 subjects of the standardized test of basic skills. “This study shows that with cognitive skills malleable and correctable, with all learning pathways treated to become operational, individuals do not have to settle for the limitations of nature and nurture” (Erland, 1999, p. 4).

Peterson (1977) staged a comparison of two groups of Navy ROTC college students. The two groups received identical instruction for the first three weeks of the course. An examination administered prior to application of accelerated instructional methodology resulted in the two groups earning almost identical scores.

A control group of students met the traditional amount of time. They were taught using traditional methods of lecture. The Lozanov (1978) method of suggestive learning was used as the basis for designing an accelerated learning experience for the other, experimental group of students.

Beginning in week four, the experimental group met half of the normal class time and received instruction using accelerated methodologies. This included stretching exercises to begin the class period followed by strategies to relax the students and prepare them for learning. Acronyms and word associations were among the techniques used during the presentation of the course material. At the end of the experiment, final exam scores for the two groups were almost identical. The researcher concluded that the experimental group had learned the same amount of information in half of the time. This was regarded as a strong argument for the use of accelerated learning strategies.

In a similar study, Walters (1977) conducted an experiment in teaching 44, ninth grade vocational agriculture students. A series of three pre-tests were used to measure levels of agribusiness achievement, attitudes toward learning, and student control of learning and destiny. The tests were administered to all 44 students. A control group was taught using traditional methods of lecture. A traditional amount of time was spent in class.

An experimental group met less than half of the traditional time. Each class meeting started with a series of physical stretching exercises. Active class participation was then followed by a summary of the day's lesson presented while soft music played in the background.

Post-tests in agribusiness achievement indicated that no significant difference could be found in the scores of the experimental versus control students. In that the experimental student met less than half of the traditional seat time, the argument could be made for the effectiveness of the accelerated instructional methodology.

Significant differences at the $p<.05$ level or better were found between the two groups in the measures of attitudes toward learning and student control of learning and destiny. Students taught using accelerated methods exemplified greater improvement in changing locus of control factors and improving agronomic interest attitudes. It was recommended that additional studies be conducted using a larger sample and a more random selection of students.

Holding instructional methodology constant while reducing the time spent by students in the classroom runs contrary to the requirements for the application of accelerated techniques in Wisconsin (Cullen, 1999). The technical colleges in Wisconsin require that a number of additional elements be present in accelerated versus non-accelerated courses.

Despite the requirements in Wisconsin, educational institutions across the United States have pursued a strategy of time-compressed or intensive course delivery. Scott and Conrad (1992) reviewed over 100 studies dealing with the development and use of time-compressed courses. It was concluded that intensive courses result in equivalent and sometimes superior learning outcomes as compared to traditional length coursework. Social sciences and humanities courses were found to even benefit from intensive versus traditional course formats. Although indicating that additional stress and fatigue result from intensive courses, students were generally supportive of the concept. The most significant obstacle appeared to be faculty attitudes toward time-compressed courses.

Wlodkowski and Westover (1999) reviewed studies to determine the difference that time makes to the learning process. Referring to time-compressed courses as accelerated, it was concluded that the competencies learned by and attitudes of the accelerated students were similar and sometimes better than students in programs of more traditional lengths. It is important to note that the definition of accelerated learning used in this literature focused only on time and not on using brain-based instructional methodology.

Given that few previous studies appeared to include all of the circumstances surrounding the use of accelerated learning as it is applied in the Wisconsin System, the literature review serves to reinforce the need to pursue this investigation.

Methodology

This study employed a descriptive research design with a survey instrument used to collect data. In the absence of an existing instrument, the objective of determining the perceptions of students, faculty, and instructional supervisors toward the application of accelerated learning strategies was answered by developing and administering a custom survey instrument. Descriptive statistics were computed for all of the rated items. Analysis of variance (ANOVA) was used to compare the mean scores of the various categories of respondents. The p-value for statistical significance was set at .05 for all responses to the survey instruments and for all statistical analyses.

Population and Sample

In accordance with the objectives of the investigation, the population for the survey was identified as students, faculty members, and administrators associated with Wisconsin Associate of Applied Science (AAS) degree programs identified as being "accelerated." According to Cullen (1999), being described as "accelerated" required compliance with the WTCS Board process for notification and delivery of accelerated programming. The accelerated designation implied that course meeting hours were being reduced in exchange for incorporating the tools of the accelerated instructional methodology into the course. Admissions representatives at each of the 16 Wisconsin technical colleges were contacted to determine if they advertised programs as being delivered utilizing accelerated instructional methodology. It was determined that 13 of the 16 colleges offered an accelerated AAS degree in Supervisory Management. Of the 13, five colleges agreed to provide the names and mailing addresses of students graduating in 2001 and 2002. These five colleges were representative of the major geographic areas of Wisconsin.

Table 1 shows the percent of surveys returned for each of the respondent types after three mailings. The table shows that the response rate was higher for administrators and faculty than it was for students.

Table 1

Summary of Samples and Return Rates by Classification

Classification	Sample *N*	Returned *N*	Returned %
Administrators	29	21	72
Faculty	97	61	63
Accelerated Students	264	88	33
Non-accelerated Students	264	77	29
TOTALS	654	247	38

Questionnaire Development

The critical dimensions of accelerated learning discovered in the review of literature served as the basis for development of a questionnaire. To fulfill the research objectives, the instrument needed to measure the frequency of experience as well as the perceived importance of each dimension of accelerated learning. Three versions of the instrument were created. One version each for administrators, faculty, and students catered to the classifications of the research subjects. The objective was to measure the perceptions of students, faculty, and administration toward the use of accelerated learning strategies.

The survey was divided into three separate sections. Section one was subdivided into seven critical dimensions of accelerated learning. Section two included staff development questions for administrators and faculty. For students, section two presented a set of questions referring to their overall learning experience. Finally, section three requested demographic data from all three sample populations. Table 2 shows the titles around which each question in the three sections was developed.

The number of questions in the survey was directly related to the issue being studied and the research objectives guiding the overall investigation. The length of the questionnaire was justified by the number of themes identified in the literature.

A pilot study was conducted by distributing one of the three survey versions to six members of each of the following populations: students, faculty members, and administrators. Their responses to the surveys were used to determine the clarity of the instructions, coverage of critical factors, and utility of survey results. Feedback from the pilot group led to changes in the phrasing of instructions and alteration of selected questions. No additional questions were suggested and no existing questions were completely struck from the survey.

Table 2

Structure of the Survey

Survey Section	Section Title	Number of Items
1a	Instructional Operations	8
1b	Curriculum	6
1c	Classroom Climate	4
1d	Instructor	7
1e	Instruction	12
1f	Learning and Transfer	4
1g	Rigor	5
2 (Versions 1-2)	Staff Development	5
2 (Version 3)	Overall Experience	4
3 (Versions 1-2)	Demographic Data	5
3 (Version 3)	Demographic Data	3

Note. Version one = administrators, version two = faculty, version three = students.

Research Results

Table 3 indicates the age data reported by the accelerated and non-accelerated students responding to the survey. As evidenced by the data in Table 3, the respondents represented a diversity of ages with the accelerated students trending toward a more mature demographic than their non-accelerated counterparts. The data in Table 4 describes administrators and faculty according to the number of years they reported being in their current positions. Faculty reported more seniority in their positions than the administrators supervising their accelerated instruction.

Research Objective One

Research objective number one focused on the perceptions of students, faculty, and instructional supervisors with respect to the critical dimensions of

Table 3

Student Response Data by Age

Age Categories (Years)	Accelerated *N*=88	%	Non-accelerated *N*=77	%
< 20	0	0.0	3	3.9
20 – 29	17	19.3	44	57.1
30 – 39	13	14.8	13	16.9
40 – 49	46	52.3	12	15.6
> 49	12	13.6	5	6.5
TOTALS	88	100.0	77	100.0

Table 4

Administrator and Faculty Respondents by Years in Current Position

Classification	*N*	Mean Years in Current Position
Administrators	21	8.4
Faculty	61	10.5

accelerated instructional methodologies utilized in the WTCS. The survey instrument presented critical dimensions of accelerated learning and asked respondents to indicate their perceived importance and frequency of experience with each dimension. The same survey questions were presented to each of three subject groups; accelerated students, non-accelerated students, and faculty. Administrators, due to their distance from the classroom, were excluded from rating their frequency of experience with accelerated learning strategies.

Students participating in accelerated instructional programming indicated that classes being scheduled at convenient times was very important. Students, faculty, and instructional supervisors agreed that these classes needed to include coursework based on skills needed in the workplace. A strong message was sent that relevant work experience on the part of the instructor was also important. Table 5 identifies perceptions of accelerated students relative to the role of the instructor.

Many of the instructional tools employed in the accelerated classroom were very important to student learning. Accelerated students reported frequently being taught in ways that were consistent with their learning styles and students credited the instructors' teaching methods with making the course material interesting.

Faculty noted the high importance of students being familiar with one another. Instructional supervisors concurred by indicating the high importance of students participating in a special orientation prior to beginning an accelerated educational program. Administrators, responding only to the levels of importance, placed high importance on all facets of the instructor's role within the classroom. The consensus between those facilitating, supervising, and participating in accelerated learning was apparent.

