Career and Technical Education Research

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Career and Technical Education Research (*CTER*) is published three times a year and is an official publication of the Association for Career and Technical Education Research (*ACTER*). *ACTER* was organized in 1966 and strives to: (a) stimulate research and development activities related to career and technical education, (b) stimulate the development of training programs designed to prepare persons for responsibilities in career and technical education research, (c) foster a cooperative effort in research, (d) foster a cooperative effort in research and development activities with the total program of career and technical education and other disciplines, and (e) facilitate the dissemination of research findings and diffusion of knowledge.

Career and Technical Education Research, 33(2), pp. 65-67.

Editor's Note

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Volume 33, Issue 2 includes a diverse array of research problems and issues in the field of Career and Technical Education (CTE). These areas focus on the future of CTE research and suggestions for communicating its significance and enhancing its impact; gender, beginning teachers, and mentors; skills standards and CTE stakeholders; CTE teacher recruitment and retention; and dual and articulated credit and its influence on college readiness and retention. The research problems and their solutions will, in large part, lead the field of CTE to enhance teaching and learning, expand its theoretical base, and inform practice.

Richard Joerger's 2007 Presidential Address emphasized strategies for communicating the significance and optimizing the effect of research in CTE. His message has implications for (a) strengthening awareness of and support for CTE research, (b) enhancing the demand and applications of CTE research, (c) the preparation of professionals to conduct and use research, (d) the expansion of intra- and interdisciplinary research partnerships and activities, and (e) identifying, monitoring, and marketing a national CTE research agenda. Joerger's insights and recommendations represent key strategies that, if embraced and pursued in the field, will determine the future vitality and relevance of CTE research in educational and workforce contexts.

Tracy Kitchel, Bradley Greiman, Robert Torres, and Scott Burris investigated the role of gender in mentoring relationships that involve beginning CTE teachers and their formal mentors. The theoretical framework was based on a strong literature and research foundation grounded in the similarity-attraction paradigm, relational demography, and attachment theory. Accordingly, the study formulated the following hypotheses: (a) There is no significant difference between males and females on psychosocial mentoring and its functions, (b) There is no significant difference between same-gender and mixed-gender dyads on psychosocial mentoring and its functions, (c) There is no significant difference between males and females on dyad similarity, (d) There is no significant difference between males and females on dyad satisfaction, (e) There is no significant difference between same-gender and mixed-gender dyads on dyad similarity, and (f) There is no significant difference between same-gender and mixed-gender dyads on dyad satisfaction. The findings contribute to the theoretical base and have important implications for professional development and improvement of teaching and learning in CTE.

Debra Bragg and Matthew Marvel examined the differences in the awareness, use, and perceived impact of educators, employers, and public-sector workforce

training providers toward state and national skills standards implementation. The theoretical framework was premised on a solid foundation embedded in the literature and ongoing inquiry related to skills standards. Three research questions were posited for the study: (a) Are there differences in awareness of Illinois' skills standards and national skills standards by employers, educators, and workforce training providers? (b) Are there differences in the use of Illinois' skills standards and national skills standards by employers, educators, and workforce training providers? and (c) Are there differences in perceptions of the impact of Illinois' skills standards and national skills standards by employers, educators, and workforce training providers? The study's results contribute to enhancing theory and practice related to skills standards development and implementation, and have significant implications for improving curriculum and instruction in CTE.

Jorge Gaytan sought to determine the perceptions held by high school CTE administrators with respect to the characteristics of teachers entering and remaining in the profession, and characteristics of schools that have been successful in recruiting and retaining CTE teachers. The theoretical framework guiding the study was based on literature and research surrounding teaching standards, and teacher recruitment and retention. The following research questions were posited for the study: (a) What are the perceptions held by high school business education department chairpersons regarding the characteristics of individuals entering the business education teaching profession? (b) What are the perceptions held by high school business education department chairpersons regarding the characteristics of individuals remaining in the business education teaching profession? and (c) What are the perceptions held by high school business education department chairpersons regarding the characteristics of high schools that have been successful in recruiting and retaining business education teachers? The study's findings can assist practitioners and other stakeholders by providing a foundation to address issues pertinent to teacher recruitment and retention in the field. Gaytan offers several recommendations for policy and future research.

JoHyun Kim and Debra Bragg investigated the effect of dual and articulated credit on college readiness and retention in community colleges. The study was well grounded conceptually in the literature and influenced by the work of Astin in the development of the theoretical framework. The research was based on the Input-Environment-Outcome (I-E-O) model that is comprised of three major components: Input variables, environment variables, and outcome variables. The central research question posited was: Are dual credit hours and articulated credit hours earned significant predictors of students' placement in remedial courses and college level credit hours earned, controlling for student gender, high school percentile rank, Tech Prep participation, and high school course-taking? The study's theory, findings, and implications are especially significant for practice with the contemporary emphasis on dual and articulated credit between high schools and community colleges.

In summary, Issue 2 focuses on enhancing the capacity for conducting CTE research and an emerging national research agenda, gender and mentoring relationalships, the efficacy of state and national skills standards, and dual and articulated credit associated with college readiness and retention. These diverse but complementary research problems present a foundation for thinking about and identifying alternative solutions, expanding the theoretical knowledge base, and improving practice in the field. Accordingly, the studies presented in Issue 2 have succeeded in contributing to CTE in these ways.

JPG

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The 2007 ACTER Presidential Address: Strategies for Increasing the Scope and Impact of Research in Career and Technical Education

Richard M. Joerger
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ACTER President, 2007

The United States owes much of its success as a nation to the quality workforce which has been guided by research, and educated in our secondary, postsecondary, college, and university institutions. Unfortunately, changes in funding and institutional priorities continue to jeopardize the capacity of our academic communities to conduct research in career and technical education (CTE). Shifts in college and university CTE program foci, program downsizing and/or elimination, lack of properly supported graduate students and faculty, inadequate funding, diverging faculty/administrative professional roles and responsibilities, and the breadth of research foci continue to impact the scope and impact of CTE research. Career and technical education researchers have a history of conducting highly-regarded investigations that yield useful findings for addressing important concerns. However, despite current trends of reduced support and priorities for research, the changes in the workforce and CTE call for more research, not less. Several strategies can be implemented by the CTE research community to gain more support for future research.

Strategies to Strengthen the Support for Research in Career and Technical Education

Educational programming changes within institutions and government entities are occurring at an increasing rate in response to the changing workforce needs of employers. As a result, demands for accurate data to make informed decisions are causing institutions to rely more upon timely and focused research conducted by university, consultant, and institutional researchers and administrators who understand the context of CTE.

Support for additional research and researchers can be increased through increased educational efforts delivered through the CTE research community. The foci of the education and related efforts that can be conducted by researchers in the Association for Career and Technical Education Research (ACTER) include more instruction about and in conducting research; increasing research partnership arrangements; extending the awareness, impact, and application of research; and monitoring and promoting CTE research foci.

Engage in Creating Greater Demand and Uses of CTE Research Results

Changing conditions in the global economy, workforce and market issues, shifts in populations, and change in education policies are increasing in pace and frequency. Informed CTE researchers should communicate the need for related research activities, additional researchers, and the use of research results through outreach, instructional, and research activities with all stakeholder groups. Likewise, CTE researchers need to exert more positive influence upon the decision makers within stakeholder groups to establish and fund research personnel, functions, and activities.

Educate More Students and Workers about the Processes for Conducting and Using Research

Researchers and educators should use educational, work, and community settings as contexts to illustrate how CTE research can be used to address meaningful problems. The ACTER community also needs to develop age- and ability-appropriate instructional materials and technologies for teaching each of the paradigms of research to all levels of students. Easily accessible instructional materials for use by instructors in teaching youth and adults can also expand the number of people with greater knowledge, skills, access, and use of research outcomes and products. The research community must disseminate existing and create new and effective instructional strategies for educators and trainers who instruct pre-service students and incumbent workers. Finally, CTE researchers should develop and provide educators and trainers access to professional development activities and resources through presentations in courses and conferences as well as through use of low cost technologies including webinars.

Expand Partnering Activities

Funding for CTE research opportunities can be expanded through relationships and partnering activities developed with leaders of traditional and nontraditional educational institutions, industry and business, government agencies, and foundations. Career and technical education researchers can gain increased research funds and support by demonstrating flexibility and adaptability, and by collaborating with the leaders of funding agencies and other researchers who share common interests. Current CTE researchers can also have considerable influence upon the amount and nature of research within and outside of academic institutions. Faculty members should work together more strategically to ensure that sound policies and strategies exist to support successful research activities of graduate students, and junior and senior CTE faculty.

Extending the Awareness, Impact, and Application of Research

The value and importance of the research conducted within CTE can be heightened through the use of additional dissemination processes and strategies that satisfy the needs of more audiences. For example, research must initially be translated into concise and easily understood reports for all stakeholder groups. Leaders in the ACTER are already making efforts to have future research conference proposals include a short research briefing for sharing with policymakers and others. Finally, CTE research reports should be made available by the ACTER and other researchers through a variety of journals, magazines, websites, and multiple forms of downloadable files accessible through the internet.

The impact of CTE research can be further increased by ACTER representatives extending invitations to more stakeholder groups to view translated and research materials and/or participate in research presentations. For example, secondary, college, and agency representatives and CTE educators should be made aware of the ACTER conferences, publications, websites, and other events. Career and technical education and collaborating researchers can also increase the awareness and influence of research through presentations at other research conferences within and outside of CTE. For example, multiple venues are available to ACTER members in affiliation with other researchers at the American Education Research Association annual conference. Finally, directing organizations, students, workgroups, and others to original and translated CTE research reports increases the use and value of research. Many practitioners place considerable value upon quality research. Providing ready access to research will likely create additional opportunities for CTE researchers to interact with end-users.

Monitoring and Promoting the Career and Technical Education Research Agenda Foci

Researchers, research centers, and non-government organizations regularly publish research agendas for career and technical education. The contents of research agendas are secured using carefully conducted research procedures from informed and interested researchers, administrators, and other CTE experts in non-government organizations. In addition to addressing the requirements of funding agencies and sponsors, the agendas are useful in guiding the research efforts of graduate students, faculty, private research organizations, and others who seek annually to initiate or expand upon a topic or program of research. Stakeholders and members of the CTE research community will soon be receiving a copy of *The National Research Agenda for Career and Technical Education*. The Research Agenda is being finalized by researchers from the ACTER in cooperation with members of the ACTER leadership and the Research Committee of the Association for Career and Technical Education (ACTE).

Development, critique, promotion, and dissemination of research agendas are important if progress is to be made by researchers in addressing the key research foci that benefit the workforce and career and technical education. Members of the ACTER, Research Committee of the ACTE, and the National Research Center for Career and Technical Education (NRCCTE) communicate and collaborate regularly in critiquing, featuring, and updating the contents of their corresponding agendas. The research agendas are featured for easy access on websites for use by members, researchers, policymakers, and other stakeholders.

In summary, the need for more career and technical education researchers is critical to address the current and emerging workforce issues. The foregoing strategies are but a few, among many others, that can be carried out by the ACTE members and leaders, and our colleagues. Together with our current researchers, and in collaboration with our emerging researchers, we can accomplish more!

Thank you all for the opportunity to serve as your President. It is now a memory filled with many new friends, experiences, and places that I will cherish for years! I hope you will agree that the efforts of our great ACTER Executive Board have added to your experience as an ACTER member or guest!

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The Influence of Gender on Relationship Aspects of Beginning Teachers and Their Mentors

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Abstract

To date, relatively few researchers have examined the gender composition of mentoring dyads in the context of Career and Technical Education (CTE). Without such studies, understanding with respect to how gender influences the dyad relationship is limited. An integrated theoretical framework that draws from the similarity-attraction paradigm, relational demography, and attachment theory is applied to this exploratory study involving beginning teachers of agricultural education. Hypotheses related to the influence of gender on the success of the mentoring relationship were tested. It appears that gender heterogeneity does not hinder the mentoring relationship of beginning teachers. The results suggested that male and female beginning teachers, and beginning teachers in same-gender and mixed-gender dyads perceived similar levels of psychosocial mentoring and its functions, and dyad satisfaction. Significant differences existed between males and females regarding their perceptions of dyad similarity; however, no significant differences were found between beginning teachers in same-gender and mixed-gender dyads on the same measure. Further research on interpersonal processes in mentoring relationships is encouraged, and gender norming in agricultural education should be examined.

Introduction

"Increasing the retention of beginning teachers" is one of the most significant issues facing education (Smith & Ingersoll, 2004, p. 685), and this challenge has been portrayed as a "national crisis (National Commission on Teaching and America's Future, 2003, p. 21). For example, the National Association of State

Boards of Education (2000) noted that "it is not unusual to find [attrition] rates as high as 50 percent within the first five years [of teaching]" (p. 11). In response, Ingersoll (2003) found that teacher induction programs and effective mentoring can lead to lower teacher attrition rates. He argued that the key solution to the teacher shortage phenomenon was to retain highly qualified teachers by changing their circumstances through proactive assistance, timely interventions, and appropriate professional development.

The national concern regarding teacher retention is being mirrored in career and technical education (CTE). Ruhland and Bremer (2002) found that increased support for professional development opportunities assisted with the retention of teachers in their initial years of teaching. The researchers concluded that beginning CTE teachers who participated in a mentoring program found the experience valuable and the quality of the relationship was a key factor.