Table 5

Perceptions of Accelerated Students – Role of the Instructor

Statements	Survey Category					
	Accelerated Students Frequency of Experience			Accelerated Students Perceived Importance		
	Ratings	*f*	%	Ratings	*f*	%
Instructors had work experience relevant to their teaching.	1	-	-	1	-	-
	2	1	1.1	2	-	-
	3	6	6.8	3	3	3.4
	4	42	47.7	4	28	31.8
	5	39	44.3	5	57	64.8
Instructors used a variety of teaching methods.	1	-	-	1	-	-
	2	1	1.1	2	1	1.1
	3	14	15.9	3	7	8.0
	4	44	50.0	4	34	38.6
	5	29	33.0	5	46	52.3
Instructors showed care and concern for students.	1	-	-	1	-	-
	2	1	1.1	2	-	-
	3	5	5.7	3	4	4.5
	4	47	53.4	4	25	28.4
	5	35	39.8	5	59	67.0
Instructors used novel approaches to teaching (ex. use of music, mind maps, manipulatives).	1	1	1.1	1	1	1.1
	2	1	1.1	2	1	1.1
	3	18	20.5	3	11	12.5
	4	25	28.4	4	32	36.4
	5	43	48.9	5	43	48.9
Instructors arranged for field-based experiences as part of the coursework.	1	10	11.4	1	2	2.3
	2	19	21.6	2	1	1.1
	3	24	27.3	3	22	25.0
	4	19	21.6	4	37	42.0
	5	16	18.2	5	26	29.5
Instructors had challenging out-of-class work expectations.	1	-	-	1	-	-
	2	5	5.7	2	2	2.3
	3	21	23.9	3	25	28.4
	4	36	40.9	4	34	38.6
	5	26	29.5	5	27	30.7
Instructors encouraged students to learn from each other through group projects and presentations.	1	-	-	1	1	1.1
	2	1	1.1	2	1	1.1
	3	8	9.1	3	7	8.0
	4	30	34.1	4	31	35.2
	5	49	55.7	5	48	54.5

Note. Rating Scale for Experience: 1=Very Rarely or Never, 2=Rarely, 3=Occasionally, 4=Frequently, 5=Very Frequently. Rating Scale for Importance: 1=Unimportant, 2=Of little importance, 3=Moderately important, 4=Important, 5=Very important.

Research Objective Two

Research objective number two centered on the differences in perception between accelerated and non-accelerated students with respect to the critical dimensions of accelerated learning. The survey instrument presented critical dimensions of accelerated learning and asked both accelerated and non-accelerated graduates of Associate of Applied Science degree programs to indicate their frequency of experience and level of importance relating to each dimension. Analysis of variance (ANOVA) was used to compare mean scores.

Students participating in accelerated courses assigned a different degree of importance to the critical dimensions of accelerated learning as compared to non-accelerated students. Convenient class scheduling and time-compressed class meetings were more important to accelerated students while using the Internet to enhance course content was more important to non-accelerated respondents. Table 6 compares responses in the category of instructional operations. Three items showed a significant difference at the .05 level. The areas of difference included convenient class scheduling, abbreviated meeting times, and use of the Internet. Accelerated students assigned significantly more importance than their non-accelerated counterparts to classes meeting fewer class hours than traditionally required. The difference was significant at the $p<.001$ level.

Emphasizing brain-based learning, multiple intelligences, and learning styles was significantly more important to accelerated students. Aspects of acceleration including course integration, active class participation, and the instructor's use of novel approaches to learning were also identified as being more important to accelerated students. Table 7 exemplifies the findings by presenting survey responses in the category of curriculum. Table 7 indicates significance at the .05 level in four out of six items.

Clearly, those students participating in accelerated learning programs encountered a learning experience different from that experienced by non-accelerated students participating in more traditional coursework. The difference was evident in their "frequency of experience" responses. According to the students, faculty teaching accelerated students more frequently used novel approaches and encouraged cooperative learning through group projects and presentations. Most importantly, the overall experience reported by both classifications of student did not differ significantly. Despite meeting fewer course hours, accelerated students reported comparable learning experiences to students in traditional programs. Table 8 compares the perceptions of accelerated and non-accelerated students in the category of overall experience.

Table 6
Accelerated and Non-accelerated Students Level of Importance – Instructional Operations

Instructional Operations	Survey Category: Accelerated Students			Survey Category: Non-accelerated Students			All Students		*F*	*P*
	N	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*		
Classes met or were conducted in off-campus locations.	88	2.61	1.45	75	2.29	1.30	2.47	1.39	2.17	.143
Classes were scheduled at times convenient to students.	88	4.83	.435	77	4.56	.85	4.70	.67	6.89	.010
Classes were accelerated, meeting fewer hours than normally required (met less than 16 hours per credit).	87	4.13	1.17	74	3.22	1.15	3.71	1.24	24.60	<.001
Class participants met informally outside of class.	88	2.93	1.11	77	2.97	1.22	2.95	1.16	0.05	.817
I participated in an orientation prior to beginning my educational program.	88	3.51	1.37	74	3.27	1.38	3.40	1.38	1.24	.268
My class sizes were small enough to allow for individual attention.	88	4.43	.76	77	4.58	.61	4.50	.70	1.99	.160
The Internet was used to enhance course content.	88	3.44	1.07	77	3.79	1.00	3.61	1.05	4.62	.033
The Internet was used to enhance communication between course participants.	88	3.33	1.20	77	3.44	1.18	3.38	1.19	0.36	.547

Note. Rating Scale: 1=Unimportant, 2=Of little importance, 3=Moderately important, 4=Important, 5=Very important.

Table 7

Accelerated and Non-accelerated Students Level of Importance – Curriculum

Curriculum	Survey Category								*F*	*P*
	Accelerated Students			Non-accelerated Students			Total			
	N	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*		
Coursework was based on actual skills needed in the workplace.	88	4.65	.66	75	4.81	.51	4.72	.60	3.11	.080
Courses were required to be taken in a logical (specific) order.	88	4.17	1.02	77	4.25	.96	4.21	.99	0.24	.623
Courses were integrated and had common assignments and projects.	88	4.06	.94	77	3.44	1.03	3.77	1.03	16.07	<.001
Curriculum included a specific emphasis on how the brain learns.	88	3.86	1.00	77	3.03	1.16	3.47	1.15	24.94	<.001
Curriculum included a specific emphasis on multiple intelligences.	88	3.73	1.11	75	3.24	1.09	3.50	1.12	7.93	.005
Curriculum included a specific emphasis on identifying students' learning styles.	88	4.10	.96	77	3.48	1.06	3.81	1.05	15.65	<.001

Note. Rating Scale: 1=Unimportant, 2=Of little importance, 3=Moderately important, 4=Important, 5=Very important.

Table 8

Compared Perceptions of Accelerated and Non-accelerated Students – Overall Experience

Rigor	Survey Category								*F*	*P*
	Accelerated Students			Non-accelerated Students			Total			
	N	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*		
How do you feel about the training you received from your Wisconsin Technical College?	88	4.25	.95	77	4.26	.85	4.25	.90	.005	.945
How do you feel about your classes as compared to courses from other providers (high school, other colleges) in terms of the amount of information learned?	88	4.14	1.030	77	4.29	.93	4.21	.99	.945	.333
How do you feel about the quality of your educational experience at your Wisconsin Technical College?	88	4.25	.95	77	4.18	.98	4.22	.96	.205	.651
How do you feel about the length (# of semesters required to complete) of your training program at your Wisconsin Technical College?	88	4.25	1.03	77	4.22	.87	4.24	.96	.038	.845

Note. Rating Scale for Satisfaction: 1=Very Dissatisfied, 2=Dissatisfied, 3=Somewhat Satisfied, 4=Satisfied, 5=Very Satisfied.

Research Objective Three

Research objective number three dealt with the differences in perception between faculty and instructional supervisors with respect to critical dimensions of accelerated academic programming. The survey instrument presented critical dimensions of accelerated learning and asked both faculty and administrators to indicate their perceived "importance" of each dimension.

In comparing faculty with instructional supervisors, a general trend emerged. Faculty frequently rated dimensions of accelerated learning with more importance than did instructional supervisors. Examples included the importance of students meeting outside of class and keeping class sizes small enough to allow for individual attention. Requiring students to take courses in a logical order and placing special emphasis on how the brain learns and multiple intelligences were also more important to faculty. Table 9 presents a comparison of faculty and administrator responses in the category of instructional operations.

Research Objective Four

Research objective number four focused on the differences between student perceptions and those of faculty and supervisors with respect to the critical dimensions of accelerated learning. The data were analyzed by combining the responses of faculty and administrators into one respondent type. Means and standard deviations for the combined faculty and administrator group were compared to responses from the accelerated students. Analysis of variance (ANOVA) was used to compare the mean scores of the two resulting groups.

Students assigned significantly more importance to convenient class scheduling and time-compressed class periods than did the faculty/administrator group. Accelerated students assigned fundamentally equal importance as faculty and administrators to all aspects of classroom climate. Showing care for students, using a variety of teaching methods, and providing challenging out-of-class work expectations was significantly less important to accelerated students than it was to their teachers and administrators. In most cases, the importance placed upon the critical dimensions of accelerated learning was higher for faculty and administrators than for students. This knowledge is important in terms of educational practice. Of special note is the category of instruction. Table 10 identifies aspects of accelerated instruction that were significantly more important to teachers and administrators than accelerated students. One important exception is the use of role-play activities.

Table 9

Faculty Compared with Administrators – Instructional Operations

Instructional Operations	Survey Category						Total		*F*	*P*
	Faculty			Administrators						
	N	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*		
Classes met or were conducted in off-campus locations.	60	3.62	1.21	21	3.43	1.21	3.57	1.20	0.38	.541
Classes were scheduled at times convenient to students.	60	4.65	.73	21	4.67	.58	4.65	.69	0.01	.925
Classes were accelerated, meeting fewer hours than normally required (met less than 16 hours per credit).	60	3.83	1.11	21	3.57	.87	3.77	1.05	0.96	.329
Class participants met informally outside of class.	59	3.90	.99	21	3.14	1.01	3.70	1.05	8.84	.004
I participated in an orientation prior to beginning my educational program.	59	4.47	.90	20	4.60	.68	4.51	.85	0.33	.570
My class sizes were small enough to allow for individual attention.	58	4.62	.52	21	3.90	.94	4.43	.73	18.18	.000
The Internet was used to enhance course content.	59	3.75	.98	21	3.71	.85	3.74	.94	0.02	.896
The Internet was used to enhance communication between course participants.	60	3.70	.96	21	3.67	.91	3.69	.94	0.02	.890

Note. Rating Scale: 1=Unimportant, 2=Of little importance, 3=Moderately important, 4=Important, 5=Very important.

Table 10

Accelerated Students Compared with Faculty/Administrators – Instruction

Instruction	Survey Category: Accelerated Students *N*	*M*	*SD*	Survey Category: Faculty / Administrators *N*	*M*	*SD*	Total *M*	*SD*	*F*	*P*
Peripherals (posters, signs, etc.) were used in and around the classroom.	88	3.84	1.06	81	4.10	.93	3.96	1.01	2.80	.096
Mind mapping (concept maps) was used as a method of organizing information.	88	3.85	.89	81	3.83	.99	3.84	.93	0.03	.862
Role-play activities were used to deliver and practice course content.	88	4.14	.76	81	3.80	1.03	3.98	.91	5.81	.017
Physical exercise was used to energize the class participants.	88	3.08	1.16	81	3.44	1.11	3.25	1.14	4.37	.038
A course theme was used to activate course materials.	88	3.47	.99	80	3.54	1.19	3.50	1.09	0.18	.672
Relaxation techniques were used to relieve tension and focus students on learning.	88	3.57	1.19	80	3.46	1.09	3.52	1.14	0.36	.551
Visualization/imagery was used as a tool to help students imagine a concept or idea.	88	3.75	1.01	81	3.90	.97	3.82	.99	0.98	.323
Concert readings were used to convey course topics and ideas.	88	3.10	1.06	79	3.28	1.07	3.19	1.07	1.13	.288

Instruction	Survey Category						Total		F	P
	Accelerated Students			Faculty / Administrators						
	N	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*		
Reflection/journaling was used to review course concepts.	88	3.34	1.09	80	3.84	.92	3.58	1.04	10.05	.002
Music was used in the classroom to reinforce information.	88	3.03	1.27	81	3.56	1.23	3.28	1.27	7.34	.007
Music was used to set the mood of the classroom (ie., energetic, relaxation, etc.).	88	3.09	1.33	81	3.72	1.29	3.39	1.34	9.63	.002
Pre-work was assigned prior to the first meeting of classes.	88	3.80	1.19	81	3.63	1.27	3.72	1.23	0.77	.381

Note. Rating Scale: 1=Unimportant, 2=Of little importance, 3=Moderately important, 4=Important, 5=Very important.

Research Objective Five

Research objective five concerned the perceptions of faculty and instructional supervisors in regard to the professional development necessary for the implementation of accelerated learning strategies. Although there was rarely a difference of significance, instructional supervisors indicated stronger agreement than faculty with regard to aspects of the professional development necessary for accelerated learning. The need for ongoing staff development was the only area of significant difference between the two subject groups. Faculty expressed stronger agreement than instructional supervisors. Instructional supervisors expressed slightly more faith in professional development's ability to change classroom practice as a result of participation. Table 11 shows the results.

Conclusions

The conclusions drawn in this study fall under the headings of classroom practice, administration of accelerated programs, professional development, and system-level issues.

Table 11

Comparing Perceptions of Faculty and Administrators Regarding Staff Development

Staff Development	Survey Category						Total		*F*	*P*
	Faculty			Administrators						
	N	*M*	*SD*	*N*	*M*	*SD*	*M*	*SD*		
Special staff development is readily available for instructors teaching accelerated courses.	78	3.42	1.16	21	3.90	1.30	3.55	1.21	2.49	.119
The staff development offered for accelerated instruction is relevant to instructor needs.	78	3.72	1.03	21	4.00	1.18	3.79	1.07	1.05	.309
Instructors teaching accelerated courses need ongoing staff development opportunities.	78	4.54	.76	21	4.00	1.00	4.40	.858	6.62	.012
The staff development offered for accelerated learning is of a high quality.	76	3.93	.94	19	4.16	1.01	3.99	.959	.80	.373
Participants in special staff development for accelerated learning change their classroom practice as a result of the experience.	77	4.09	.79	21	4.14	1.01	4.10	.85	.06	.808

Note. Rating Scale: 1=Strongly disagree, 2=Disagree, 3=Somewhat agree, 4=Agree, 5=Strongly agree.

Classroom Practice

From this investigation it can be concluded that students in the WTCS participating in courses and programs designated as "accelerated" are being facilitated using strategies significantly different from those used with non-accelerated students. Learning is being facilitated through the use of brain-based instructional techniques that are not being used as frequently in the traditional classrooms.

Unlike many of the accelerated learning studies profiled in the literature review, accelerated learning in Wisconsin involves the use of different instructional methods which are often combined with time compressed class meetings. Many studies of accelerated learning have been conducted by comparing traditional length courses with time-compressed courses. Factors other than time spent in the classroom have been largely held constant.

It can be concluded from this study that the overall learning experience is not significantly different for traditional students as compared to accelerated students. This is especially important considering that accelerated students attended as much as 50% fewer class hours than the non-accelerated students. Despite the difference in hours of class attended, the ratings of the overall educational experience were equivalent. This finding provides a substantial defense for the use of the time-compressed but brain-based accelerated instructional methodology.

No matter their gender, accelerated students were in agreement as to the importance of the tools used in the accelerated classroom. It can be concluded from this study that the WTCS uses instructional tools that are important to students' learning experiences. As long as two years after graduation, students still reported the instructional tools employed in their accelerated programs as being important.

Administration of Accelerated Programs

A conclusion which can be drawn from the findings in this study is that students have different perceptions of the importance of many of the critical dimensions of accelerated learning as compared to the perceptions of employees of the WTCS colleges operating accelerated degree programs. These differences are not strictly one-sided. In some cases students assigned more importance than college employees to dimensions such as in the case of when classes are scheduled.

Professional Development

It can be concluded from this investigation that faculty and instructional supervisors agree on the level of professional development necessary for the implementation of accelerated learning strategies. Faculty members do however indicate a greater need for ongoing staff development as compared to the responses of instructional supervisors

System-level Issues

From this investigation it can be concluded that the WTCS is utilizing brain-based, accelerated instructional techniques in the delivery of its accelerated Associate of Applied Science degree programs. Students participating in courses and programs designated as "accelerated" reported experiencing tools and techniques very different from their non-accelerated, more traditional counterparts.

Recommendations

The findings and conclusions of this investigation are bases on which to make recommendations for future policy, practice, and further research. The following paragraphs outline recommendations regarding the operation, improvement and expansion of accelerated academic programming.

Policy

The findings in this investigation indicated that accelerated students experienced an instructional methodology different from that offered to traditional students. Considering the importance of the techniques, as indicated by all of the stakeholders, it is recommended that the WTCS continue to enforce the guidelines for accelerated programming within associate degree programs (Cullen, 1999).

The results of this study indicated that students perceived no significant difference between the overall experience in traditional versus accelerated courses. In that accelerated students spent as much as 50% less time in the classroom, the investigation provides data to support the expansion of accelerated teaching methodologies to other occupational areas. Students can experience a comparable overall learning experience in less time when accelerative techniques are employed.

It is recommended that the WTCS adopt a policy and procedure for evaluating programs to determine their suitability for becoming accelerated. Adding greater specificity to the guidelines for accelerated programming within associate degree programs (Cullen, 1999) would also enhance the effectiveness of the methodology.

Practice

The findings of the study indicated that accelerated students assigned a high degree of importance to critical dimensions of the accelerated methodology. In contrast, traditional students reported significantly less exposure to these methodologies. It is recommended that staff development be initiated to assist faculty teaching traditional courses in incorporating these instructional tools deemed as important. With no alteration of course duration, accelerated instructional methodologies could be incorporated to expose traditional students to these "important" learning tools.

Faculty facilitating accelerated courses reported ongoing staff development as being very important to the continued quality of the instruction. It is recommended that colleges not already offering ongoing support of the accelerated methodology initiate a program of continuing education for its practitioners.

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Emerging Educational and Agricultural Trends and their Impact on the Secondary Agricultural Education Program

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Abstract

The primary purpose of this study was to identify the emerging trends in education and agriculture and to determine their implications on the secondary agricultural education program. For this study, the researchers did a national solicitation for nominations with 1,160 national agricultural education leaders, state agricultural education leaders, university agricultural educators and agriculture teachers. Fifty education experts and 50 agricultural experts were identified and invited to participate in the study. Three rounds of a Delphi survey were used to identify the emerging trends.

This study identified 12 emerging educational issues and 6 emerging agricultural issues. Educational issues included: Finance and Budget, Teacher Recruitment, Teacher Education, Curriculum, Educational Leadership, Teacher Recognition and Reward, Teaching and Instructional Strategies, Standards, Legislation and Policy, Professional Development, Teacher Attitude, and State Leadership. Agricultural Issues included: Environmental Influences on Agriculture, Technology and Innovation in Agriculture, Food Supply and Safety in Agriculture, Trade Issues in Agriculture, Youth in Agriculture, and Urban Sprawl/Impact on Agriculture.

It was concluded that many of the educational issues have not changed dramatically over the years. Agricultural issues seemed to have broadened from a production focus to issues that deal with agriculture's relationship to society.

Introduction and Theoretical Framework

Each year, a national publication, *THE FUTURIST*, produces a top 10 forecasts for the year. In 2002, four of their forecasts addressed educational and agricultural issues as follows (World Future Society, 2002, pp. 1-2):

1. Future farmers could make more money from air than the land by having one turbine on a quarter of an acre of land. The estimate is that a return of $2,000 per year could be realized versus growing corn, which would bring in a return of $100 per year.

2. Schools will solve behavior problems with better nutrition. One school eliminated fights, expulsions and suicides by offering students healthy foods and not allowing them to fill up on junk foods.
3. Goodbye textbooks, hello networked learning. Printed and bound textbooks will disappear as more interactive coursework is developed and distributed over the Internet.
4. Fish farming will overtake cattle ranching as a food source by 2010. Aquaculture has been the fastest-growing sector of the world food economy over the past decade, while beef production has stagnated.