Within CTE, agricultural education is experiencing teacher shortages (Kantrovich, 2007). This shortage is a result of three major factors. First, there is a demand for teachers as represented by the continued growth in the number of secondary teaching positions in agricultural education. The total number of agricultural education teaching positions in the United States has increased by 866 since 1992, which represents an 8.7% increase during this time period (Kantrovich, 2007). Second, the teacher shortage is attributed to the discrepancy between the total number of qualified graduates of agricultural education teacher preparatory programs and those who actually enter teaching. Since 1992, only 61.3% of the qualified agricultural education graduates entered the teaching profession (Kantrovich, 2007). Finally, the retention of beginning teachers is an important variable in the teacher shortage phenomenon. For example, Joerger, Greiman, and Ovrebo (2007) reported that the retention rate for novice teachers of agricultural education in Minnesota was 82.4% after the first year of teaching.

In addition to teacher shortages, agricultural education faces an additional recruitment challenge in the form of a national initiative identified as 10 x 15. The 10 x 15 initiative is aimed at increasing the number of quality high school agricultural education programs from the 2006 level of 7,242 (The Council for Agricultural Education, 2006) to 10,000 by the year 2015 (National FFA Organization, 2005). The initiative suggested that 2,758 more teachers must be hired to teach in new and/or expanded programs. Thus, it appears that agricultural education faces an enormous challenge to recruit and retain quality teachers by 2015.

While mentoring has been promoted as one strategy to retain beginning teachers, the literature on mentoring is still developing (Allen, Poteet, Eby, Lentz, & Lima, 2004; Wanberg, Welsh, & Hezlett, 2003). According to Hezlett and Gibson (2005), "many questions about mentoring remain poorly answered or have yet to be thoroughly investigated" (p. 447). Scholars (Hezlett & Gibson, 2005; Young, Cady, & Foxon, 2006) have identified directions for further research that pertain to the mentoring relationship and the role of gender within the relationship. Darling, Bogat,

Cavell, Murphy, and Sánchez (2006) proposed that research focuses on individual differences such as gender due to its implications for the design and implementation of mentoring programs. Little attention, however, has been focused on mentoring research within the context of CTE. The current study is one of the first in CTE to focus on gender in an effort to facilitate an effective mentoring relationship and, therefore, assist beginning teachers to succeed.

Theoretical Framework

The establishment of a positive relationship between a beginning teacher and his/her mentor is critical to the successful outcomes of the dyad. In support of this premise, an integrated theoretical framework is presented, and consists of the similarity-attraction paradigm, relational demography, and attachment theory. According to the *similarity-attraction paradigm* (Byrne, 1971), individuals who perceive themselves to be similar are more attracted to each other than are those who perceive themselves as dissimilar. Similarity might be on several dimensions (i.e., attitudes, gender, outlook, personality, race), and allows dyad members to anticipate each other and increase the ease and quality of their interactions (Meglino, Ravlin, & Adkins, 1991; Somech, 2003). Trust between dyad members has been shown to increase as a result of perceived similarity (Mayer, Davis, & Schoorman, 1995). In contrast, dissimilarity leads to differences in attitudes, values, and beliefs, and to low communication between dyad partners (Burns & Otte, 1999; Epitropaki & Martin, 1999).

Tsui and O'Reilly (1989) introduced *relational demography* and defined it as "the comparative demographic characteristics of members of dyads or groups who are in a position to engage in regular interactions" (p. 403). They suggested that demographic similarities help to build an attraction dynamic; whereby, dyad members who have similarities have a positive association with each other. In contrast, demographically dissimilar dyad members tend to view and treat each other less favorably. Research in relational demography has most commonly examined gender and racial similarity, and is based on the assumption that surface-level similarity reflects deeper-level similarity in attitudes, personality, or outlook (Harrison, Price, & Bell, 1998). Research findings have indicated support for relational demography as same-gender dyads reported more effective performance, liked each other more, had less conflict, and had a higher quality experience (Farh, Tsui, & Cheng, 1995; Green, Anderson, & Shivers, 1996; Tsui & O'Reilly, 1989). Therefore, relational demography affects dyadic relationship processes and outcomes above and beyond simple demographics.

Attachment theory (Bowlby, 1969) provides additional insight into the relationship dynamics of the mentoring dyad. This theoretical framework contends that a person's ability to develop and maintain relationships begins at a very early age based on the individual's attachment to a parent or primary caretaker. These

childhood *internal working models* of attachment or templates are continued into adulthood, and shape adult relationships across an individual's life span (Fonagy, 2003). In previous research, it has been determined that friendships and romantic relationships (Krause & Haverkamp, 1996; Shulman, Elicker, & Sroufe, 1994), and a person's method of seeking help and guidance from others (Marvin, Cooper, Hoffman, & Powell, 2002) are all influenced by the individual's childhood attachment system. Based on empirical findings, adults with secure attachments relate easily and confidently with others, and are willing to seek assistance when necessary (Bennett & Saks, 2006). In contrast to secure attachment, adults with insecure patterns of attachment may appear uncomfortable with intimacy and may be hesitant to ask for help (Hesse, 1999). Therefore, attachment theory provides a useful foundation to examine the mentoring relationship.

Literature Review

Gender differences have been reported in the literature by numerous scholars. Sosik and Godshalk (2000) concluded that males are typically "more task-oriented, results-driven, competitive, rational, strategic and unemotional" (p. 105); whereas, females tend to be more "relationship-oriented, nurturing, cooperative, intuitive, empathic, and emotional expressive" (p. 105). Gender differences are apparent in the context of education. In general, female teachers tend to gravitate more towards elementary grade levels than males, and male teachers are more prevalent at the secondary level (Zumwalt & Craig, 2005). Among younger teachers, females leave the profession earlier than males. In contrast, males leave the profession sooner than females among older teachers (Zumwalt & Craig, 2005).

Males and females differ in regard to their perceptions of the mentoring relationship. For example, beginning male teachers use different metaphors to describe their mentors than do female teachers. In a study of secondary English beginning teachers, male teachers compared the mentor-protégé interaction to relationships "between therapists and clients, or between parents and children" (Rigler, 2000, p. 13). In contrast, female beginning teachers compared their mentor-protégé interaction to relationships "between a coach and athlete, or advisor and advisee" (p. 13). Interestingly, beginning teachers who were male used more positive terms to describe their mentors than did females (Rigler, 2000).

Ensher and Murphy (1997) investigated gender in a business mentoring context, and they found that female mentors provided less psychosocial support than their male counterparts. In addition, factors such as liking, perceived similarity, and psychosocial mentoring were influential in a protégé's satisfaction with his or her mentor. The researchers suggested that "gender may not be as important as was originally hypothesized" (p. 475). However, Sosik and Godshalk (2000) concluded that the literature did not yield definitive findings regarding gender composition in the mentoring relationship.

Recent studies conducted in agricultural education have examined the relationship that beginning teachers have with their mentors. Researchers determined that the dyad relationship involving beginning teachers and mentors can be enhanced through a goal of assistance rather than evaluation (Peiter, Terry, & Cartmell, 2005). Beginning teacher assistance in the form of psychosocial mentoring (Burris, Kitchel, Greiman, & Torres, 2006) and professional mentoring (Greiman, 2007) were found to be provided by mentors. Further, a positive relationship was found between psychosocial mentoring and satisfaction with the mentoring relationship (Greiman, Torres, Burris, & Kitchel, 2007). This finding was valid across different mentoring relationships (i.e., in-school mentor and in-profession mentor), and was found from the perspective of the novice teacher but not from the perspective of their mentors (Greiman, 2007). Research has determined that beginning teachers and formal mentors who perceived they were similar to their dyad partners were more likely to have a satisfying mentoring experience (Burris et al., 2006; Greiman et al., 2007). The researchers found that similar values, attitudes, working styles, and teaching philosophies were factors that influenced a positive mentoring experience, successful relationship, and satisfactory interaction.

Kitchel (2006) provided additional insight into the mentoring relationship by examining gender as a variable. In a study of student teachers and cooperating teachers in agricultural education, a significant difference was found between males and females. Male student teachers perceived that they received a higher level of psychosocial mentoring functions involving counseling and friendship from their cooperating teachers. In addition, male student teachers were more satisfied with the dyad relationship involving their cooperating teachers than were female student teachers.

Ragins' (1997) model of diversified and homogeneous mentoring relationships provided further insight regarding consideration in matching dyad members. As described by Sosik and Godshlak (2000), "this model proposes that composition of the mentoring relationship influences the mentor function provided..., which in turn influences outcomes for the protégé…" (p. 104). Ragins outlined two dimensions to the dyad relationship. The first dimension is whether or not the dyad relationship is diversified or homogeneous. Ragins (1997) proposed that protégés in homogeneous groups will experience stronger psychosocial functions and role modeling. The second dimension is whether or not the mentor and protégé are of the majority or minority group. Demographics, such as gender and ethnicity, are considerations when examining groups for majority or minority status. Ragins proposed that "relationships involving minority mentors will provide fewer career development functions than relationships involving majority mentors" (p. 504). When the two dimensions interact, Ragins posited that "homogeneous mentoring relationships involving majority members will provide greater protégé outcomes than any other combination of the mentoring relationship" (p. 506).

Identifying and measuring the outcomes of a mentoring relationship can be accomplished by applying Kram's (1985) mentor role theory which outlines those psychosocial and career functions a mentor can provide to his or her protégé. The focus of this study was the investigation of psychosocial function. Kram identified four functions, and through a review of literature, Greiman (2002) identified a fifth function. Kitchel (2006) outlined these functions succinctly:

> The *role modeling* function is "demonstrating valued behaviors, attitudes and/or skills that aid the junior in achieving competence, confidence, and a clear professional identity" (Hall, 1986, p. 162). The *counseling* function is when a mentor is "providing a helpful and confidential forum for exploring personal and professional dilemmas" (p. 162). When a mentor provides "mutual caring and intimacy that extends beyond the requirements of daily work tasks" and is "sharing experiences outside the immediate work setting," then he/she is providing the *friendship* function (p. 162). In providing support related to the *acceptance* function, a mentor is "providing ongoing support, respect, and admiration, which strengthens self-confidence and self-image" (p. 162). Greiman (2002, p. 22) identified the *social* function as one that includes "social interaction and informal exchanges about work and outside work experiences." (p. 65)

Given the differences between males and females, further research in CTE is needed to better understand how gender might influence the mentoring relationship. With current and predicted shortages of CTE teachers, retention efforts such as mentoring will be important in retaining quality teachers. However, relatively few studies have examined the gender composition of mentoring dyads in the context of CTE. Without such studies, understanding of the extent to which gender influences the dyad relationship is limited. Further, the ability to provide useful guidance to practitioners with respect to the development of a satisfying and effective dyad relationship is impeded without research on this significant educational issue (Smith & Ingersoll, 2004).

Purpose and Objectives of the Study

The purpose of the study was to investigate the role of gender in mentoring relationships that involve beginning agricultural education teachers and their formal mentors. To achieve this purpose, the following research objectives were developed:

1. Describe and compare beginning teachers' perceptions of psychosocial mentoring by gender and dyad gender composition.
2. Describe and compare beginning teachers' perceptions of dyad similarity by gender and dyad gender composition.
3. Describe and compare beginning teachers' perceptions of dyad satisfaction by gender and dyad gender composition.

Hypotheses

The following nondirectional null hypotheses were formulated for the study:

H_{01}: There is no significant difference between males and females on psychosocial mentoring and its functions.

H_{02}: There is no significant difference between same-gender and mixed-gender dyads on psychosocial mentoring and its functions.

H_{03}: There is no significant difference between males and females on dyad similarity.

H_{04}: There is no significant difference between males and females on dyad satisfaction.

H_{05}: There is no significant difference between same-gender and mixed-gender dyads on dyad similarity.

H_{06}: There is no significant difference between same-gender and mixed-gender dyads on dyad satisfaction.

Methods

This study was descriptive-survey in design (Gall, Borg, & Gall, 1996), and the target population was agricultural education teachers in their first year of teaching in a Midwestern state. After comparing beginning teacher demographics over an extended number of years, the researchers found the Oliver and Hinkle (1982) argument to be reasonable that a sample in any given year could be representative of the population over time. As such, the time and place sample consisted of beginning agriculture teachers (n = 80) from two different cohorts. Each beginning teacher was paired with a mentor in the school where they taught, or with an agricultural education mentor in a neighboring school. The names of the beginning teachers were obtained from the Department of Elementary and Secondary Education located in the Midwestern state, and served as the frame for the study. For both cohorts of beginning teachers, data were collected at the end of their first year of teaching using the Mentoring Relationship Questionnaire (MRQ). The MRQ (Greiman, 2002) consists of scales that measure psychosocial mentoring, dyad similarity, and dyad satisfaction.

Psychosocial Mentoring

This section of the MRQ identified the extent that participants perceived their formal mentors had provided psychosocial support. The scale consisted of 15 statements representing each of the five psychosocial mentoring functions. Each function (i.e., acceptance, counseling, friendship, role modeling, and social) was measured through three questions. The function of acceptance was represented by an item such as, “To what extent has your formal mentor accepted you as a competent colleague.” An example of an item expressing the function of counseling was, “To what extent has your formal mentor been willing to discuss your questions and

concerns." An example of an item that denoted the friendship function was, "To what extent has your formal mentor been someone you could confide in." The role modeling function was represented by items such as, "To what extent has your formal mentor been someone you wanted to emulate" Finally, the social function was represented by such statements as, "To what extent has your formal mentor got together with you informally after work."

Beginning teachers were asked to identify the extent that their mentors performed on each of the 15 items using a 7-point Likert-type scale ranging from 1 = *not at all* to 7 = *very large extent*. Greiman (2002) reported a Cronbach's alpha coefficient of .97 for psychosocial mentoring, and a range from .89 to .94 for each of the psychosocial mentoring functions. Post-hoc reliability analysis yielded a Cronbach's alpha of .97 for the psychosocial mentoring construct, and alphas that ranged from .91 to .97 for each of the five functions.