These forecasts point out the changes that could be occurring in education and agriculture in the future. Whether or not these forecasts are true, the important issue to consider is that change is coming and inevitable.

Herring (1995) stated, “In a dynamic, ever-changing world, I believe that perhaps the great challenge we face in agricultural education is that of anticipating and managing change” (pp. 7-8). He predicted that agricultural education would face challenges in the future in the following areas: agricultural education mission, clientele, delivery system, modernization of supervised agricultural education programs, teacher education programs, in-service education programs, reform of agricultural education instruction, tech-prep, and updating curriculum.

According to Ray Kurzweil, 1999 Medal of Technology winner presented by the World Technology Network, at today’s rate of progress, the next 20 years (2003-2023) will be equivalent to the entire twentieth century in its rate of change. Change and progress will continue to occur at a rapid pace. This was reinforced by Alvin Toffler who indicated that with rapid change students must be taught how to learn, unlearn and relearn (Case, 2003, slides 1-3).

Change is not new. In 1971, the United States Department of Agriculture predicted that there would be more change in the next 30 years than there had been in the past 70 years. Thus they were predicting more change between 1971 and 2000 than had occurred between 1900 and 1971. This prediction of change was focused on how many people would farm, how many people would need to be fed, and how food would be distributed around the world (United States Department of Agriculture, 1971).

There are enormous changes occurring in the nation’s agricultural industry. These changes include the lowest commodity prices in the United States in over 40 years, consolidations in agribusiness, and increasing pressures on the livestock, poultry, and dairy industries from environmental advocacy groups. Furthermore, as reported by former Secretary of Agriculture Dan Glickman, “. . . rural America, where most of the agricultural production in the nation exists, does not have the transportation, educational, and communications infrastructure to easily make a shift from the traditional agricultural economy” (Emerging Issues Forum, 2000, p. 13).

There is a need for state and national leaders to focus on emerging trends and issues in education and agriculture. Warmbrod (1986) indicated that agricultural education tends to pay greater attention to the significance and importance of those issues that are researched. This gives greater relevance to the need for identifying those issues and trends in the future. Buriak and Shinn (1993) reported that there was a need for maintaining compatibility with the national priorities for the food and agricultural science system and the educational system and for communicating agricultural education priorities to agencies and organizations which have national responsibilities to plan and budget future research.

Frick (1993) identified a list of agricultural education curriculum subject areas of highest priority to the future of middle grades agricultural education as follows: food safety/consumer relations; leadership/human relations; careers and future of agriculture; agricultural science and experimentation; agricultural vocabulary; and agricultural benefits to the world. This research generated a list of prioritized curriculum needs for one segment of agricultural education instructors. However, it did not take a more global view of issues facing the agricultural education program in the future.

In 1977, Stewart and Shinn reported that there were five areas of greatest importance to agriculture teachers, state supervisors and teacher educators. Those areas were curriculum development, funding, teacher education, teacher shortage and evaluation.

The dynamics that are occurring in the educational and agricultural sectors of the nation create challenges for the agricultural education program. Clearly, the agricultural education program is the intersection between these two sectors. Knowing the environment and being able to adjust to the changes occurring in agriculture and education is critical to the future growth and, in fact, survival of the agricultural education program.

The theoretical foundation for this research is an adaptation of Clarke's "instrumental futurism." (Clarke, 1997). Clarke developed the concept of instrumental futurism to advance the field of information technologies. This concept is intended to assist in the formulation of strategy or policy. This approach can help policy-makers in determining what actions to take, and what forms of monitoring to institute.

Education and agriculture are in a turbulent and challenging time. Education is facing major changes. Heavy emphases on educational reform initiatives like vouchers, charter schools, home schooling, school funding, accountability, testing, and teacher quality are re-shaping the educational landscape. The disparities between rural and urban schools are reaching crisis proportions and the pressure to recruit and retain high quality teachers has reaching a critical point. These factors are substantial and integral to the future of the economy in rural and urban areas. Agriculture is facing major changes. Not only will what farmers grow be different, but also the global impact of how they grow and market their crops and livestock will be significant. Clearly, astute business skills, global understanding and flexibility will be keys to the future of those involved in the agricultural industry.

The purpose of the study was to identify the educational and agricultural trends in the United States to enable leaders of the agricultural education program to make appropriate decisions regarding the future direction of the agricultural education program. These decisions would include, but not be limited to, curriculum direction, marketing efforts, professional development for agriculture teachers, and FFA programming.

This study was needed since there is no recent research that identifies educational and agricultural trends and issues that should be considered in planning for the future direction of the nation's agricultural education program. This begins to close that knowledge gap to assist leaders of the agricultural education program in their future planning.

Purposes and Objectives

The purpose of this study was to identify trends and issues in education and agriculture, and to see what the implications are for the agricultural education program and to develop ideas for future consideration by leaders responsible for the agricultural education program. The two research questions for this study are:

1. What are the emerging educational trends in the nation?
2. What are the emerging agricultural trends in the nation?

Methods and Procedures

The type of research used in the study was survey research using the Delphi technique (Sackman, 1975). For this study two panels of national experts, one in education and one in agriculture, were used. The study sought to determine the national trends in these two sectors. This design enabled the researcher to develop consensus on a number of issues without face-to-face confrontation (Helmer, 1966). Delphi operates on the principle that several heads are better than one in making subjective conjectures about the future . . . and that experts will make conjectures based upon rational judgment rather then merely guessing" (Weaver, 1971).

When an expert panel has at least 15 members and is truly representative of the expert community, the Delphi method is reliable (Dalkey, Rourke, et al., 1972). Dalkey et al. indicated that a group size of 13 was needed for reliability with a correlation coefficient of .9. Therefore, she recommended a group size of 12 to 15. Sutphin suggested that the sample should be large enough to obtain the amount of expertise necessary to effectively conduct the study. Beyond this number, the sample size should be held to a minimum to reduce cost and an over abundance of data which becomes cumbersome and yields no additional information for the study (Sutphin, 1981).

The agricultural panel was comprised of a cross-section of the agricultural community including commodity leaders, farmers, agribusiness representatives, policy-makers, educators, students and cooperative extension personnel. The educational panel was comprised of a cross-section of the educational community including teachers, school administrators, school board members, policy-makers, educational organization leaders, students, and parents.

The panel was identified through a national nomination process. Over 1,160 state supervisors, university educators, teachers and national staff in agricultural education were contacted via email and asked to nominate up to five experts each in agriculture and in education. Two requests for nominees were conducted with a total of 72 education experts and 70 agricultural experts being nominated. These experts represented the diversity of education and agriculture and the geography of the United States.

Narrowing these nominees to a manageable group of experts was the next challenge. Each nominee had a brief biographical sketch. These nominees were reviewed by the members of the researcher's graduate committee. Based on the needs of the study and nomination information, a group of 50 education leaders and 50 agricultural leaders were selected. The educators were from 26 states and all major geographic regions of the nation. The agriculturists were from 20 states and all major geographic regions of the nation. The nominees were purposefully selected to insure that a wide range of educational and agricultural backgrounds were represented on the expert panel. Some of the nominees were not able to participate and there was some attrition as the study progressed. The final number of participants was 15 for education and 15 in agriculture, which meets the Dalkey, Rourke, Lewis, and Snyder (1972) threshold.

In a Delphi study, multiple questionnaires are used (Ludwig, 1997). The development and the administration of the questionnaires were interconnected. Three rounds of questionnaires were used in the study. The first questionnaire asked the participants to identify up to 10 of the most critical issues facing education and agriculture respectively. The first round identified 264 issue responses in education and 180 issue responses in agriculture. Many of the issues were identified more than one time. Based on the responses and frequency of responses, the researcher collapsed the initial education and agriculture lists to 40 educational issues and 24 agricultural issues. Each issue was a major topic area with a brief description of what that issue area entailed.

The second-round questionnaire was developed by the researcher based on the information collected in the first round. A five-point, Likert-type scale was used by the participants to rate the importance of the issues. Respondents were asked to share comments and suggestions in regards to each item. Two follow-up reminders were conducted via email to increase the response rate. A total of 19 educational issues and 17 agricultural issues emerged based upon the rating given on the five-point Likert-type scale.

The third-round questionnaire asked the participants to rate the importance of the issues on a five-point, Likert-type scale and to rank the items in terms of their importance and impact on agriculture or education respectively (Ludwig, 1997). One follow-up was done via e-mail to maximize the response rate. There was a natural break in the ratings at 4.0. Twelve education trends and six agricultural trends were identified.

Results and Findings

The 19 items presented to the education expert panel in Round 3 are presented in Table 1. The table shows the final ratings and ranking of the panel. Finance and Budget was the highest rated and ranked item (4.64, 1). This was followed by Teacher Recruitment/Retention (4.57, 2). The remaining 10 items that were rated above 4.0 are Teacher Education (4.42, 3), Curriculum (4.28, 4), Educational

Table 1
Mean Scores on Educational Issues

Educational Issues	*M*	*SD*	Rank
Finance/Budget	4.64	.50	1
Teacher Recruitment/Retention	4.57	.65	2
Teacher Education	4.42	.51	3
Curriculum	4.28	.73	4
Educational Leadership	4.35	.76	5
Teacher Recognition/Reward	4.29	.64	6
Teaching/Instructional Strategies	4.29	.86	7
Academic Standards	4.21	.58	8
Legislative/Policy	4.14	.74	9
Professional Development	4.14	.86	10
Teacher Attitude/Morale	4.14	.95	11
State Leadership	4.07	.72	12
Accountability/High Stakes Testing	3.93	1.09	13
Family/Community Involvement	3.93	.62	14
Classroom Management/Discipline	3.86	.86	16
Public Perception/Awareness	3.86	.86	15
Role of Public Education/Public Expectations	3.79	.73	18
Industry Connections/Partnerships	3.79	.83	17
Educational Research	3.64	.80	19

Note. The mean score was determined by the respondents' ratings on a five point Likert scale with 1 = not important, 2 = somewhat important, 3 = important, 4= very important, 5 = extremely important.

Leadership (4.35, 5), Recognition and Reward (4.29, 6), Teaching/Instructional Strategies (4.29, 7), Academic Standards I4.21, 8), Legislative/Policy (4.14, 9), Professional Development (4.14, 10), Teacher Attitude (4.14, 11) and State Leadership (4.07, 12).

The agricultural expert panel respondents rated and ranked 17 emerging agricultural issues. Environmental Influence on Agriculture was the highest rated and ranked item (4.65, 1). The five other items that were rated above 4.0 or were Technology and Innovation in Agriculture (4.27, 7), Food Supply and Safety in Agriculture (4.18, 2), Trade Issues in Agriculture (4.09, 4), Urban Growth and Sprawl (4.0, 5), and Youth in Agriculture (4.0, 8). The list of the 17 items with their ratings and rankings are found in Table 2.

Table 2
Mean Scores on Agricultural Issues

Agricultural Issues	*M*	*SD*	Rank
Environmental Influence on Agriculture	4.45	.69	1
Technology/Innovation in Agriculture	4.27	.65	7
Food Supply/Safety in Agriculture	4.18	.87	2
Trade Issues in Agriculture	4.09	.70	4
Urban Growth/Sprawl Impact on Agriculture	4.00	.98	5
Youth in Agriculture	4.00	.97	8
Farm Bill Implications	3.83	.98	10
Public Awareness/Understanding in Agriculture	3.82	1.04	6
External Influences/Impacts on Production Agriculture	3.82	1.08	3
Consumer Impact on Agriculture	3.73	.79	9
Water Issues in Agriculture	3.73	.79	12
Federal Regulations Impacting Agriculture	3.73	.79	14
Rural Issues and Agriculture	3.64	.92	11
Research Impact on Agriculture	3.45	.52	16
Changes in Agribusiness	3.45	1.13	13
Alternative Uses for Agricultural Products	3.36	.67	17
Land Issues in Agriculture	3.36	.92	15

Note. The mean score was determined by the respondents' ratings on a five point Likert scale with 1 = not important, 2 = somewhat important, 3 = important, 4= very important, 5 = extremely important.

In education, there was agreement between the top educational issues per the Likert-scale rating and the overall ranking. In agriculture, there was difference in the rating and the ranking of the top six issues. Technology and Innovation in Agriculture rated second, but was ranked seventh while Youth in agriculture rated sixth, but was ranked eighth. It is also noteworthy that Public Awareness and External Influences ranked sixth and third respectively, but did not rate in the top six.

Conclusions, Recommendations, and Implications

Based on the findings of this study, the following conclusions were drawn:

1. Agricultural issues are global in nature and are connected to international trade, public policy, food supply, agricultural awareness, urban growth, and the environment. These themes overlap in many ways and make the future of agriculture difficult and challenging.
2. Education issues are linked to public policy, leadership, training and finance. These three areas appear to be overlapping in their nature since they are either caused by or the result of another issue. At the center of most of the issues is the number one issue of finance and budget. This has been a challenge in the past and will probably continue to be in the future.

The results of this study provide some clear signals for state and national agricultural education leaders as they chart the future direction of the agricultural education program. Failure to recognize the signals and to adjust course would be detrimental to the program.

Educational Implications

Finance and budget are clearly the primary concerns of leading educators in the United States. According to Erskine Bowles, "With the inequity of funding that is occurring from school to school based on local taxation, a large segment of our students, especially in rural areas, are not getting the highest quality of education" (Emerging Issues Forum, 2000, p. 12). Furthermore, with a growing student population base, a demand for higher teacher salaries and the trend of greater school choice through the use of vouchers, this issue is not likely to go away. A final complication to the finance and budget issue for agricultural education is the focus on academic standards and testing. Chances are that a great funding emphasis will be focused in that direction thereby reducing the funding for career and technical education programs like agricultural education.

Teacher recruitment and retention have been of concern and although much has been done to increase teacher salaries in many parts of the nation, the issue remains. A significant part of this problem is found in the way teachers are treated. As Brown (2003) indicated there has been a great focus and concern over the years regarding student drop out. However, there is an equal or greater concern regarding teacher dropouts. According to Camp (2002), agricultural education programs nationwide are continuing to have a shortfall in the number of fully qualified teachers prepared to accept available teaching positions. With a growing student population and higher expectations of the education system, finding and keeping qualified teachers is essential.

Teacher education was surfaced as a high priority by the expert panel. This was interesting in light of an earlier study by Connors (1998) that indicated that agriculture teachers and state supervisors saw this as a problem while university educators did not. One could say that the university faculty is not in tune with where the field is. However, this could point to a different concern. Perhaps the expectations that universities are placing on faculty and the tight budgetary times are forcing faculty to make choices that are not recognized by teachers and state supervisors. All of the many educational issues including, but not limited to, recruitment, retention, standards, accountability, high stakes teaching, and reaching diverse audiences intersect in teacher education programs. Preparing students in a manner that not only makes them good teachers, but also good managers of change, is vital. Successful teachers must be prepared to deal with a challenging, ever-changing environment. Agricultural education must have a well-prepared teaching force if it is to thrive in the future.

Not surprisingly, curriculum continues to be a central issue for education. Curriculum, what should be taught, was being debated at the beginning of the 20th century and it is today at the beginning of the 21st century. In the early 1900's there was a push for more curricular rigor and ways for measuring school results. In 2003 there is a push for more curricular rigor and ways for measuring school results. Obviously, it is not a new debate, but it is one that has attention from the federal level with the No Child Left Behind Legislation (United States Department of Education, 2003). There is now a greater emphasis on quality teaching and accountability at the local level. Agricultural education must make sure that its curriculum is current and viable.

Educational leadership is an issue that is of significant importance to the future of education. This issue tends to overlay with several others. Educational leaders must recruit, hire and retain quality teachers. Educational leaders must find ways to address budgetary issues. Educational leaders must assure that good curriculum is being taught and provide leadership and support to teachers to make sure that this is occurring. The agricultural education profession should make efforts to help teachers deal effectively with administrators and work to assure that educational leaders know and understand the value of an agricultural education program.

Teacher recognition and reward is an issue that will continue to be of concern in the future. Teacher salaries have made a considerable leap in recent years (Home School Legal Defense Association, 2002a). However, there continues to be concern in the area for not only appropriate compensation for teachers, but also their treatment as professionals. Teachers should not be viewed as hired help according to former North Carolina Governor Jim Hunt (Brown, 2003). A highly motivated, well-trained agriculture teaching profession is a necessity for agricultural education to grow in the future. This issue has serious implications for the total educational establishment.

Effective teaching and instructional strategies are an issue for the future of education. Quality teaching is critical in today's world of high stakes testing and accountability. One of the pillars of the No Child Left Behind Legislation is identification of proven strategies for increasing student performance (United States Department of Education, 2003). Agricultural education leaders must carefully monitor these developments and finds ways of increasing teacher performance to enhance student learning and to be supportive of the academic goals in the areas of reading, writing, and math.

Standards were an issue at the beginning of the 1900's and they continue to be a high priority today. Reeves (2000) reported that Dewey was advocating many of the same themes in his day that are being promoted today. The question for the agricultural education profession is, how can agricultural education be a part of the solution? This issue should be addressed on a national, state and local level to assure that agricultural education has relevance in today's school environment.

Education has historically been a very political issue. That is not predicted to change over the next few years according to educational experts. Legislation at the federal and state level has influence and impact on the focus and direction of instruction in the school. Legislation and policy tend to point out what will be measured in the school. It is important for agricultural education leaders to recognize that whatever gets measured will get done and if the agricultural education program survives in the future, it will rely in large part on being measured as an essential component of the school. Political activity on the part of the agricultural education program's leadership is vital and must be a part of the future for the program.

Professional development has been identified as a priority issue for the future of education. Assuring that teachers are up-to-date on the latest content and teaching technology is essential. The North Central Regional Educational Laboratory (2002) reported that quality and technology are essential for educational success. Professional development for agriculture teachers is essential to the future of the agricultural education program.

Teacher attitude/morale was perceived by educational experts to be a high priority in the future. Teacher attitude/morale refers to the enthusiasm and excitement that teachers have about their profession. The attitude of a teacher could be influenced by external factors like salary or working conditions. Teachers need to be encouraged and recognized by leaders in the agricultural education program to improve teacher attitude.

State leadership was identified as a key issue for the future. Most states have lost state leadership positions over the past decade. This has reduced the support that teachers receive for professional development and curriculum support. Agricultural education has experienced different situations in different states. State leadership typically drives the development of professional development and curriculum products. The need for state leadership will continue to be major concern for agricultural education leaders.

Agricultural Issues

The environment is a major issue in agriculture. This issue deals with water, air, soil and other factors that have an impact on natural resources and quality of life. As agriculture meets these challenges through the use of biotechnology and the use of improving farming practices, agricultural education needs to assure that its instructional program and professional development activities are aligned with the needs of the industry. Agricultural education can play a major role in the education of the public in regards to these issues if its leaders choose to focus in this arena.

Technology has had a dramatic impact on agriculture over the past century. From having a farmer feed less than 10 people to over 212 is a significant leap forward that is a result of technological advances. These changes have been so rapid in agriculture that often it is difficult for agricultural education to keep pace. Professional development and continuing education for agriculture teachers is vital for agricultural education's future.

Food Supply and Safety is a significant issue for the future of agriculture. The impact of biotechnology is certainly being felt here. If the world is to be fed over the next 50 years, biotechnology will be a significant player. Agricultural education can play a major role in the future of promoting and educating the public in this important area. The students of agricultural education must be informed about food issues so that they cannot only be good producers, but also good consumers.