Dyad Similarity

Five items (e.g., "My formal mentor and I see things much the same way") were designed to measure the perceived similarity of the dyad relationship. Beginning teachers provided their perceptions using a 7-point Likert-type scale with 1 representing *strongly disagree* and 7 representing *strongly agree*. The Cronbach's alpha reliability estimate for dyad similarity was found to be .98 for Greiman in 2002; a .98 post-hoc coefficient was found when that same section of the instrument was used for this study.

Dyad Satisfaction

Five items (e.g., "In regard to the interaction with my formal mentor the relationship has been a positive experience") were intended to gain a measure of the perceived satisfaction with formal mentoring. The participants provided their perceptions using a 7-point Likert-type scale with 1 representing *strongly disagree* and 7 representing *strongly agree*. This scale has been found to be highly reliable (α = .99; Greiman, 2002); additionally a .98 coefficient was found post-hoc when using these items for this study.

Data collection was conducted using an adaptation of Dillman's (2000) tailored design method to maximize response rate. For both cohorts of beginning teachers, the data collection process began by sending participants a pre-notice message. The survey packet was mailed to the beginning teachers five days later. Ten days after the first mailing, an e-mail reminder notice was sent to the nonrespondents. A week later, a second packet containing a revised cover letter and a questionnaire was mailed to the nonrespondents. The final contact with nonrespondents was approximately 25 days after the first mailing, and consisted of a telephone call that encouraged the return of the questionnaire. A total of 70 beginning teachers responded to the questionnaire, which resulted in an overall

response rate of 87.5%. Miller and Smith (1983) argued that there is justified reason to believe that late respondents may likely possess similar characteristics to nonrespondents. Therefore, to address nonresponse error, participants were dichotomized into two groups: on-time (i.e., response received before follow-up letter mailed) and late (i.e., response received after follow-up letter mailed). The two groups were compared regarding their responses to the Likert-type items comprising the constructs of psychosocial mentoring, dyad similarity, and dyad satisfaction. No significant ($p < .05$) differences were found between the two groups of respondents using independent samples *t*-tests.

The data were coded and entered into SPSS 13.0 for analyses. For research objectives 1, 2, and 3, mean scores and standard deviations were calculated to summarize the data for interval or ratio level data, and independent samples *t*-tests were conducted to compare the gender groups regarding psychosocial mentoring received, dyad similarity, and dyad satisfaction. For each comparison, an alpha level of .05 was established *a priori* for tests of significance. Effect sizes were calculated and interpreted using Cohen's (1988) *d*: small effect size (d = .20-.49), medium effect size (d = .50-.79), and large effect size ($d \geq .80$).

Findings

The average age of beginning teachers in the study was 25 years (SD = 5.4), and participants ranged in age from 22 to 50. The participant group consisted of a nearly equal distribution of gender with 51.4% male (n = 36) and 48.6% female (n = 34). Approximately 56% (n = 39) of beginning teachers taught in a single teacher program while 43% (n = 30) taught in multiple teacher programs; one teacher did not report the number of teachers in the program. The average student enrollment in programs where the beginning teachers were located was 85 (SD = 62.9). Over one-half (56%, n = 39) of the beginning teachers were paired with a mentor of the same-gender (i.e., male-male, female-female), and 44% (n = 31) were in dyads with a mixed-gender composition (i.e., male-female, female-male).

The first research objective was to describe and compare beginning teachers' perceptions of psychosocial mentoring by gender and dyad gender composition. As shown in Table 1, both males and females perceived that they were receiving psychosocial mentoring to a *large extent* (M_{male} = 5.14, SD = 1.43; M_{female} = 4.46, SD = .08). Two-tailed, independent samples *t*-tests were conducted to test null hypothesis one. While male beginning teachers had higher scores than females, no significant differences ($p < .05$) were found between males and females on psychosocial mentoring and its functions (i.e., acceptance, counseling, friendship, role modeling, and social). Therefore, null hypothesis one was not rejected. Small effect sizes (Cohen's *d*) were found for the difference in perceptions between male and female beginning teachers regarding psychosocial mentoring and its functions (see Table 1).

As shown in Table 2, participants in same-gender dyads and mixed-gender dyads perceived that they were receiving psychosocial mentoring to a *large extent* (M_{same} = 5.13, *SD* = 1.53; M_{mixed} = 4.40, *SD* = 1.69). Two-tailed, independent samples *t*-tests were conducted to test null hypothesis two. While beginning teachers in same-gender dyads had higher scores than mixed-gender dyads, no significant difference ($p < .05$) was found between the two groups on psychosocial mentoring and its functions. As a result, null hypothesis two was not rejected. Small effect sizes (Cohen's *d*) were found for the difference in perceptions between same-gender and mixed-gender dyads regarding psychosocial mentoring and its functions (see Table 2).

Table 1
Independent Samples t-test for Gender Differences on Psychosocial Mentoring

	Male (n = 36)		Female (n = 34)				
Mentoring Function	*M*	*SD*	*M*	*SD*	*t*	*p*	Cohen's *d*
Psychosocial mentoring	5.14	1.43	4.46	1.78	1.77	.08	.43
Acceptance	5.59	1.17	5.02	1.73	1.57	.12	.39
Counseling	5.50	1.51	4.87	1.91	1.52	.13	.37
Friendship	5.48	1.57	4.69	2.12	1.75	.09	.43
Role modeling	5.10	1.71	4.35	2.06	1.65	.10	.40
Social	4.07	2.18	3.36	2.03	1.40	.17	.34

Note. 7-point scale (1 = not at all, 3 = some extent, 5 = large extent, 7 = very large extent)

Table 2
Independent Samples t-test for Dyad Gender Differences on Psychosocial Mentoring

	Same-gender (n = 39)		Mixed-gender (n = 31)				
Mentoring Function	*M*	*SD*	*M*	*SD*	*t*	*p*	Cohen's *d*
Psychosocial mentoring	5.13	1.53	4.40	1.69	1.89	.06	.46
Acceptance	5.60	1.27	4.94	1.67	1.85	.07	.46
Counseling	5.47	1.59	4.83	1.86	1.54	.13	.38
Friendship	5.44	1.71	4.67	2.05	1.70	.09	.42
Role modeling	5.11	1.79	4.27	1.99	1.85	.07	.45
Social	4.08	2.22	3.29	1.93	1.54	.13	.38

Note. 7-point scale (1 = not at all, 3 = some extent, 5 = large extent, 7 = very large extent)

The second research objective was to describe and compare beginning teachers' perceptions of dyad similarity by gender and dyad gender composition. As outlined in Table 3, both male and female beginning teachers *agreed* that they were similar to their mentors. However, male beginning teachers had a higher dyad similarity score (M = 5.09, SD = 1.22) than did female teachers (M = 4.31, SD = 1.86). A two-tailed independent samples *t*-test was conducted to test null hypothesis three (see Table 3); a significant difference was found between males and females on dyad similarity (p = .05). Consequently, null hypothesis three was rejected. A medium effect size (Cohen's d) reflects the difference in perceptions between male and female beginning teachers regarding dyad similarity (see Table 3).

Table 3
Independent Samples t-test for Gender Differences on Dyad Similarity and Dyad Satisfaction

	Male (n = 36)		Female (n = 34)				
Construct	*M*	*SD*	*M*	*SD*	*t*	*p*	Cohen's *d*
Dyad similarity	5.09	1.22	4.31	1.86	2.05	.05*	.51
Dyad satisfaction	5.65	1.36	4.92	2.14	1.68	.10	.42

Note. 7-point scale (1 = strongly disagree, 3 = disagree, 5 = agree, 7 = strongly agree)
*p = .05

As shown in Table 4, beginning teachers in both dyad gender compositions (i.e., same-gender, mixed-gender) *agreed* that they were similar to their mentors. A two-tailed, independent samples *t*-test was utilized to test null hypothesis four (see Table 4). While beginning teachers in same-gender dyads had a higher score (M = 5.02, SD = 1.47) for perceived similarity than did beginning teachers in mixed-gender dyads (M = 4.32, SD = .07), no significant (p < .05) difference was found between the two groups. Accordingly, null hypothesis four was not rejected. A small effect size (Cohen's d) was found for the difference in perceptions between beginning teachers in same-gender dyads and mixed-gender dyads regarding dyad similarity.

The third research objective was to describe and compare beginning teachers' perceptions of dyad satisfaction by gender and dyad gender composition. Both male and female beginning teachers *agreed* that they were satisfied with their mentoring relationships (see Table 3). A two-tailed independent samples *t*-test was used to test null hypothesis five. Male beginning teachers had a higher score (M = 5.65, SD = 1.36) than females (M = 4.92, SD = 2.14) for dyad satisfaction. However, a significant difference was not found (p < .05) between males and females on dyad satisfaction. Therefore, null hypothesis five was not rejected. A small effect size (Cohen's d) was found for the difference in perceptions between male and female beginning teachers regarding dyad satisfaction (see Table 3).

Furthermore, beginning teachers in both dyad gender compositions *agreed* that they were satisfied with their mentoring relationships (see Table 4). A two-tailed, independent samples *t*-test was calculated to test null hypothesis six (see Table 4). Beginning teachers in same-gender dyads had a higher dyad satisfaction score (M = 5.62, SD = 1.55) than did beginning teachers in mixed-gender dyads (M = 4.90; SD = .11). However, no significant difference was found between beginning teachers in same-gender and mixed-gender dyads on perceived dyad similarity. Therefore, null hypothesis six was not rejected. A small effect size (Cohen's *d*) was found for the difference in perceived dyad satisfaction between beginning teachers in same-gender dyads and mixed-gender dyads (see Table 4).

Table 4
Independent Samples t-test for Dyad Gender Differences on Dyad Similarity and Dyad Satisfaction

	Same-gender (n = 39)		Mixed-gender (n = 31)				
Construct	*M*	*SD*	*M*	*SD*	*t*	*p*	Cohen's *d*
Dyad similarity	5.02	1.47	4.32	.07	1.84	.07	.45
Dyad satisfaction	5.62	1.55	4.90	.11	1.62	.11	.41

Note. 7-point scale (1 = strongly disagree, 3 = disagree, 5 = agree, 7 = strongly agree)

Conclusions, Implications, and Recommendations

With the current and predicted shortages of teachers in agricultural education, mentoring efforts will play an important role in retaining quality teachers. Accordingly, this study was conducted to gain a better understanding with respect to the role that gender plays in mentoring relationships. However, little research had been conducted in CTE regarding gender composition of the mentoring dyad; therefore, this study sought to begin inquiry. Based upon the findings of the study, several conclusions, implications, and recommendations are offered.

It was concluded that male and female beginning teachers, and beginning teachers in same-gender and mixed-gender dyads perceived similar levels of psychosocial mentoring and its functions, and dyad satisfaction. Thus, the findings of this study did not support previous relationship research (Ensher & Murphy, 1997; Kitchel, 2006) that reported significant differences between males and females. Additionally, they did not support Ragins' (1997) argument that homogeneous dyads experience higher levels of psychosocial mentoring. However, this study was exploratory in nature and involved two cohorts of beginning teachers in one state. The preliminary findings warrant additional research with a larger sample size to further explore gender as a variable in mentoring relationships. The intent of this

study was to begin inquiry and discussion of gender as an influence on the success of the dyad and the potential for beginning teacher retention.

The findings revealed that for all measures (i.e., psychosocial mentoring and its functions of acceptance, counseling, friendship, role modeling, and social; dyad similarity; dyad satisfaction), males and same-gender dyads had higher scores than did females and mixed-gender dyads. There was only one significant difference; male beginning teachers had higher scores on dyad similarity than did female beginning teachers. It appears that beginning male teachers perceived they were more similar to their mentors than did beginning female teachers. Therefore, it is recommended that mentors be aware of this difference and the potential barriers that might impact the effectiveness of dyad relationships.

In general, this finding supports the contention that research on gender composition of the mentoring relationship does not yield definitive findings (Sosik & Godshalk, 2000). In addition, the findings of this study lend limited support for the similarity-attraction paradigm (Byrne, 1971), and relational demography (Tsui & O'Reilly, 1989). Overall, it appears that gender heterogeneity did not hinder the mentoring relationship of this cohort of beginning agricultural education teachers and their formal mentors.

One possible explanation for the lack of significant differences by gender and dyad gender composition, other than males having higher scores on dyad similarity than females, might be found in attachment theory (Bowlby, 1969). It was possible that the males and females in this study had secure attachments, were able to relate easily and confidently with others, and were willing to seek assistance when necessary (Bennett & Saks, 2006). The early childhood attachments of the beginning teachers might be one of the factors that assisted them in successfully developing relationships with their mentors. Young et al. (2006) expressed their belief in attachment theory as follows:

> Related to mentoring, if we haven't developed a fully functional sense of security about relationships, in general, our ability to develop mentorship may be hindered. Thus, attachment theory may add to the explanation of why some mentors and protégés may feel more comfortable keeping a purely professional relationship whereas others develop a more personal bond. Likewise, attachment theory may provide some understanding about why some mentorships are more successful than others. (p. 166)

Scholars have given increased attention to attachment theory in relationship research as represented by the Bennett and Saks (2006) observation of a "burgeoning of adult attachment research" (p. 670) being conducted in the past decade. They suggested this approach in CTE, and echoed the call for further research regarding the interpersonal processes in mentoring relationships that are supported theoretically by attachment theory (Hezlett & Gibson, 2005). Both quantitative and qualitative methodological approaches might yield additional insights that would be valuable in gaining a better understanding of mentoring relationships.

Another possible explanation for the lack of significant differences by gender and dyad gender composition is gender norming. "Gender norming is the process of adjusting male [sic] standards to accommodate the entry of women," in this case to the agricultural education profession (Rooks, 1999, ¶ 2). The agricultural education profession has been historically male-dominated; however, many beginning female teachers have been in this environment for a number of years. For example, beginning female teachers were part of agricultural education programs in high school and as members of the FFA, an intracurricular youth organization. Future research is needed to investigate this dynamic and to identify if and how beginning teachers and their mentors have developed gender norming strategies and techniques. Sex role congruency theory (Stewart, Stewart, Friedley, & Cooper, 1990) might be a conceptual foundation for further exploration of this phenomenon.