Agricultural experts indicated that trade issues were a high priority in agriculture. With farm income decreasing and commodity prices at a 40 year low, it is imperative that trade agreements and their long-term impact on the agricultural economy be carefully monitored. Agriculture is more global than ever before and if agricultural education is to successfully compete in the world economy, students and teachers must have a solid grounding in agricultural trade issues.

Agricultural experts indicated that youth in agriculture was a significant issue. This should be viewed as a positive sign for the agricultural education community since it indicates that there is a need for more youth to pursue involvement in agriculture. The fact that agricultural experts see this as a need area indicates that there is a high need for what agricultural education does. Agricultural education should remain loyal to its agricultural base and continue to focus on preparation of students for agricultural careers.

Urban growth and sprawl has become a significant issue for agriculture in the past few years. In 1971, the United States Department of Agriculture forecasted that this would be an issue by the turn of the century, and they were right. With a growing population that is driven heavily by an increasing Hispanic population, the

United States finds its cities and towns taking up more and more agricultural land. Agricultural education can have a role in working with future agricultural leaders and agriculture teachers to better understand these issues and become involved in the process. The dividing line between urban and rural America is disappearing and both segments of society must work together to resolve this critical issue.

When one looks broadly at the findings of this study, a case can be made for state and national agricultural education leaders to focus more energy and time on scanning the educational and agricultural environments. Understanding the critical issues facing education and agriculture, and being able to see where the trends are heading is vital to the future success of agricultural education.

Recommendations Based Upon the Research

1. One or more of the national organizations in agricultural education should create an educational process for monitoring and keeping national and state leaders updated on emerging agricultural and educational issues.
2. One or all of the national organizations in agricultural education should develop a system for gathering data for forecasting trends and issues in agricultural education. This system could be a joint venture between several of the organizations.
3. Agricultural education at the national and state levels should develop systems for influencing public policy in education and agriculture. These systems should operate cooperatively and should involve partnerships and alliances with other significant organizations
4. The agricultural education profession should conduct research on the priority issues that have been identified in this study. Educational issues, such as, finance and budget, teacher recruitment and retention, and teacher education deserve continued research efforts. Agricultural issues, such as, environmental impact, food supply and safety, and international trade need further research as future curriculum and professional development efforts are developed.

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The Relation of Source Credibility and Message Frequency to Program Evaluation and Self-Confidence of Students in a Job Shadowing Program

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Abstract

Using a pre- and post-test design, this study examined the relation of an adult's credibility and message frequency to the beliefs of female high school students participating in a job-shadowing program. Hypotheses were based on the Elaboration Likelihood Model of attitude formation and change. Findings indicate that credibility of the adult moderated the relation between message frequency and student evaluations of the program's usefulness to their careers, and between message frequency and student confidence. Students perceived program participation to be more useful if adults were seen as having high credibility than if adults' credibility with the students was low. Additionally, a student's confidence in her ability to be successful in a job was positively related to message frequency, when the adults in the program were credible. Future areas of research for school-to-work programs using the Elaboration Likelihood Model are discussed.

Introduction

Programs linking education and business have grown considerably in the U.S. since the passage of the national School-to-Work Opportunities Act in 1994. Many of these programs are based on the establishment of a relationship between an adult and a student. These relationships may range from short-term job shadowing experiences for the student to longer-term work-based learning experiences. Estimates indicate that more than 84,000 mentoring-based corporate partnerships have been created in the U.S. (Beltz, 1995; Ganzel, 2000; Wentling, 2000). Job-shadowing programs, in particular, have grown in popularity over the last few years as a means to connect the business and educational communities. For example, in 2003, a job shadowing day sponsored by the National Job Shadowing coalition, which includes the U.S. Department of Labor, the U.S. Department of Education, America's Promise and Junior Achievement, attracted over one million student participants and more than 100,000 participating employers (Job shadowing: Current News, 2003). Despite their recent growth and popularity, little research has been conducted on these types of programs.

Since these partnerships represent a considerable investment in time and resources by both the academic and business communities, there is need for this type of research.

As such, the purpose of the present study is to begin to fill this gap in the literature by exploring factors that are associated with student reactions to participating in a job-shadowing program. Specifically, this study explores perceptions of program usefulness and students self-confidence in their ability to be successful in the workplace. Focusing on participant beliefs as outcomes is consistent with the objectives of most job shadowing programs. Shorter-duration programs like these are more likely to focus attention on forming and shaping student beliefs toward work and careers, and less on learning job-specific skills which are usually acquired through longer-term work experiences.

The influence of early work experiences on adolescents and the effects of many school-to-work transition programs in the U.S. have been the focus of a steady stream of research and debate (see Lewis, Stone, Stone, Shipley & Madzar, 1998; Stern, 1997; Stone & Mortimer, 1998). Much of this research has offered different theoretical frameworks to justify the assumption that these programs will have beneficial effects on their student participants. One of the frameworks that has been used is a contextual learning perspective. This perspective assumes that exposure to a work environment will help students see the relevance of the knowledge and skills that are learned and acquired in school and, this understanding will serve to enhance student motivation to learn (Lave & Winger, 1991; Raizen, 1989).

Other school-to-work researchers have used a different theoretical framework which emphasizes the role of the adult in the program. For example, social cognitive career theory has been used to explain how school-to-work programs may influence the career development of students (Lent, Hackett & Brown, 1999). In this theory, self-efficacy is a significant determinant of career interests, choice goals and outcome expectations (Lent, Brown & Hackett, 1994; Lent, Hackett & Brown, 1999). Sources of self-efficacy include mastery and vicarious learning experiences, as well as social persuasion. While longer-term school-to-work programs can provide opportunities for mastery experiences, shorter-term, job-shadowing programs offer vicarious learning experiences and expose the students to persuasive messages from adults. Implicitly, then, this perspective is based on the effects of the adult as a role model, relying heavily on theories of social learning, social identity and social persuasion (Bandura, 1986; Kelman, 1958, 1961; Meyer, 1994; Salancik & Pfeffer, 1978).

However, neither of these perspectives may be sufficient in understanding and explaining job-shadowing programs. Job shadowing is usually for a short duration, with the contact between the student and adult ranging from as little as an hour to as long as one day. Since frequency of contact is an important element in examining the effect of a role model in social learning theory (Bandura, 1986), the student's exposure to the adult in these programs may not be of sufficient length to lead to any long-term change.

This same reasoning may also apply to the contextual learning perspective. Given that a job shadowing experience exposes students to the work environment for a short duration, expecting long-term changes in student beliefs or behaviors may be unrealistic. Moreover, since students often fail to see a connection between what is taught in school and what is needed on a job, some have recently raised doubts that exposure to a work environment for any period of time will lead to student development and learning (Hughes, Moore & Bailey, 1999). These doubts about the positive, motivational effect of a work environment have also been echoed in past research that found evidence of negative effects of working on adolescents (Greenberger & Steinberg, 1986; Stern, Stone, Hopkins & McMillion, 1990).

As neither contextual learning nor role modeling may provide sufficient reasons to expect that participating in a job-shadowing program is related to positive student attitudes and beliefs about the program, the present study uses another framework, the Elaboration Likelihood Model (ELM) to help understand the potential impact of program participation on the student. The ELM hypothesizes that belief formation and attitude changes are based upon the presence and interaction of multiple factors (Petty & Cacioppo, 1981), two of which are the frequency of the messages that are communicated and the credibility of their source. This model and the relevance of these factors to the present study will now be discussed.

The Elaboration Likelihood Model

In the ELM, individual beliefs or attitudes are formed or changed by a persuasive message through either a central or peripheral route (Petty & Cacioppo, 1986). The route is dependent upon the degree to which the person is both motivated and able to think about, consider or elaborate on the message. The ELM proposes that changes in attitudes or beliefs follow the central route when the person is not only motivated to change, but has the ability to carefully process the message that is received. In the model, belief or attitudinal change following this route is related to long-term, behavioral change (Petty & Cacioppo, 1986).

The model also posits that beliefs may be temporarily changed via the peripheral route in the presence of a strong peripheral cue, even if the individual lacks either the ability or motivation to evaluate the message. The short-duration of the job-shadowing experience may limit the student's ability and perhaps even motivation to evaluate messages communicated by the adults. Since the adults who work with the students during their job shadowing experience are likely to serve as strong peripheral cues, any formation or changes in student beliefs associated with job shadowing are likely to occur via this peripheral route, through the persuasive appeals of the adult. These appeals are enhanced by a number of different factors in the model, one of which being the credibility of the message source (Petty & Cacioppo, 1986; Petty, Cacioppo, Strathman & Priester, 1994; Wood, Kallgren & Priesler, 1985).

These source credibility effects have been shown to be strong when the message is consistent with previously held attitudes (McGinnies, 1973), as well as an individual's direct experience with the subject (Wu & Shaffer, 1987). Although many students who participate in these programs have had some work experience, it is not extensive (given their age). As such, their knowledge of work is limited, which also may impose limits on the strength of their beliefs about work and their careers. It is also likely that the messages provided to the students are not comprehensive due to the brief time the students spend with the adult during their time together. Given these conditions, it is expected that the credibility of the adults to the students in these programs and the frequency with which the adults communicate career and job-related messages will be important factors in influencing the students' beliefs about the usefulness of the program to their careers and the confidence of the students to be successful in their jobs.

The Present Study and Hypotheses

This study uses a sample of female, urban high school students participating in a 'Take Your Daughter to Work' day program. The program was sponsored by a not-for-profit agency in a metropolitan area in the northeastern part of the US and was intended to provide female students from lower socio-economic backgrounds the opportunity to visit and interact with adults at a professional workplace. The agency recruited adults from organizations throughout the metropolitan area and matched them with students who expressed an interest in participating. The two objectives of the program were: (1) to increase the young women's confidence in their ability to succeed at a workplace and (2) to foster the career development of the young women. The latter was to be accomplished by encouraging the participants to consider different careers and talking about their career aspirations with the adults to which they were assigned.