The findings of this study supported the concept that beginning teachers and their mentors overcame gender differences, and dyadic relationships functioned satisfactorily. Regardless of gender or dyad gender composition (i.e., same-gender, mixed-gender), it was determined that beginning teachers generally agreed they were receiving psychosocial mentoring and its functions, similar to their mentors, and satisfied with dyad relationships. This finding supported previous research (Greiman et al., 2007) that the psychosocial needs of beginning teachers are being satisfied by mentoring, and that this assistance is being provided regardless of the context (i.e., dyad arrangement involving in-school and in-profession mentors, gender of the beginning teacher).

Protégés' perceived similarity to their mentors is related to mentoring received (Ensher & Murphy, 1997; Greiman, 2002; Turban, Dougherty, & Lee, 2002), and to satisfaction with the mentoring relationship (Young & Perrewé, 2000). Arguably, individuals who are similar encounter less conflict, which can lead to greater satisfaction in the workplace. Therefore, a quality mentoring experience for beginning teachers is critical for their retention in the profession (Holloway, 2001; Smith & Ingersoll, 2004). Further, a successful mentoring experience provides a foundation for launching beginning teachers on a successful career pathway. The general agreement between mentoring outcomes by beginning teachers, regardless of gender or dyad gender composition, also indicated that some degree of gender difference awareness exists on the part of beginning teachers and their mentors. While this study did not examine the perceptions of mentors, they play an important role in overcoming barriers to gender differences. Additional study involving matched pairs of dyad partners is warranted so that congruence and differences between perceptions can be compared (Greiman, 2007; Young & Perrewé, 2000).

This study was limited by a sufficient number of female mentors. Consequently, the dyad gender composition was coded as a dichotomous variable (i.e., same-gender, mixed-gender) during data analysis. The full spectrum of dyad gender combinations (i.e., female to female, female to male, male to male, male to female) were not analyzed. Therefore, it is recommended that further research be

conducted that involves all four dyad gender combinations (Ragins, 1997). Regardless, this exploratory study was a foundation for future research focused on the mentoring relationships of beginning agricultural education teachers. Gaining a better understanding of what can facilitate a successful match between dyad members, and what can be initiated to improve the mentoring process, has implications for teacher efficacy and longevity in the profession.

References

Allen, T. D., Poteet, M. L., Eby, L. T., Lentz, E., & Lima, L. (2004). Career benefits associated with mentoring for protégés: A meta-analysis. *Journal of Applied Psychology, 89,* 127-136.

Bennett, S., & Saks, L. V. (2006). A conceptual application of attachment theory and research to the social work student-field instructor supervisory relationship. *Journal of Social Work Education, 42,* 669-682.

Bowlby, J. (1969). *Attachment and loss: Vol. 1 attachment*. New York: Basic Books.

Burns, J. Z., & Otte, F. L. (1999). Implications of leader–member exchange theory and research for human resource development research. *Human Resource Development Quarterly, 10*, 225–247.

Burris, S., Kitchel, T., Greiman, B. C., & Torres, R. M. (2006). Beginning and mentor agriculture teachers' perceptions of psychosocial assistance, similarities, and satisfaction. *Journal of Agricultural Education, 47*(4), 64-75.

Byrne, D. (1971). *The attraction paradigm.* New York: Academic Press.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum.

Darling, N., Bogat, G. A., Cavell, T. A., Murphy, S. E., & Sánchez, B. (2006). Gender, ethnicity, development, and risk: Mentoring and the consideration of individual differences. *Journal of Community Psychology, 34,* 765-779.

Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method*. New York: John Wiley.

Ensher, E. A., & Murphy, S. E. (1997). Effects of race, gender, perceived similarity, and contact on mentor relationships. *Journal of Vocational Behavior, 50*, 460-481.

Epitropaki, O., & Martin, R. (1999). The impact of relational demography on the quality of leader–member exchanges and employees' work attitudes and well-being. *Journal of Occupational and Organizational Psychology, 72*, 237–240.

Farh, J. L., Tsui, A. S., & Cheng, B. (1995, August). *The influence of relational demography and Guanxi: The Chinese case.* Paper presented at the National Academy of Management meeting, Vancouver, British Columbia, Canada.

Fonagy, P. (2003). The development of psychopathology from infancy to adulthood: The mysterious unfolding of disturbance in time. *Infant Mental Health Journal, 24,* 212-239.

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction.* White Plains, NY: Longman.

Green, S. G., Anderson, S. E., & Shivers, S. L. (1996). Demographic and organizational influence on leader-member exchange and related work attitudes. *Organizational Behavior and Human Decision Processes, 66,* 203-214.

Greiman, B. C. (2002). Providing professional and psychosocial assistance for beginning agriculture teachers: The perceptions of formal mentors and novice teachers. *Dissertation Abstracts International, 63* (07), 2434A. (UMI No. 3060100)

Greiman, B. C. (2007). Influence of mentoring on dyad satisfaction: Is there agreement between matched pairs of novice teachers and their formal mentors? *Journal of Career and Technical Education, 23,* 153-166.

Greiman, B. C., Torres, R. M., Burris, S. H., & Kitchel, T. J. (2007). Beginning teachers' perceptions of in-school and in-profession mentoring relationships. *Career and Technical Education Research, 32*(1), 23-43.

Hall, D. T. (Eds.) (1986). *Career development in organizations.* San Francisco: Jossey-Bass.

Harrison, D. A., Price, K. H., & Bell, M. P. (1998). Beyond relational demography: Time and the effects of surface- and deep-level diversity on work group cohesion. *Academy of Management Journal, 41,* 96-107.

Hesse, E. (1999). The adult attachment interview: Historical and current perspectives. In J. Cassidy & P. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 395-433). New York: Guilford.

Hezlett, S. A., & Gibson, S. K. (2005). Mentoring and human resource development: Where we are and where we need to go. *Advances in Developing Human Resources, 7,* 1-24.

Holloway, J. (2001). The benefits of mentoring. *Educational Leadership, 58*(8), 85-86.

Ingersoll, R. M. (2003). *Is there really a teacher shortage? A research report.* Seattle, WA: Center for the Study of Teaching and Policy.

Joerger, R. M., Greiman, B. C., & Ovrebo, C. J. (2007). *2006-2007 career and technical education teacher induction program final report.* St. Paul: University of Minnesota.

Kantrovich, A. J. (2007). *A national study of the supply and demand for teachers of agricultural education from 2004-2006.* East Lansing: Michigan State University.

Kitchel, T. (2006). Perceived differences, by gender, in student teacher-cooperating teacher interactions. *Journal of Southern Agricultural Education Research, 56*(1), 62-75.

Kram, K. E. (1985). *Mentoring at work*. Boston: Scott, Foresman and Company.

Krause, A. M., & Haverkamp, B. E. (1996). Attachment in adult child–older parent relationships: Research, theory, and practice. *Journal of Counseling & Development, 75,* 83–92.

Marvin, R., Cooper, G., Hoffman, K., & Powell, B. (2002). The circle of security project: Attachment-based intervention with caregiver-pre-school child dyads. *Attachment & Human Development, 4*, 107-124.

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review, 20,* 709–734.

Meglino, B. M., Ravlin, E. C., & Adkins, C. L. (1991). Value congruence and satisfaction with a leader: An examination of the role of interaction. *Human Relations, 44*, 481–495.

Miller, L. E., & Smith, K. L. (1983). *Handling nonresponse issues. Journal of Extension 21*(5), 45-50.

National Association of State Boards of Education. (2000). *The full circle: Building a coherent teacher preparation system*. Alexandria, VA: NASBE.

National Commission on Teaching and America's Future (2003). *No dream denied: A pledge to America's children.* New York: Author.

National FFA Organization. (2005). 10,000 quality programs by 2015. *FFA Advisors Making a Difference, 14*(3), 8.

Oliver, J. D., & Hinkle, D. E. (1982). Occupational education research: Selecting statistical procedures. *Journal of Studies in Technical Careers, 4*(3), 199-208.

Peiter, R. L., Terry, R. Jr., & Cartmell II, D. D. (2005). Mentoring first year agricultural educators: Examining a state-mandated induction program. *Journal of Agricultural Education, 46*(1), 11-19.

Ragins, B. R. (1997). Diversifed mentoring relationships in organizations: A power perspective. *Academy of Management Review, 22,* 482-521.

Rigler, S. E. (2000). *Gender differences in beginning teachers' metaphors for mentoring*. Washington, DC: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED447070)

Rooks, S. C. (1999). Looking at G.I. Jane through lenses of gender. *American Communication Journal, 2*(1). [Electronic version]

Ruhland, S. K., & Bremer, C. D. (2002). Professional development needs of novice career and technical education teachers. *Journal of Career and Technical Education, 19*(1), 18-31.

Shulman, S., Elicker, J., & Sroufe, L. A. (1994). Stages of friendship growth in preadolescence as related to attachment history. *Journal of Social and Personal Relationships, 11,* 341–361.

Smith, T. M., & Ingersoll, R. M. (2004). What are the effects of induction and mentoring on beginning teacher turnover? *American Educational Research Journal, 41,* 681-714.

Somech, A. (2003). Relationships of participative leadership with relational demography variables: A multi-level perspective. *Journal of Organizational Behavior, 24,* 1003–1018.

Sosik, J. J., & Godshalk, V. M. (2000). The role of gender in mentoring: Implications for diversified and homogeneous mentoring relationships. *Journal of Vocational Behavior, 57,* 102-122.

Stewart, L. P., Stewart, A. D., Friedley, S. A., & Cooper, P. J. (1990). Communication between the sexes: Sex differences and sex-role stereotypes (2nd ed.). Scottsdale, AZ: Gorsuch Scarisbrick.

The Council for Agricultural Education. (2006). *Unmistakable potential: 2005-2006 annual report on agricultural education.* Washington, DC.

Tsui, A. S., & O'Reilly, C. A. (1989). Beyond simple demographic effects: The importance of relational demography in superior–subordinate dyads. *Academy of Management Journal, 32,* 402–423.

Turban, D. B., Dougherty, T. W., & Lee, F. K. (2002). Gender, race, and perceived similarity effects in developmental relationships: The moderating role of relationship duration. *Journal of Vocational Behavior, 61,* 240-262.

Wanberg, C. R., Welsh, E. T., & Hezlett, S. A. (2003). Mentoring research: A review and dynamic process model. *Research in Personnel and Human Resource Management, 22,* 39–124.

Young, A. M., Cady, S., & Foxon, M. J. (2006). Demystifying gender differences in mentoring: Theoretical perspectives and challenges for future research on gender and mentoring. *Human Resource Development Review, 5,* 148-175.

Young, A. M., & Perrewé, P. L. (2000). What did you expect? An examination of career-related support and social support among mentors and protégés. *Journal of Management, 26,* 611-632.

Zumwalt, K., & Craig, E. (2005). Teachers' characteristics: Research on the demographic profile. In M. Cochran-Smith & K. M. Zeichner (Ed). *Studying teacher education* (pp. 111-156). Washington, DC: American Educational Research Association.

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Awareness, Use, and Perceived Impact of Selected Stakeholders Toward the Implementation of Skills Standards in the State of Illinois

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Abstract

This study examined differences in the awareness, use, and perceived impact of educators, employers, and workforce training providers toward skills standards implementation in the State of Illinois. Group differences were revealed on the use of skills standards, with educators displaying significantly higher levels of use than employers or workforce training providers. Group differences were also evident on the perceived impact of skills standards; wherein, educators and workforce training providers were more likely than employers to perceive an impact, particularly with respect to career and technical education (CTE) and private sector human resource functions. The results indicated relatively limited engagement of employers in skills standards, despite their support and encouragement of the educational community to engage in implementation.

Introduction

Eager to improve the quality of the workforce and enhance economic competitiveness, state officials in Illinois supported the development of skills standards even prior to the formation of the federal government's National Skill Standards Board (NSSB) in 1994. In the mid-1990s to early 2000s, the Illinois Occupational Skill Standards and Credentialing Council (IOSSCC) appropriated over $5 million in state funding to develop standards in numerous occupational fields. This study examined skills standards to identify the differences in awareness, use, and perceived impact by three key stakeholder groups, including educators, employers, and workforce training providers. Additionally, it considered the implications of the findings for implementation of programs of study under the 2006 federal Carl D. Perkins CTE legislation. The perspectives of the groups were particularly important because they represent constituencies referenced in state and federal policy as central to CTE program implementation.

The National Skills Standards Movement

During the 1980s, policymakers on both sides of the aisle called for strengthened relationships between school and work (Dykman, 1996). Numerous reports recommended improving the nation's educational system to prepare students for a globally competitive workforce (e.g., Commission on the Skills of the American Workforce, 1990). Similar to the Secretary's Commission on Achieving Necessary Skills (SCANS, 1991; Whetzel, 1992), this Commission advocated for a new system of education that would institute policies, structures, and processes by strengthening connections between education and business. Both commissions concluded that a lack of standards addressing academic and occupational skills achievement was detrimental to preparing students for employment. In comparison to other nations, the U.S. lacked a cohesive system of standards on any level. The U.S. Department of Labor strongly favored the implementation of skills standards, suggesting it would be impossible to prepare a technical workforce or improve the economy without their widespread adoption (Wills, 1995).

Following rancorous debate over the role government should play in skills standards, business representation, and the impact of standards on hiring women and minorities (Kincheloe, 1999), Congress passed the *Title V: The National Skill Standards Act of 1994* to establish the National Skills Standards Board (NSSB). The primary role of the NSSB was to encourage, promote, and assist in the development and adoption of a national system of voluntary occupational skills standards (P.L. 103-227, Title V, National Skill Standards Act, 1994). An underlying theme of the legislation authorizing the NSSB was to engage various stakeholder groups in the implementation of a voluntary skills standards system, with collaborative relationships between education and business being an integral component (NSSB, 2001; Wills, 1997). From the time the NSSB was established, occupational skills standards were perceived as a way to support states, industry groups, and professional associations to prepare students and workers for the modern and increasingly globalized workplace. The National Skill Standards Act included a provision for the sunset of the NSSB five years from its inception, but the NSSB continued until 2003. When active, the NSSB website claimed to have "collected and organized the most comprehensive database of Industry credentials and certifications in existence today" (n.d.).

The NSSB also attempted to establish common language about skills standards, although confusion remains. Terms such as "skills standards" and "occupational skills standards" continue to be used interchangeably. For this study, the term "skills standards" is used in its broadest sense to define workplace performance, including all aspects of employment that are designated through collaborative efforts of states, schools and colleges, business and industry, and other governmental or professional organizations. They reflect an orientation towards job performance that includes occupational-technical, employability, and academic performance. Occupational skills standards define what work is to be performed,

how it will be measured, and how well it should be completed. Employability skills, sometimes called soft skills, refer to the general aspects of work behavior that apply to many occupations, often emphasizing personal qualities (Carnevale & Desrochers, 2001). Academic skills are associated with learning standards, referring to the knowledge and skills students are expected to possess relative to core academic subject matter such as mathematics, English, and science. Academic skills are particularly crucial for K-12 education, but also across the education spectrum because the changing nature of the workplace drives the need for language, mathematics, and scientific literacy. Increasingly, occupational, employability, and academic skills are recognized as essential to students' future successes, whether students progress to college or work (ACT, 2006).

Tucker (2007), a longstanding advocate for standards, recommended measuring student performance against widely accepted standards associated with academics and occupations. The push for standards-based education, focused primarily on core academics, aligns with No Child Left Behind (NCLB). Generally, standards are expected to clarify what knowledge and skills should be taught and guide the measurement of student competence (Darling-Hammond, 2004). Under NCLB, the measurement of student progress on meeting standards through testing has been raised to a new level of importance because of the assumed relationship between student progress towards meeting standards and the effectiveness of the educational system. Federal legislation, whether NCLB or the Carl D. Perkins CTE Act, encourages the alignment of curriculum with standards. It also rewards and sanctions student performance. Policymakers, educators, employers, and many others view standards as crucial to not only holding schools accountable but to aligning education and workforce training systems with employers and the economy (Ganzglass, Simon, Mazzeo, & Conklin, 2002).

State Skills Standards Initiatives

In the early 1990s, prior to the initiation of the NSSB, Wills (1993) reported that 34 states used their funds to develop skills standards. These state initiatives were conducted in association with CTE curriculum development, ranging from a level of $3,000 to $20,000 per occupational cluster. Approximately 75% of the states also funded the ongoing maintenance and revision of skills standards and related task lists. The Institute for Educational Leadership documented approximately 700 committees using industry volunteers to assist states, and about 400 professional societies and business and industry associations that promoted or issued skill-based credentials. Potential users of state level skills standards were educators, employers, and workforce training providers such as those who directed Workforce Investment Act (WIA) grants. Even with these many and varied state initiatives, Wills (1995) noted sizable gaps in implementation across the 50 states and by occupation within states, with no one set of skills standards used by all states. Because of the variability

nationally, the study pointed to the need for state level studies of skills standards implementation.

Of all 50 states, Illinois was particularly active in pursuing skills standards (Rahn, O'Driscoll, & Hudecki, 1999). In 1992, a couple of years prior to the start of the NSSB, skills standards were added to Illinois' portfolio of academic (learning) standards. In that year, the Illinois legislature passed the Occupational Skill Standards Act (Public Act 87-1210 or P.A. 87-1210) establishing the IOSSCC, and appropriating substantial state funding to implement three primary purposes: (a) to recognize and develop skills standards and credentialing systems, (b) to market and promote their use in the private sector, and (c) to work with state councils and agencies to promote the application of standards and credentials. The IOSSCC's vision was "to have [a] statewide system of industry-defined and recognized skills standards and credentials for all major skilled occupations that provide strong employment and earning opportunities in Illinois" (2000, p. 4). The IOSSCC members were to play a major leadership and coordination role in establishing and marketing the system for use in hiring, training, and promoting employees. The IOSSCC endorsed skills standards and credentialing systems for occupations that included: (a) requiring basic workplace skills and technical training, (b) providing a large number of jobs with either moderate or high earnings, and (c) providing career advancement in related occupations with moderate or high earnings.

Illinois statute specified the Illinois State Board of Education (ISBE) as the sole administering agency of the federal Carl D. Perkins CTE legislation and charged the ISBE with developing a system of core standards and measures of performance for CTE programs. Public Act 87-1210 addressed occupational skills in education and employment by establishing a nine-member panel composed of representatives from business and industry, with five members appointed by the Governor and four by the State Superintendent of Education. Public Act 87-1210 also specified that the ISBE establish statewide academic, technical, and employability skills standards; establish a credentialing system for certifying the qualifications of individuals on these standards; publish the standards regularly to promote their voluntary use; and coordinate the development of skills standards and credentialing systems with those of other states to promote consistency and increase employment opportunities for students.

According to Rahn et al. (1999), Illinois was unusually deliberate about using business, industry, and labor in the identification, verification, and implementation of skills standards and credentialing systems, designating business and industry to lead the standard-setting process. The state's economy was grouped into 14 occupational categories (e.g., agriculture and natural resources, construction, energy and utilities) that aligned closely, but not identically, with the categories of the NSSB. Similar to the NSSB's process, the IOSSCC created an industry subcouncil for each occupational category that acted as a voluntary partnership charged with conceiving how skills standards benefit multiple stakeholder groups. In Table 1, uses of skills

standards are attributed to educators, employers, and students and workers based on the IOSSCC (2004).

Table 1
Benefits of Skills Standards Attributed to Educators, Employers, and Students and Workers

Stakeholder Group	Benefits of Skills Standards
Educators	1. Keep abreast of a rapidly changing workplace. 2. Contribute to curriculum and program development. 3. Provide students with better career advice. 4. Communicate with parents because educators have up-to-date information about industry needs. 5. Strengthen the relationship between schools and local businesses.
Employers	1. Focus the investment in training and reduce training costs. 2. Boost quality and productivity and create a more flexible workforce. 3. Improve employee retention. 4. Improve supplier performance. 5. Enlarge the pool of skilled workers.
Students and Workers	1. Help workers make better decisions about training they need to advance in their careers. 2. Allow workers to communicate better to employers about what they know and can do. 3. Improve long-term employability by helping workers move easier among work roles. 4. Enable workers to help their children make effective academic and career and technical education (CTE) decisions.

Source: Illinois Occupational Skills Standards and Credentialing Council (2004)

According to the state's specifications, educators are expected to use the skills standards to develop education and training programs aligned with the workplace, advise students and parents about these programs, and encourage relationships between schools and businesses. Employers are expected to use the skills standards to enhance employee training, productivity, and retention; and create a larger impact on suppliers and the labor force. Students and parents are expected to use the skills standards to make better decisions about education, training, and career preparation and retention. Additionally, the skills standards are intended to empower employees to communicate their skills and employment situations.

Skills Standards and Human Capital Theory

Gray and Herr (1998) pointed out the relevance of skills standards applied to CTE curriculum to build a competent workforce, arguing that workforce education and training is predicated on the theory of human capital investment. Specifically, human capital investment theory predicts that individuals and, by extension, employers who invest in human capital through investment in education and training are more productive (i.e., produce high quality goods and services more rapidly at lower cost) and, therefore, generate more revenue (i.e., salary for individuals and profit for private firms) than when investment in human capital is limited or missing. Human capital investment theory has particular relevance to this study because it may be associated with the stakeholder groups' awareness of skills standards and with decisions to use them or recognize their impact. If skills standards encourage investment in education and workforce training and enhance the competencies of students and graduates who seek employment, and are viewed as such by key stakeholders, then skills standards may offer a useful mechanism for enhancing the economy. Stakeholders who associate skills standards with human capital investment may value and attribute greater impact to their use. Conversely, stakeholders who are not aware of skills standards, or who know about them but fail to recognize standards as making a valuable contribution to human capital investment, may not attribute a positive impact to their use.

However, while it is possible that skills standards are associated with human capital investment, information that guides decisions about human capital and the labor force is imperfect, therefore, making it difficult for stakeholders to observe specific benefits. Tangible evidence of impact is difficult to discern, possibly explaining why the interest in skills standards of the NSSB and other groups has shifted to the role of education in credentialing. Signaling theory (Spence, 2002) suggested that an individual's ability to perform in the workplace is largely obscured from employers and, consequently, unobservable. As a result, employers seek cues or signals to inform them that individuals possess the ability to perform a job and be productive in the workplace. According to this theory, it is possible that skills standards, operating through credentials, signal competency to employers. Thus, signaling theory may offer a plausible rationale why employers (and other stakeholders) value and use skills standards, and believe them to be valuable in matching graduates' standards-based education to employment.

Extant research presents a mixed picture regarding whether skills standards are recognized by stakeholders as valuable. Numerous scholars postulate the value educators and employers should attribute to skills standards; however, little is known about whether these groups use them or attribute value to their use in a tangible way. Bailey and Merritt (1995) suggested that skills standards benefit employers by helping them identify qualified workers, reduce the costs of screening applicants, support new employee recruitment, and improve the public perception of their businesses. Similarly, Spill (2002) claimed that skills standards enhance employers'

communication of knowledge and skills requirements to new and incumbent employees, and reduce costs and risks associated with the hiring and promotion of employees. Employees and students benefit by being able to make informed investments in education and training, and they are better positioned to communicate knowledge and skills requirements to employers. Public agencies and community groups such as workforce training providers funded by the WIA benefit by becoming involved, enhancing workforce training programs, and enhancing workforce and economic development. Expressing a similar view as Bailey and Merritt (1995), Carnevale and Desrochers (2001) endorsed the use of standards, performance-based assessments, and industry-based certifications. They suggested that failing to adopt academic and occupational skills would leave students with inadequate competencies to perform in future education or jobs.

Bunn and Stewart (1998) expressed optimism for the use of skills standards by various stakeholder groups, suggesting businesses benefit by using skills standards to stimulate employees' career advancement opportunities. Educators benefit by using them to design training and facilitate linkages with complementary initiatives aimed at workforce skills enhancement. Moreover, educators who adapt course content to address academic and occupational skills standards benefit by preparing graduates for productive employment. Speculating on the potential impact of skills standards on CTE, Bunn and Stewart described six themes: (a) improved communication between education and business and industry, (b) improved relevancy of curriculum content, (c) improved teaching and learning processes, (d) enhanced connections between school and employment for graduates, (e) better prepared entry-level workers, and (f) improved accountability. Faulkner (2002) added that skills standards communicate the skill requirements of frontline workers in high performance environments without ambiguity, serving as a means of benchmarking the very best education and training.

Representing one of only a handful of studies of skills standards implementation, Aragon, Woo, and Marvel (2004) investigated awareness and implementation of industry-based skills standards using a nationally representative sample of community college deans. Data were collected across 10 CTE program areas, with findings showing that 75.7% of the deans integrated skills standards into their curriculum. The highest level of integration was in manufacturing, construction, automotive, and health; national industry-based standards were predominant over state level standards. Many community colleges tied certification to skills standards, particularly in health occupations, but a college degree or diploma remained the most common form of credentialing. However, the results of Aragon et al. contrasted with earlier studies by Haimson and Hulsey (1999), Hoachlander and Rahn (1994), and Dykman (1996) who examined employer perspectives toward skills standards. These studies concluded that skills standards faced considerable challenges in winning respect among employers. In particular, Haimson and Hulsey (1999) revealed that employers were neither familiar with the standards nor did they show strong support

for them. They concluded that most employers place little emphasis on skills standards with only the most highly committed adopting them. Questions with respect to the utility and impact of skills standards pertaining to employers remain unanswered, with little empirical investigation on skills standards implementation.

Purpose of the Study

At a time when the U.S. is engaged in implementation of CTE in response to the federal Carl D. Perkins CTE legislation of 2006, this study provides insight into the experiences of one state that emphasized skills standards. The study sought to document the State of Illinois' skills standards initiative from the vantage point of three stakeholder groups identified by state level legislation. The research examined the awareness, use, and perceived impact of skills standards (state and national) by three stakeholder groups: educators, employers, and public-sector workforce training providers funded by WIA. The three research questions that guided the study included: (a) Are there differences in awareness of Illinois' skills standards and national skills standards by employers, educators, and workforce training providers? (b) Are there differences in use of Illinois' skills standards and national skills standards by employers, educators, and workforce training providers? and (c) Are there differences in perceptions of the impact of Illinois' skills standards and national skills standards by employers, educators, and workforce training providers? Knowing the perspectives of these three stakeholder groups may provide insights into skills standards and yield implications for future implementation of the federal Carl D. Perkins CTE legislation.

Methodology

The data were derived from a research study solicited by the Governor's Office of the State of Illinois. A mixed method, concurrent qualitative-quantitative design (Creswell, 2005) was used with the predominant method being a structured e-mail and fax survey to assess awareness, use, and perceived impact of skills standards by selected stakeholder groups. The mixed method design allowed for the collection of quantitative data collected using open-ended telephone interviews and document review, including content analysis of websites and web-based materials. State agency officials were interviewed using a semi-structured protocol, and document reviews were conducted prior to, during, and after the survey was completed to deepen understanding of the results and propose implications for policy and practice. In addition to interviewing state level administrative personnel from the Illinois State Board of Education (ISBE), the Illinois Community College Board (ICCB), and the Department of Commerce and Economic Opportunity (DCEO), officials from six other states identified by state staff as peers of Illinois, were interviewed about skills standards implementation using a semi-structured protocol. Further, NSSB employees and other experts regarding skills standards (e.g., scholars,

policy analysts) were interviewed by telephone, comparing Illinois' approach to skills standards implementation and gathering input into the interpretation of survey results.