Based on these objectives, this study explores the relation between program participation and the students' confidence in their ability to be successful in a job, as well as their judgment of the program's usefulness to their careers. The ELM predicts that an individual will not evaluate a message on its own merits if the person has limited experience with the subject and strong, peripheral cues are present (Petty & Cacioppo, 1986; Petty, et al., 1994). The limited work experience of high school students makes it unlikely that they will evaluate the messages from the adults on their own merits and, as such, the messages communicated to the students will not be related to student attitudes and beliefs, regardless of message frequency. Thus, it is hypothesized:

> **Hypothesis 1:** *The frequency with which job related and career related messages are communicated to a student in a job-shadowing program will not be related to student confidence levels in performing a job or student evaluations of the program's usefulness to their careers.*

However, the credibility of the adults who spend time with the students should act as strong peripheral cues to student attitudes and beliefs. Based on the ELM, the credibility of the message source will moderate the relation between the message frequency and individual beliefs. Specifically, the influence of persuasive appeals to the receiver of the message is dependent upon both the frequency of the message and the credibility of the source (Petty & Cacioppo, 1986; Petty, et al., 1994). Thus,

> **Hypothesis 2:** *In a job shadowing program, career-related messages communicated frequently by an adult who is seen as credible by the student will be*

significantly, positively related to the student's evaluation of the program's usefulness to a career.

and:

Hypothesis 3: *In a job shadow program, job-related messages communicated more frequently by an adult who is seen as credible by the student will be significantly, positively related to the student's confidence in being successful in a job.*

Method

Sample

One hundred and fifty (150) participants in the 'Take Your Daughter to Work' day program were chosen at random to receive surveys before and after their visits to the work place. Teachers distributed the first survey during class time, three weeks before the day the students were scheduled to go to the work site. The teachers distributed the second survey four days after the students' visits. In all, 118 students received and completed the first survey; the difference between the 150 target and the 118 received was due to student absences on the day the survey was distributed. In the second round, 99 surveys (out of the original 150) were completed by students. Of those 99, 80 had completed the initial survey (again, the difference was due to student absences on the day the surveys were distributed). Chi-square tests indicated that there were no statistically significant differences between those who responded to both surveys and those who responded to the first but not the second survey (racial composition of the groups: χ^2 (5, 115) = 4.62, $p > .10$; educational background of parent or guardian: χ^2(6, 109) = 3.28, $p > .10$; self-reported grades: χ^2 (5, 114) = 4.39, $p > .10$; age: χ^2(4, 117) = 2.04, $p > .10$).

The average age of the 80 students in the final sample was 15 and 56% of the respondents were African American, 22% Hispanic, 10% White and 4% Asian, (the remaining 8% indicated 'other' or did not indicate their race). All were female and 90% of the participants were in the 10th grade. Most of the respondents (81%) indicated they planned to go to college full time after graduation and work part time, 15% said they planned to work full time and go to school part time, while 3% thought they would not continue their education after high school. The educational background of the people providing financial support (parent, guardian, etc.) to the respondents reflects the targeted population of this program, as 77% indicated that this person's highest level of education was less than an Associate's (two year) degree (20% had not earned a four year, high school degree).

Measures

Measures of the self-confidence levels of the students to do a job were collected at both time one and time two. Confidence in one's ability to be successful in a job was measured by the mean of the following five items: After I graduate from school, 'I feel I will be able to do the job I get', 'I don't think I will have any problems adjusting to work', 'I think I will be qualified for the job I get', 'I feel confident that my skills and abilities will be the same as others working in similar jobs' and 'The job I get will be within my abilities'. Responses to these items were made on a seven-item scale (1 = Strongly disagree to 7 = Strongly agree). Cronbach's alpha for these scales were: .67 at time 1 and .77 at time 2. The correlation between time 1 and time 2 was .34 ($p < .01$). As recommended by Feldt (1980), the Pittman procedure was used to test for significant differences in the alpha coefficients between time one and time two. This procedure takes into account the alpha levels, their correlation and sample size. The results (t = 1.63) indicated that the difference (.67 versus .77) was not statistically significant.

The usefulness of the program to the students' careers was measured as the response to the item: "Participating in a day like this could help me in my career" and was measured on a seven-point scale (1 = Strongly disagree and 7 = Strongly agree) in the post-survey. Measuring program utility using a single item can impose limits on the construct's reliability and validity. However, these concerns are somewhat lessened when the construct is one-dimensional, straightforward or unambiguous, as it is in this study (Sackett & Larson, 1990).

Items used to measure the credibility and competence of the mentor were adopted from the career and psychosocial functions that have been identified in the extensive organizational literature on mentoring (Chao, Walz and Gardner, 1992; Kram, 1983; Noe, 1988). Previous research has measured mentor credibility along such dimensions as reliability, trustworthiness, and sincerity (Wu & Shaffer, 1987). From a mentoring perspective, these dimensions represent the psychosocial functions of mentoring, which have been defined as those that enhance a protégé's sense of competence and effectiveness (Kram, 1983). Five items, consistent with Wu and Shaffer's (1987) dimensions and which reflect the psychosocial functions of mentoring, were used to assess the adult/mentor's credibility. This variable is the mean of five items ($\alpha = .79$) that were adapted from Noe's work (1988). These items were: "Did your mentor: 'Serve as a role model to you (in other words, was your mentor someone you would try to be like)', 'Show attitudes and values similar to yours', 'Show interest in your feelings', 'Show you feelings of respect' and 'Encourage you to talk openly about any fears or concerns you have about work'. Responses were made on a five-point scale (1 = Not at all, 5 = To a very large extent).

The frequency with which a job-related message was communicated to the students was measured as the mean of three items ($\alpha = .73$): How often did your mentor: "Share personal experiences to help you on a job", "Discuss any questions or concerns you have about your ability to do a job" and "Discuss ways to act on a job with you". Responses were made on a five-point scale (1 = Not at all, 5 = To a very large extent). The frequency of the adult's career-related messages to the student ($\alpha = .74$) was assessed as the mean of two items. These items were: How often did your mentor: "Share his/her career history with you" and "Encourage you to prepare for a career".

Responses were made using the same five-point scale as the self-confidence variable (1 = Not at all and 5 = To a very large extent).

Analysis Strategy

Two hierarchical regression models were used to test the study's hypotheses. To test the first hypothesis, message frequency variables were entered into the regression models first, followed by the measure of the adult's credibility. In the final step, the interaction term between message frequency and the adult's credibility was entered as the test for the hypothesized moderator effect.

Results

Descriptive statistics, means, standard deviations, and correlations for the variables are shown in Table 1. The means show some restriction of range for both time 1 and 2 confidence variables. As expected, the correlation between the measures at time one and time two of the confidence variable was significant. However, the correlations between the post-program confidence variable and both message frequency variables (job and career-related) were not significant. This was also true for the correlation between the time two confidence variable and credibility of the adult. Alternatively, correlations between career usefulness with the frequency of the career message and the mentor's credibility are significant.

Table 1. *Means, Standard Deviations, Reliabilities, and Intercorrelations*

Variable	*M*	*SD*	Variable					
			1.	2.	3.	4.	5.	6.
1. Self-confidence T1	6.24	.66	(.67)					
2. Job message frequency	3.99	.92	.09	(.79)				
3. Career message frequency	4.20	.96	-.07	.73**	(.74)			
4. Credibility	3.90	.79	.08	.76**	.66**	(.75)		
5. Self-confidence T2	6.30	.77	.34**	.06	.06	.01	(.77)	
6. Career usefulness	6.07	1.32	.15	.56**	.44**	.60**	.22	---

Note. ***p* < .01 Two-tailed. Coefficient alpha reliabilities are reported in parentheses in the main diagonal. *N*'s range from 76-79

Results of the first hierarchical regression model (Table 2), show that, contrary to hypothesis 1, there is a positive, significant relation between message frequency and usefulness of the program. However, this estimate is not significant when source credibility is included in the model. Consistent with hypotheses 2, the interaction between source credibility and message frequency is significantly related to the usefulness of the program to the students' career.

Table 2. *Hierarchical Regression Results: Career Usefulness*

Variable	Model 1	Model 2	Model 3
Step 1: Career-related message frequency	.44**	.07	-.09
Step 2: Source credibility		.56**	.49**
Step 3: Message frequency x Credibility			-.18**
Total R^2	.19**	.37**	.43**
R^2 Change		.18**	.06**

Note: Standardized coefficients; $N = 74$
**$p < .01$. Two tailed tests

Table 3 shows the results of the second hierarchical regression analyses. Consistent with hypothesis 1, the relation between the frequency of job related messages is not significantly related to the student's confidence level after the program. The interaction between message frequency and credibility of the adult is significant, supporting hypothesis 3.

Table 3. *Hierarchical Regression Results: Self-confidence*

Variable	Model 1	Model 2	Model 3	Model 4
Step 1: Self-confidence: Time 1	.33**	.33**	.33**	.03**
Step 2: Frequency of job related message		.02	.09	.17
Step 3: Source Credibility			-.09	.02
Step 4: Message frequency x Credibility				.17*
Total R^2	.10**	.11*	.11*	.17*
R^2 Change		.01	.00	.06*

Note: Standardized coefficients; $N = 74$
**$p < .01$, *$p < .05$. Two tailed tests

Figures 1 and 2 show the nature of these interactions. The relation between both outcomes and message frequency is moderated by source credibility. Figure 1 shows that when message frequency is either low or high, high source credibility is related to higher levels of student evaluations about the usefulness of the program when compared to messages received from adults with low credibility. Figure 2 also shows the importance of the adult's credibility, as there is no relation between message frequency and student confidence when the adult has low credibility, but there is a strong, positive relation between message frequency and student confidence when the adult has strong credibility with the student.

Figure 1. Source Credibility as a Moderator of the Relationship Between Message Strength and Career Usefulness

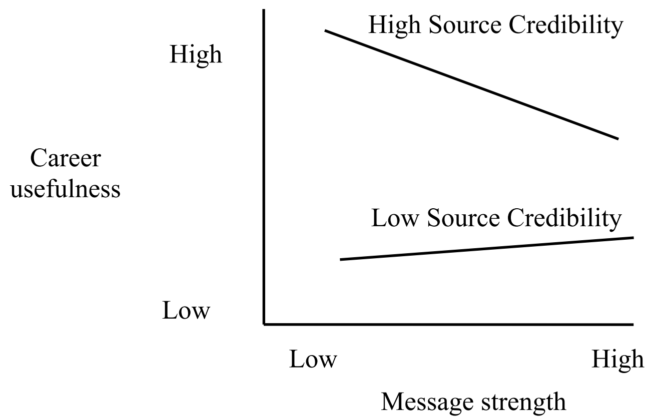
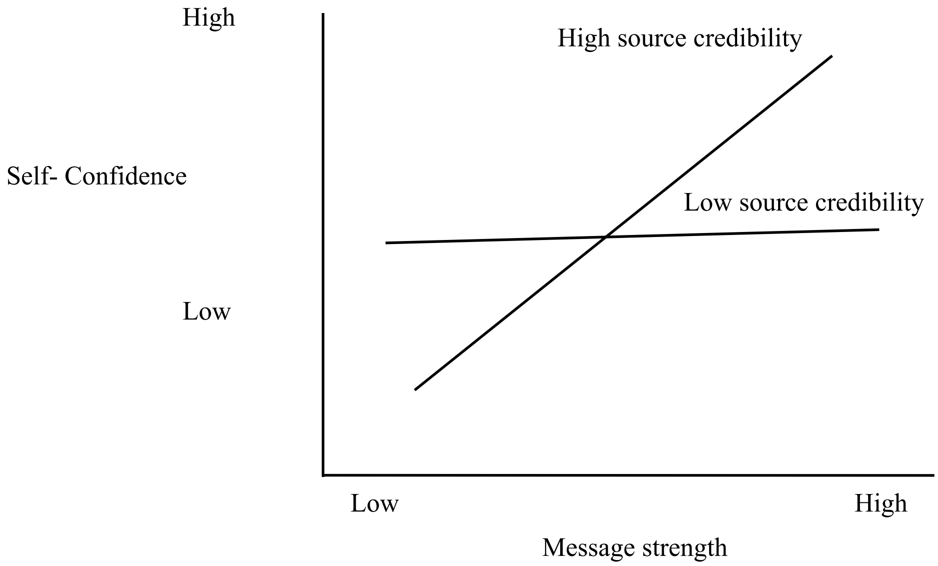


Figure 2. Source Credibility as a Moderator of the Relationship Between Message Strength and Self-Confidence at Time 2



The negative slope in the high source credibility condition shown in figure 1 is counter-intuitive. As message frequency increases, perception of the program's utility toward the student's career should increase, particularly if the source of the message is seen as credible. To test if the slope is significant, the data were split at the median (high vs. low source credibility) and the regression model was run using only the data from the students who perceived high source credibility. The results of this analysis indicated that the slope of the line was not significant (F (1, 44) = .75, $p > .10$).

Discussion

The focus of this study was to explore factors that are related to student participant beliefs concerning the usefulness of a job-shadowing program and students' confidence in their ability to be successful in a job. Based on the ELM, it was hypothesized that since the contact between the adult and student is of a short duration, student beliefs would be related to the frequency with which the adult communicated a message and the credibility of the adult to the student.

The results suggest that even a short-term, student-adult interaction may be seen as being instrumental to a student's career and may be related to student confidence to be successful in a job. Both of these outcomes were dependent upon the interaction of the credibility of the adult to the student and the frequency with which messages were communicated. While adult credibility was significantly related to student evaluations of the program's utility toward their careers, the impact of the career-related messages on the student perceptions was only significant when coupled with the adult's credibility. Similarly, the relation between a student's confidence to be successful in a job occurred not only if the adult provided job-relevant messages, but also if the student perceived the adult to be a credible source of information.

The significant interactions between message frequency and source credibility in both regression models are consistent with the process of belief and attitudinal formation which follows the peripheral route hypothesized by the ELM (Petty & Cacioppo, 1986). This path presupposes the individual has neither strong initial beliefs, nor extensive experience with the subject. As a result, the individual's beliefs and subsequent attitudes may be influenced by the presence of peripheral cues, hypothesized in this study to be the adults with whom the students interact during the day. However, it is not only the presence of a peripheral cue that may be related with student beliefs, but, as shown in this study and hypothesized in the ELM, it is also the frequency of the messages that are communicated by the adult and the adult's credibility that are instrumental factors in student belief formation.

If future research using the ELM continues to show that student beliefs are influenced by these peripheral cues any effect of a short term, school-to-work programs like job shadowing will most likely erode over time, without continued reinforcement of the messages from credible sources. The implication, then, is that these programs will not elicit longer-term belief or, subsequent, behavioral changes from their student participants.

School-to-work programs have diverse objectives that range from shaping student attitudes toward work, acquiring job specific skills and technical competencies, to providing opportunities to explore different careers and industries (Stern, 1997). As employers continue to emphasize the need for entry-level employees to possess what they consider to be appropriate work attitudes (Cappelli, 1995), school-to-work programs should respond to this need by continuing to target participant beliefs and attitudes. Yet the paths by which attitudes may be affected in job shadowing and other, shorter-term school-to-work programs will most likely be related to only temporary shifts in attitudes and student beliefs. An effective school-to-work approach may be one that consists of a series of progressively longer-term programs that will lead to more permanent changes in beliefs, attitudes and student behavior. This strategy may begin with these short-term, job shadowing experiences that rely on adult role models acting as peripheral cues to shape student ideas. As students progress to longer-term programs, they will then be more prepared to evaluate the experiences and messages they hear. This would imply the ELM's peripheral route would be used in initially shaping student beliefs and then beliefs would be either created or changed by the more permanent, central route. This is an area that may be important for future researchers to consider.

Beliefs and attitudes formed or changed via this central route will more closely predict future behavior than those attitudes formed from these indirect, vicarious experiences (Fazio & Zanna, 1981) and will be less susceptible to counter persuasion (Wu & Shafer, 1987). Thus, shorter-term, job-shadowing programs may be more attractive to employers if they are presented as part of a longer-term plan to manage the student's transition into the work place.

Besides demonstrating that a job-shadowing program may be related to student beliefs, another contribution of the present study is the evidence it presents for the usefulness of the Elaboration Likelihood Model in assessing the impact of school-to-work programs. While the effects of many school-to-work programs have been examined in previous research, reasons why they influence students are often conjecture, highlighting the need for theory development and application in the school-to-work field (Tinsley, 1995). This study has shown evidence that the ELM may be a useful theoretical basis not only for future research, but to help guide public policy and administrative decisions, as well as adult/mentor behavior in the program itself.

When the programs are offered to students is one such public policy decision. Since the development of self-efficacy, career aspirations and career interests is thought to begin in the elementary and middle school years (Lent, Brown & Hackett, 2000; Lent, Hackett, & Brown, 1999), the results of the present study may indicate that job shadowing and other shorter-term school-to-work programs may best be offered during these early school years.

The model can also help adult participants and administrators improve the effectiveness of school-to-work programs that rely on adult-student interaction. One way this can be done is to help identify the sources of the adult's credibility to the student. Racial and gender similarity between the adult and student may be one such source, as similarity has been shown to lead to higher perceptions of protégé satisfaction and greater contact with adult mentors (Ensher & Murphy, 1997). In addition to the credibility of the source, the model also predicts that other factors will moderate the relationship between messages delivered to the students and attitude formation. For example, messages that are less relevant to the student are often discounted and are less influential to the recipient (Beach, Mitchell, Deaton & Prothero, 1978). Thus, in order to be effective, the objectives of a job shadowing should either be relevant to the student prior to the start of the program or the adult participants must try to make them relevant during the program. This is a challenging objective, particularly since these programs have been expanded to include students who are not planning to begin full-time employment right after high school and for whom career and job issues may not be of an immediate concern (Hughes, Moore & Bailey, 1999).

The limitations of this study must be considered when interpreting its results. The small sample size and characteristics (i.e., all female, primarily young women of color) limit extrapolating the findings beyond the current sample. Additionally, the adult's perception of the relationship was not explored in the present study. As such, the self-reported data from the students are subject to common method variance. This common method variance may also account for the relatively high correlations between some of the variables.

Besides its effect on the coefficient estimates in the regression models, multicollinearity can be problematic when testing for interaction effects (Ganzach, 1998). It has been suggested that some moderator effects are spurious and that quadratic terms should be added to the regression models when the independent variables are highly correlated (Cortina, 1993). This was not done in the present study, since it would be inconsistent with the premises of the ELM. Furthermore, including quadratic terms in the regression models significantly increases the probability of Type II error (accepting the null, i.e., no interaction effect) as the correlation between the independent variables increases, particularly in studies with smaller data samples (Ganzach, 1998).

Despite these limitations, this study has shown evidence that participating in a job-shadowing program may be related to student beliefs, but this relationship is highly dependent upon the credibility of the adult with whom they interact, as well as the frequency of the messages students hear. It has been proposed, based on the ELM, any relationship between program participation with student beliefs will be short-term, since they are more dependent upon the presence of these strong peripheral cues. Future research should explore this in more detail, perhaps using the model to examine the effects of longer-term school-to-work programs, to test if students have both the experience and motivation to elaborate on and judge the messages they hear in these programs exclusive of their source and strength.

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