Sample

A sample comprised of employers, educators, and local providers of workforce training was chosen. The sampling frame for the employer group was derived from the Governor's Office of the State of Illinois, including employers who had previous involvement in Illinois' skills standards initiative, supplemented with lists of employers identified as Fortune 500 firms or associated with CTE programs offered by Illinois community colleges. The research team worked directly with the ICCB and cooperatively with several Illinois industry groups to obtain a broad-based representation of employers. The respondents were employed in human resources units and perceived to have sufficient knowledge of employee skills to respond to questions regarding skills standards implementation. The educator group, divided evenly between secondary and postsecondary, included all individuals who attended one of three regional workshops pertaining to federal Carl D. Perkins CTE funding, and they were asked to respond to questions about skills standards implementation. The third group, workforce training providers, included the total group of professionals employed by the Illinois Department of Employment Security (IDES) Local Workforce Investment Areas as well as IDES Rapid Response Agencies. These administrators had responsibility for workforce training services and employment associated with WIA.

The total number of persons surveyed was 538; 156 persons responded yielding a response rate slightly under 30%. A response rate was calculated for each subgroup because the rate differed substantially by group. The educator group had a response rate of 58%, the workforce training provider group had a 39% response rate, and the employer group showed a response rate of 15%. Nonrespondents were selected randomly as recommended by Dillman (2007) to determine nonresponse bias. A total of 30 nonrespondents, 10 representing each group, was contacted via telephone and administered an abbreviated version of the survey. A comparison of responses revealed no significant differences between this group and relevant subgroups.

Instrumentation

Alternative versions of the survey instrument were developed by the research team for data collection via e-mail and fax. Named the *Illinois Skill Standards Survey,* the instrument was reviewed for content validity by a panel of experts associated with the IOSSCC and business and industry, and state officials of the ISBE, ICCB, and IDES. Researchers with expertise pertaining to skills standards also

commented on the instrument. A relatively small number of individuals similar to members of the sample participated in a pilot test to estimate reliability.

The Illinois Skill Standards Survey was a comprehensive instrument that contained four sections. In section one on awareness and use, the respondents were requested to respond yes or no as to whether they were aware of national skills standards, whether their organization was using national skills standards, and whether they were aware of Illinois skills standards. National skills standards referred to industry-based skills standards that were facilitated or supported by the NSSB, recognizing that the NSSB did not have authority to mandate skills standards (NSSB, 2001). The respondents who were aware of national standards were asked whether they were using any of 42 skills standards developed or recognized by the state because of their identification with the NSSB. Section one also listed 25 items identified as tasks that use skills standards, and respondents were asked to indicate their level of use on a 5-point scale. Examples of the tasks are developing learning objectives, developing training programs, and communicating business expectations to students or employers. These items were drawn from literature that advanced a rationale for skills standards, particularly IOSSCC (2000) and Rahn et al. (1999). The rating scale was quantified such that 1 indicated *not used*, 2 indicated *seldom used* (associated with use of the task 25% or less of the time), 3 indicated *somewhat seldom used* (associated with 26-50% of the time), 4 indicated *somewhat often used* (51-75% of the time), and 5 indicated *often used* (76-100% of the time). The respondents could also respond *not applicable* (N/A). In addition, respondents selected from a list the ways they became familiar with skills standards and the organizations responsible for familiarizing them.

Section three contained statements of perceived impact of skills standards, divided into statements associated with business impact and academic (educational) impact. These items were consistent with the notion of signaling and credentialing (Spence, 2002), and more specifically reflected the perspectives of Bailey and Merritt (1995), Bunn and Stewart (1998), Spill (2002), and others with respect to potential benefits and impact. The respondents were instructed to rate these statements on a 5-point Likert scale ranging from 1 for strongly disagree to 5 for strongly agree, with a mid-point of undecided. To assess the internal consistency of the impact scales, Coefficient alpha (Cronbach, 1951) was used post hoc for both the business and academic impact statements; the business impact statements had an estimated internal consistency of .95 and the academic impact statements had an estimated internal consistency of .89. Section four addressed the respondents' backgrounds including job and position title, size and type of employing organization, and primary function of the employer. For business functions, the respondents were given a list of 21 business and industry cluster areas, such as construction, information technology, and manufacturing.

Data Collection and Analysis

The data were collected using e-mail or fax depending upon respondent access to various Internet-based technology. Each time the respondents were contacted, the survey was sent as a file attached to an electronic or fax cover letter, providing the respondents two different forms of the survey. The decision to use e-mail and fax to conduct the survey was made because some schools and businesses were perceived to lack the technological capability to complete an online survey.

Chi-square was used to determine if the groups differed on the awareness and use items as reported by either dichotomous yes or no responses. The business and academic impact statements were analyzed by stakeholder group, using descriptive statistics and analysis of variance to determine differences between groups. Tukey's post hoc comparison tests were performed when F values were statistically significant. For ease of interpretation, the statements regarding use and impact were displayed according to their ranking from highest to lowest for the employer group, then educators, followed by workforce training providers. Qualitative data were analyzed for themes and patterns to better describe and interpret the quantitative survey results.

Findings

Awareness and Use of Skills Standards

The findings show differences in awareness, use, and perceived impact of state and national skills standards, including numerous tasks illustrating differences in use of skills standards by the employer, educator, and workforce training provider groups. At least 75.0% of all three stakeholder groups were aware of Illinois skills standards, with 91.9% of educators, 85.7% of employers, and 75.0% of workforce training providers indicating awareness of the standards (see Table 2). However, differences were evident between stakeholder groups on awareness of national skills standards as indicated by a significant X^2 of 14.19, p = .001. A much smaller percentage of employers (57.1%) indicated awareness of national standards as compared to educators (86.7%) and workforce training providers (78.6%).

The examination of awareness of skills standards by stakeholder group indicated that more employers were aware of state standards (85.7%) than national standards (57.1%); whereas, the percentage of educators and workforce training providers indicating awareness of state and national standards was similar (91.9% for state standards and 86.7% for national standards for educators, 75.0% for state standards and 78.6% for national standards for workforce training providers). The interviews revealed that employers attributed awareness of skills standards rather narrowly, to involvement with state agencies and local education partners. By contrast, educators and workforce training providers learned about skills standards through a multitude of mechanisms, including their relationships with local education partners and employers as well as through mailings and seminars sponsored by state

agencies. Having a greater number and more diverse informational mechanisms may have contributed to greater awareness of skills standards among educators and workforce training providers than employers.

Table 2
Awareness and Use of Skills Standards by Employers, Educators, and Workforce Training Providers

	f	*P*	X^2	*df*	*P*
Aware of Illinois' Skills Standards			5.11	2	.078[a]
Employer (*n* = 49)	42	85.7			
Educator (*n* = 74)	68	91.9			
Workforce (*n* = 28)	21	75.0			
Aware of National Skill Standards			14.19	2	.001
Employer (*n* = 49)	28	57.1			
Educator (*n* = 75)	65	86.7			
Workforce (*n* = 28)	22	78.6			
Using Illinois' Skills Standards			16.87	2	<.001
Employer (*n* = 40)	11	27.5			
Educator (*n* = 66)	43	65.2			
Workforce (*n* = 17)	5	29.4			
Using National Skill Standards			29.82	2	<.001
Employer (*n* = 48)	6	12.5			
Educator (*n* = 72)	41	56.9			
Workforce (*n* = 25)	4	16.0			

Note. [a]Cell count less than 5.

A significant difference was found in the use of Illinois skills standards among the three stakeholder groups; a much higher percentage of educators (65.2%) reported using the state's skills standards than either the employer (27.5%) or workforce training provider (29.4%) groups. National standards were used much less than state standards by all three stakeholder groups; this finding was corroborated by interviews with state officials. Because of the level of emphasis and support given state standards through the work of the IOSSCC, state officials anticipated greater use of state rather than national standards, with the findings being consistent with this assumption.

When awareness of skills standards was compared to use by each stakeholder group, awareness of standards was much greater than use for both the state and national skills standards. For example, 86% of the employers reported awareness of Illinois skills standards but only 28% reported using them; 75% of the workforce

training providers were aware of state skills standards as compared to 29% who reported using them. In fact, the incidence of use of state skills standards by the employer and workforce training provider groups was strikingly similar, with both groups indicating use at slightly less than 30%. Only the educator group showed a high level of awareness and a relatively high level of use, 92% and 67%, respectively. However, even for educators, use of the state's skills standards was substantially less than awareness, with a similar pattern evident for national skills standards.

Tasks Utilizing Illinois Skills Standards

Delving more deeply into the use of skills standards, the respondents were asked to rate the extent to which tasks associated with Illinois' skills standards were used (see Table 3). First, none of the mean responses of the three groups placed any tasks at the 4.0 or above level on a 5-point scale, indicating that on average, none of the tasks were associated with using Illinois' skills standards 51% or more of the time the tasks were performed. Recognizing their moderate and lesser use by all groups, educators reported use of several more tasks associated with the Illinois and national skills standards at the moderate level than the other two groups, as indicated by mean ratings between 3.0 and 4.0.

Only four tasks received a mean rating of 3.0 or above by all three stakeholder groups. All four of these tasks were associated with the education and training function, specifically developing learning objectives, designing work-based learning experiences, modifying instructional practices, and developing or revising curriculum. These findings suggested that all three stakeholder groups associated the Illinois skills standards with the education and training function consistent with a priority of the IOSSCC (2000). Tasks receiving lower mean ratings by all three stakeholder groups, only slightly above or falling below 2.0 for use less than 25% of the time were: promoting employees, recruiting employees, assessing or evaluating employees' work experience, and screening applicants for employment. Despite an endorsement by the IOSSCC for using skills standards to support human resource functions such as employee recruitment and evaluation, human resource tasks were not associated with skills standards according to any stakeholder group.

Sixteen tasks were rated at a moderate level of use (25% to 50% of the time) by educators compared to six tasks receiving the 3.0 level by employers and workforce training providers. Educators yielded mean ratings from 3.0 to 4.0 on tasks such as developing training programs, communicating business expectations to students and employees, assessing program outcomes, articulating with two-year schools, and providing certification of skills attainment. Two tasks rated at 3.0 or above by employers and educators were developing training programs and communicating business expectations to students or employees. It is noteworthy that educators also gave these items a rating of 3.0 or above; whereas, workforce training providers did not. Two tasks rated 3.0 or above by workforce training providers were

Table 3
Tasks Utilizing Illinois' Skills Standards by Employers, Educators, and Workforce Training Providers

Tasks Utilizing Illinois Skills Standards	Employer (n = 12)		Educator (n = 45)		Workforce (n = 7)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*
Developing training programs	3.33	1.61	3.56	1.21	2.50	1.52	1.62	.21
Developing learning objectives	3.25	1.58	3.95	0.94	3.67	1.51	1.46	.24
Communicating business expectations to students or employees	3.18	1.33	3.45	0.95	2.67	1.03	1.67	.20
Modifying instructional practices	3.17	1.47	3.60	1.05	3.20	1.64	0.59	.56
Developing or revising curriculum	3.14	1.35	3.98	0.93	3.33	1.63	2.52	.90
Designing work-based learning experiences	3.00	1.67	3.59	1.15	3.40	1.52	0.94	.40
Assessing individuals' outcomes	2.82	1.33	3.44	1.08	3.67	1.51	1.52	.23
Designing employee development	2.78	1.30	2.80	1.23	2.14	1.57	0.77	.47
Marketing educational program to business and industry	2.75	1.91	3.33	1.02	2.20	1.30	2.40	.10
Assessing program outcomes	2.67	1.66	3.28	1.18	2.43	1.27	1.92	.16
Collaborating with educational institutions	2.60	1.78	3.42	1.16	1.43	0.79	7.97	<.01
Attaining program or school accreditation	2.50	1.64	2.97	1.54	2.67	1.53	0.28	.76
Collaborating with business and industry	2.50	1.62	3.53	1.10	2.57	1.27	4.43	.02
Marketing educational program to students or employees	2.44	1.81	3.07	1.19	2.00	1.10	2.34	.11
Articulating with two-year schools	2.43	1.81	3.15	1.16	2.00	0.89	2.92	.06
Benchmarking to compare skill levels of potential and current employees	2.40	1.17	2.66	1.20	1.83	1.60	1.10	.34

Table 3 *(continued)*
Tasks Utilizing Illinois' Skills Standards by Employers, Educators, and Workforce Training Providers

Tasks Utilizing Illinois Skills Standards	Employer (n = 12)		Educator (n = 45)		Workforce (n = 7)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*
Partnering with workforce development programs	2.38	1.60	3.28	1.22	2.29	1.50	2.83	.07
Assessing or evaluating employees work performance	2.30	1.34	2.69	1.44	1.80	1.30	0.97	.39
Promoting employees	2.20	1.14	2.19	1.11	1.50	0.58	0.73	.49
Providing certification of attainment of skills	2.00	1.05	3.07	1.18	3.00	1.63	3.17	.05
Articulating with four-year schools	2.00	1.41	2.69	1.35	1.33	0.82	3.08	.06
Screening applicants for employment	2.00	0.82	1.96	1.25	1.71	1.11	0.15	.86
Recruiting employees	2.00	1.00	1.88	1.07	1.50	0.84	0.46	.64
Assessing or evaluating employees work experience	2.00	1.05	2.63	1.50	1.83	1.17	1.31	.28
Articulating with secondary schools	1.80	1.79	3.63	1.05	2.00	1.00	9.31	<.01

assessing individuals' outcomes and providing certification of skills attainment. Here too, educators rated these tasks 3.0 or above, while employers did not.

Finally, the results of the analysis of variance indicated that the three stakeholder groups differed statistically on four tasks associated with using the Illinois skills standards (see Table 3). Two of these tasks were concerned with collaboration among groups. First, there was a significant difference with respect to collaborating with educational institutions ($F = 7.97$, $p \leq .01$), with a Tukey post hoc comparison test revealing a significant difference between the mean response of educators ($M = 3.42$) and the mean response of workforce training providers ($M = 1.43$). These results suggested that educators associated using skills standards with the task of collaborating with other educational institutions more than workforce training providers. Collaborating with business and industry revealed a significant difference between groups ($F = 4.43$, $p = .02$). However, the difference was between educators ($M = 3.53$) and employers ($M = 2.50$). These results suggested that educators were associating skills standards with collaborations with business and industry; employers were not associating skills standards and collaborations with educators.

Another task that revealed a statistical difference on mean ratings was providing certification of attainment of skills, reporting an $F = 3.17$, $p = .05$. In this case, the Tukey post hoc comparison test indicated a significant difference between the educator and employer groups ($p = .04$), with educators providing an average rating of $M = 3.07$ compared to employers' average rating of $M = 2.00$. This result parallels an earlier finding that suggested educators were associating use of skills standards with certification of skills more than employers. Finally, the task of articulating with secondary schools revealed a significant difference among the stakeholder groups ($F = 9.31$, $p < .01$). The Tukey post hoc comparison test indicated that educators differed significantly from employers and workforce training providers. Educators yielded a mean rating of $M = 3.63$, employers $M = 1.80$, and workforce training providers $M = 2.0$.

Perceived Impact of Skills Standards

The data pertaining to the perceived impact of Illinois' skills standards for employers, educators, and workforce training providers are presented in Table 4. A total of 11 statements were associated with academic impact and 10 with business impact. The results are listed in descending order according to the mean ratings of employers on the 5-point Likert scale for educators and workforce training providers. Overall, employers and educators rated more impact statements at a level of 3.0 or above than workforce training providers. A total of 20 items were rated by employers and 17 were rated by educators at 3.0 or above compared to the workforce training provider group that rated only 7 items at this level. All three groups rated the academic impact statements higher than the business impact statements.

Table 4

Perceived Impact of Illinois' Skills Standards by Employers, Educators, and Workforce Training Providers

Impact of Illinois' Skills Standards	Employer (n = 14)		Educator (n = 47)		Workforce (n = 9)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*
Illinois' skills standards encourage alliances between education and business/industry. (A)	4.14	0.53	3.91	0.69	3.78	0.67	0.97	.39
Illinois' skills standards provide a basis for educational goals. (A)	4.07	0.73	3.83	0.77	3.33	1.12	2.28	.11
Individuals from programs with industry certification have higher level skills than those from programs without industry certification. (A)	3.93	0.73	3.76	0.82	3.56	0.73	0.61	.55
Illinois' skills standards encourage individuals to take more ownership of their skill development. (A)	3.93	0.62	3.57	0.81	2.78	1.09	5.56	.01
Illinois' skills standards enhance CTE programs. (A)	3.86	0.66	4.07	0.65	3.67	0.87	1.54	.22
Illinois' skills standards demand more accountability of occupational education programs than what is presently required. (A)	3.86	0.77	3.59	0.93	3.33	0.87	0.98	.38
Illinois' skills standards help identify competent individuals for employment in my organization. (B)	3.73	0.90	3.47	1.02	2.43	1.51	3.65	.03
Illinois' skills standards provide a benchmark for my organization to compare skill levels of employees. (B)	3.73	1.01	3.49	0.89	2.29	1.25	5.45	.01
Individuals who meet Illinois' skills standards have a smoother school-to-work transition than those who do not. (A)	3.64	0.84	3.83	0.76	3.11	1.05	2.97	.06
Illinois' skills standards have a positive effect on the productivity of my organization's workforce. (B)	3.58	0.79	3.38	0.82	2.57	1.51	2.86	.07
Programs that use Illinois' skills standards are more effective than programs that do not. (A)	3.57	0.76	3.57	0.83	2.89	1.05	2.58	.08

Table 4 *(continued)*

Perceived Impact of Illinois' Skills Standards by Employers, Educators, and Workforce Training Providers

Impact of Illinois' Skills Standards	Employer (n = 14)		Educator (n = 47)		Workforce (n = 9)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*
Individuals who complete training/education using Illinois' skills standards meet my organization's requirements for entry level jobs. (B)	3.50	1.17	3.34	0.84	2.43	1.13	3.16	.06
From the experience in my organization, Illinois' skills standards encourage alliances between education and business/industry. (A)	3.50	1.09	3.57	0.90	2.43	1.27	3.97	.03
Illinois' skills standards will lower my organization's recruiting costs. (B)	3.33	0.49	2.82	0.87	1.86	1.07	7.00	<.01
Illinois' skills standards decrease my organization's time to screen prospective employees. (B)	3.25	0.97	2.21	0.84	1.86	1.07	7.39	<.01
In my organization it is common to hear that educational programs that use Illinois' skills standards have a better reputation than programs that do not. (A)	3.25	1.06	3.14	1.02	2.00	1.29	3.74	.03
Illinois' skills standards lower my organization's training costs. (B)	3.17	0.72	3.00	0.95	2.29	1.25	2.07	.14
Illinois' skills standards are used by business and industry to determine who should be promoted. (B)	3.07	1.07	2.98	0.95	2.56	1.13	0.82	.45
Illinois' skills standards provide a basis for career goals in my organization. (B)	3.00	1.28	3.56	0.94	2.00	1.00	7.12	<.01
In my organization, employees who meet Illinois' skills standards receive higher wages than those who do not. (B)	2.83	0.83	2.68	1.09	2.14	1.07	1.03	.36

Note. (A) indicates items that were identified with academic impact. (B) indicates items that were identified with business impact.

The results revealed statistical differences among the three groups for eight items, three items pertaining to academic impact and five items to business impact, based on Tukey's post hoc comparison. First, the results revealed a significant difference between employers and educators and workforce training providers on the academic impact item specifying that Illinois skills standards encourage individuals to assume more ownership for their skills development ($F = 5.56$, $p = .01$). On the 5-point scale ranging from *strongly agree* to *strongly disagree*, educators and employers had item mean ratings of 3.93 and 3.57, respectively, compared to the mean rating of 2.78 by workforce training providers. The second academic item showing a difference between groups suggested that educational programs that used Illinois' skills standards had a better reputation than programs that did not. The mean ratings of employers and educators were significantly higher than the mean ratings for workforce training providers ($M = 3.25$ for employers, $M = 3.14$ for educators, and $M = 2.00$ for workforce training providers; $F = 3.74$, $p = .03$). However, it is noteworthy that all these ratings were lower than the other two academic items.

While examining group differences for the business impact statements, a similar pattern emerged for the three academic items in that employers and educators rated the business items similarly and higher than workforce training providers; however, some differences appeared by item. Specifically, employers differed from workforce training providers with respect to the mean rating that Illinois' skills standards helped to identify competent individuals for employment, with the mean rating for employers being 3.73 compared to 2.43 for workforce training providers ($F = 3.65$, $p = .03$). Both the mean ratings of employers and educators differed from workforce training providers on the statement that Illinois' skills standards provide a benchmark to compare skill levels, with employers yielding a mean rating of 3.73, educators 3.49, and workforce training providers 2.29 ($F = 5.45$, $p = .01$). On the item specifying Illinois' skills standards lower recruiting costs, the employers' mean rating was 3.33 and the educators' mean rating was 2.82, which did not differ significantly but did differ significantly from the mean rating of 1.86 for workforce development providers ($F = 7.00$, $p \leq .01$). The item specifying Illinois' skills standards decrease my organization's time to screen prospective employees indicated a significant difference between employers and educators and between employers and workforce training providers; employers' mean rating was 3.25, educators' mean rating was 2.21, and workforce training providers' mean rating was 1.81 ($F = 7.39$, $p \leq .01$). No significant difference was found between educators and workforce training providers on this item. Finally, a significant difference was found between educators and workforce training providers, but not between educators and employers on the statement that Illinois' skills standards provide a basis for career goals. The mean ratings for educators and workforce training providers were 3.56 and 2.00, respectively ($F = 7.12$, $p \leq .01$).

Conclusions and Implications for Policy and Practice

This study examined the differences in awareness, use, and perceptions of the impact of skills standards from the perspective of three stakeholder groups. The different experiences of stakeholders with skills standards were evident in the results, paralleling the literature as well as Illinois' statute that recognized the unique benefits for different stakeholder groups. Indeed, the disparity of responses reflected wide variability of use and perceived benefits, raising questions in regard to skills standards implementation in relation to the federal Carl D. Perkins Act of 2006.

The findings revealed that while awareness and use of skills standards varied by employer, educator, and workforce training provider, all three groups reported relatively high levels of awareness but lower levels of use. All groups indicated higher levels of awareness and use of state standards than national standards, suggesting the preference of the state (via Illinois administrators) to implement its own skills standards. While the merits of curriculum and credentialing in alignment with skills standards was recognized as important by all three groups, the higher ratings of academic impact over business impact implied that the groups perceived direct application of skills standards to education. All three stakeholders perceived that skills standards were most applicable prior to employment, possibly acting as an indicator of the skills possessed by future employees and their employability and work readiness. In this sense, human capital theory and signaling theory provided a useful means of interpreting different stakeholder findings, with employers perceiving themselves as a beneficiary of individuals trained by education and training providers.

Of the three stakeholder groups, educators were the most aware, the most likely to claim use, and the most likely to perceive impact. According to the state's legislation, educators are expected to use the skills standards to develop education and training programs aligned with the workplace, to advise students and parents about these programs, and to encourage relationships between schools and businesses. The results suggested that educators play additional roles in skills standards implementation, including making employers aware and informing them with respect to how skills standards may be useful to their businesses. Educators act as mediators between states and employers, helping business and industry understand the relevance of skills standards in the workplace. Without this role, employers play a relatively modest part in skills standards implementation. Employers are expected to use skills standards to enhance employee training, productivity, and retention; and create a larger impact on suppliers and the labor force (Bailey & Merritt, 1995; Spill, 2002). However, they reported limited use and impact on their own human resource policies and practices. These results were predicted by Dykman (1996) and others who were concerned that the vagueness of skills standards may lead employers to undervalue them. However, Dykman's study suggested a slightly different phenomenon was at work. That is, employers understand the value of skills standards but they associate the responsibility for implementing and using them with education

and training providers. Without a clear incentive to adopt skills standards, employers may not perceive the need to invest their own resources. Rather, they rely on education and training providers to inform them about skills standards. Further, they expect them to train their future employees according to recognized standards.

The findings suggested that education and training providers should assist employers to understand skills standards and their potential contributions. The findings revealed the importance of CTE educators communicating what skills standards are intended to do, how skills standards are developed and implemented relative to CTE curriculum, and how skills standards relate to employee (future and incumbent) competence and human resource development. Recognizing this special informational and training role for educators is an important contribution of this study.

It is assumed that the State of Illinois (as well as other states) intends to advance skills standards implementation in association with the federal Carl D. Perkins CTE Act. Accordingly, the findings of the study underscore the need to engage employers, educators, and workforce training providers fully and consistently in information sharing and supporting their roles in dissemination and utilization at the local level. Second, skills standards implementation has been associated with few rewards and incentives for employers and workforce training providers, and only modest rewards and incentives for public education. More consideration should be given to rewards and incentives to encourage local implementation and utilization. Additionally, increased attention should be focused on evaluating whether skills standards have a positive impact on Illinois' workforce. Understanding the actual impact of skills standards and proceeding beyond rhetorical claims, would help to lay the groundwork for documenting the benefits to various stakeholder groups and guiding future state policy. Third, states should increase their technical assistance delivery at the local level, including secondary schools, community colleges, and four-year colleges and universities, recognizing that partnerships between these educational entities are essential to skills standards implementation. Without comprehensive planning, implementation of skills standards under the federal Carl D. Perkins CTE Act of 2006 may not exceed implementation under previous legislation.

References

ACT. (2006). Ready for college and ready for work? Same or different. Iowa City, IA: Author. Retrieved December 30, 2007, from http://www.act.org/path/policy/pdf/ReadinessBrief.pdf

Aragon, S. R., Woo, H.-J., & Marvel, M. R. (2004). *Analysis of the integration of skill standards into community college curriculum*. St Paul, MN: National Research Center for Career and Technical Education. Retrieved October 24, 2007from http://www.nccte.org

Bailey, T., & Merritt, D. (1995). *Making sense of industry-based skill standards.* Berkeley, CA: National Center for Research in Vocational Education, University of California at Berkeley.

Bunn, P., & Stewart, D. (1998). Perceptions of technical committee members regarding the adoption of skill standards in vocational education programs. *Journal of Career and Technical Education, 14,* 7-17.

Carl D. Perkins Career and Technical Education act of 2006. *The Library of Congress*.

Carnevale, A. P., & Desrochers, D. M. (2001). *Help wanted… credentials required: Community colleges in the knowledge economy*. Washington, DC: Educational Testing Service and American Association of Community Colleges.

Commission of the Skills of the American Workforce. (1990, June). *America's choice: High skills or low wages!* Rochester, NY: National Center on Education and the Economy.

Creswell, J. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (2nd ed.). New Jersey: Pearson Prentice Hall.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16,* 297-334.

Darling-Hammond, L. D. (2004, June). Standards, accountability, and school reform. *Teachers College Record, 106,* 1047-1085.

Dillman, D. A. (2007). *Mail and Internet surveys: The tailored design method* (2nd ed.). New York: Wiley. Dykman, A. (1996). Setting the bar for what students must know. *Techniques: Making Education & Career Connections, 71*(8) 30-32, 68.

Dykman, A. (1996). Setting the bar for what students must know. *Techniques: Making Education & Career Connections, 71,* 30-33.

Faulkner, S. (2002). National skill standards can meet local needs [Electronic version]. *Learning Abstracts, 5*(3), 1-2.

Ganzglass, E., Simon, M., Mazzeo, C., & Conklin, K. (2002). A governor's guide to creating a 21st-century workforce. Washington, DC: National Governor's Association. Retrieved January 3, 2008, from: http://www.nga.org/Files/pdf/AM02WORKFORCE.pdf

Gray, K., & Herr, E. (1998). *Workforce education: The basics*. Boston: Allyn and Bacon.

Haimson, J., & Hulsey, L. (1999). *Making joint commitments: Roles of schools, employers, and students in implementing national skill standards (MPR Reference No. 8466-400)*. Princeton, NJ: Mathematica Policy Research, Inc.

Hoachlander, G., & Rahn, M. (1994). National skill standards: Everyone agrees on the destination. Getting there is another story. *Vocational Education Journal, 69*(1), 20-22, 47.

Illinois Occupational Skill Standards and Credentialing Council (IOSSCC). (2000). *Progress report 2000 and beyond.* Springfield, IL: Author. Retrieved November 23, 2004, from: http://www.ioes.org/cte_curr/oss/index.html

Kincheloe, J. (1999). *How do we tell the workers? The socioeconomic foundations of work and vocational education.* Boulder, CO: Westview Press.

National Skills Standards Act. Public Law 103-227, Title V, 1994.

National Skill Standards Board. (2001). *Annual report.* Washington, DC: Author.

Occupational Skill Standards Act. Public Act 87-1210, 1992.

Rahn, M. L., O'Driscoll, P., & Hudecki, P. (1999). *Taking off! Sharing state-level accountability strategies*. Berkeley, CA: National Center for Research in Vocational Education.

Secretary's Commission on Achieving Necessary Skills. (1991). *What work requires of schools: A SCANS report for America 2000.* Washington, DC: U. S. Department of Labor.

Spence, M. (2002, June). Signaling in retrospect and the informational structure of markets. *The American Economic Review, 92*(3), 434-459.

Spill, R. (2002). An introduction to the use of skill standards and certifications in WIA programs. Washington, DC: National Skill Standards Board.

Tucker, M. (2007). Charting a new course. *Educational Leadership, 64*(7), 48-52.

Whetzel, D. (1992). *The secretary of labor's commission on achieving necessary skills* (Report No EDO-TM-92-1). Washington, DC: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED339749)

Wills, J. L. (1993). *Overview of education and industry skill standards systems in the United States – Volume I.* Draft report for the Institute for Educational Leadership, U.S. Department of Education.

Wills, J. L. (1995). *Voluntary skill standards and certification: A primer.* Washington, DC: Department of Education, Employment and Training Administration.

Wills, J. L. (1997). Standards: Making them useful and workable for the education enterprise (NSSB Database No. 01000105). Washington, DC: Center for Workforce Development.

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Teacher Recruitment and Retention: An Essential Step in the Development of a System of Quality Teaching

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Abstract

The purpose of this study was to examine the (a) perceptions held by high school business education department chairpersons regarding the characteristics of individuals entering and remaining in the teaching profession and (b) characteristics of schools that have been successful in recruiting and retaining business education teachers. The findings revealed that women are more likely to enter the teaching profession than men; attrition is higher for beginning (first 3 years) and near-retirement business education teachers; and schools with higher levels of minority, low income, and low-performing students experience higher business education teacher attrition rates. Recommendations for policy and future research are provided.

Introduction

In addition to the difficult task of finding teaching methods that ensure learning effectiveness (Bok, 2005; Kendall, 2006), the American educational system is facing other significant challenges. These challenges have been identified in various reports developed by The Committee on Science, Engineering, and Public Policy (2006) and The Secretary of Education's Commission on the Future of Higher Education (2006). They include keeping college affordable, expanding college access for low income and minority students, increasing accountability for educational outcomes, preparing secondary students for higher education, increasing opportunities for lifelong education and workforce training, and internationalizing the student experience (American Council on Education, 2006). Embedded in these challenges is the teacher recruitment and retention problem. Schools struggle to maintain standards for high quality teaching while constantly engaging in the recruitment of new highly qualified teachers and the retention of new hires and veteran teachers (Guarino, Santibañez, & Daley, 2006). The same struggle is experienced by individuals involved in the preparation of business teachers (United States Department of Education, 2006).

Literature Review and Conceptual Framework

Several factors have contributed to the teacher recruitment and retention problem including (a) changes in class size, partially due to increased immigration

led by the Hispanic population in the United States (National Education Association, 2006; United States Department of Commerce, 2004); (b) retirement of a significant percentage of teachers; (c) higher birth rates between the years 1995 and 2000; (d) movement of teachers from school to school (Ingersoll, 2001); (e) the fact that about 20% of new teachers leave the profession within the first three years (Tamberg, 2007); and (f) 50% of new teachers resign within five years (Lambert, 2006; Tamberg, 2007).

Educators and policymakers have designed strategies to respond to the teacher recruitment and retention problem, including revision of certification requirements and the funding of mentoring programs. However, educators and policymakers do not have a complete understanding of teachers' concerns about the profession and their places of employment (Johnson & Birkeland, 2003). Adding complexity to this issue is the fact that business teacher preparation programs in the United States face increased demands for accountability by state and federal organizations, parents, and the community at large. That is, educational institutions offering these programs are increasingly being held accountable for the graduates they produce (National Council for Accreditation of Teacher Education, 2006).

Increased accountability has a direct impact on the teacher recruitment and retention problem, as secondary business education teachers leave the profession partly because they feel overwhelmed with all of the pressures and lack of support from school administration (Gaytan, 2005; Lambert, 2006). Additionally, the revised accreditation standards focus on demonstrating candidate impact on K-12 student learning (National Council for Accreditation of Teacher Education, 2006). This higher level of accountability that involves the linking of instructional practices to student outcomes, poses many challenges for business teacher educators throughout the nation. Some of these challenges include finding appropriate measures of student learning, dealing with a wide array of issues related to student discipline, experiencing a lack of test standardization among schools, and tracking candidates and their employers to obtain their perceptions of the quality of education delivered. Other challenges include the use of alternate measures of student learning (e.g., whole school scores) by some schools and the wide range of teacher behaviors found in a given learning environment (Darling-Hammond, Berry, & Thoreson, 2001; Wenglinsky, 2002). Regardless of the difficulties experienced when attempting to respond to the challenges, business education teachers are held accountable for demonstrating the impact of candidates on student performance (American Association of State Colleges and Universities, 2007). Changes in class size, teacher retirement, higher birth rates, teacher mobility, school administrators' lack of understanding of teachers' concerns about the profession, and revised accreditation standards have contributed to the business teacher recruitment and retention problem.

Perhaps more than ever, it is essential to recruit and retain highly effective business teachers because "while many U.S. citizens are too poorly educated to gain employment in the new economy, high-tech firms must import workers with science

and technology training from other parts of the world. And while the U.S. has sent many of its low-skilled jobs abroad, it is falling behind other nations that once supplied cheap, unskilled labor, who are now developing a highly educated workforce that will soon direct the work of others" (Darling-Hammond, 2006, p. 15). In summary, American educational institutions must prepare for this type of tough competition by constantly and consistently engaging in self-assessment and strategic planning to achieve continuous improvements (Bok, 2005; National Center for Educational Statistics, 2005; Scanlan, 2006). The work of Guarino et al. (2006) was used as the framework for this study, as they focused on the struggles that schools experience to maintain standards for high quality teaching while constantly engaging in the recruitment of new highly qualified teachers and the retention of new hires and veteran teachers. Aggressive strategies must be developed to respond more effectively to the business education teacher recruitment and retention challenge.

Purpose of the Study

The purpose of this study was to examine the perceptions held by high school business education department chairpersons with respect to the characteristics of individuals entering and remaining in the teaching profession. It also examined schools that have been successful in recruiting and retaining business education teachers. Specifically, the following research questions were posed in this study:

1. What are the perceptions held by high school business education department chairpersons regarding the characteristics of individuals entering the business education teaching profession?
2. What are the perceptions held by high school business education department chairpersons regarding the characteristics of individuals remaining in the business education teaching profession?
3. What are the perceptions held by high school business education department chairpersons regarding the characteristics of high schools that have been successful in recruiting and retaining business education teachers?

The study's findings will assist educational stakeholders, including business teacher educators, to gain a better understanding with respect to the characteristics of individuals entering and remaining in the teaching profession, and the schools that have been successful in recruiting and retaining business education teachers.

Methodology

Population and Sample

A list of high school business education programs was obtained from the State Department of Education. Letters and e-mail messages were sent to the business education department chairpersons. From a total population of 954, a simple random

sample of 250 high school business education department chairpersons in a southeastern state was selected for this study. The respondents' anonymity was guaranteed in the study. A response rate of 68% (170 of 250) was achieved. Most respondents were female (*n* = 119, 70%); White, non-Hispanic (*n* = 141, 83%) or African American (*n* = 26, 15%); held an Educational Specialist degree (*n* = 75, 44%), Master's degree (*n* = 75, 44%), or Bachelor's degree (*n* = 20, 12%); and were between 41 and 50 years of age (*n* = 66, 39%), 31 and 40 years of age (*n* = 53, 31%), and 51 and 60 years of age (*n* = 39, 23%). The respondents had between 10 and 14 years of experience (*n* = 41, 24%), between 15 and 19 years (*n* = 37, 22%), and between 20 and 24 years (*n* = 26, 15%). Finally, while 44% (*n* = 75) of the survey respondents worked in urban schools, 56% (*n* = 95) worked in suburban schools. Complete demographic characteristics of the survey respondents are displayed in Table 1.

Instrumentation and Data Collection

The survey instrument completed by the business education department chairpersons consisted of (a) six questions soliciting demographic information; (b) 10 five-point Likert-format items, with response options along a continuum of strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree; and (c) 15 open-ended questions. The survey instrument was designed to examine the perceptions held by high school business education department chairpersons regarding the characteristics of individuals entering and remaining in the teaching profession. Additionally, it intended to examine schools that had been successful in the recruitment and retention of business education teachers. A pilot test was conducted two months prior to the full-scale administration of the survey to estimate the reliability and validity of the instrument. Data were collected from seven high school business education department chairpersons who were not included in the sample. Based upon this input, the instrument was revised to enhance its content and face validity. The internal consistency of the revised instrument was determined to be .81, computed by procedures described by Cronbach (1951). Internal consistencies greater than .70 are generally considered acceptable for research instruments (Gay, Mills, & Airasian, 2006; Nunnally, 1978).

Data Analysis

The responses from the business education chairpersons were used to determine their overall perceptions regarding the characteristics of individuals entering and remaining in the teaching profession, and the characteristics of schools that had been successful in recruiting and retaining business education teachers. The MANOVA analysis method was used to determine the extent to which differences might be present in the responses as a function of demographic variables.

Table 1
Demographic Characteristics of the Survey Respondents (n = 170)

Item		Percentage (%)	*f*
Gender	Female	70	119
	Male	30	51
Ethnicity	White, non-Hispanic	83	141
	African American	15	26
	Other	2	3
Academic degrees	Educational Specialist	44	75
	Master's	44	75
	Bachelor's	12	20
Age	21-30	7	12
	31-40	31	53
	41-50	39	66
	51-60	23	39
Years of experience	1-4	17	29
	5-9	13	22
	10-14	24	41
	15-19	22	37
	20-24	15	26
	25-29	9	15
Type of school	Suburban	56	95
	Urban	44	75

Findings

Characteristics of Individuals Entering the Business Education Teaching Profession

The survey respondents indicated that 78% of the individuals entering the business education teaching profession were: female, 68% White, non-Hispanic; 22% African American; and 8% Hispanic. Compared to the demographic characteristics of individuals entering the teaching profession within the last two decades, racial minority participation has increased which may lead to more diversity-sensitive classrooms. Minority student enrollment has also increased drastically from 17% in 1991 to 39% in 2000 (Guarino et al., 2006; U.S. Department of Education, 2002).

In regard to the perceptions of the quality of teachers entering the business education teaching profession, the MANOVAs indicated that statistically significant differences were present between urban (n = 75) and suburban (n = 95) schools, $F(4, 170) = 4.72$, $p = .001$, $n^2 = .04$. Table 2 indicates that the survey respondents from urban schools (M = 4.15, SD = 1.25) were perceived to have less qualified teachers

than those working in suburban schools (M = 3.79, SD = 1.41). It appears that there is a gap between wealthy and poor schools in terms of effective and equitable business education teaching and learning. The problem is that minority and low income students have the least qualified teachers (Darling-Hammond, 2004).

This study found that women were more likely to enter the business education teaching profession than men (Broughman & Rollefson, 2000; Guarino et al., 2006; Henke, Chen, Geis, & Knepper, 2000). This gender imbalance may be related to the fact that women have had fewer employment choices than men throughout history. Perhaps "women continue to bear a greater share of child-rearing responsibilities than men and find teaching to be more compatible with these constraints; thus narrowing their choice set" (Guarino et al., 2006, p. 184).

In terms of perceived measured ability of individuals entering the teaching profession, 63% (n = 107) of the survey respondents agreed that individuals entering the business education teaching profession at their schools had lower ACT or SAT scores than those individuals in nonteaching jobs. This finding is supported by several studies (Ballou, 1996; Darling-Hammond, 2006; Gitomer, Latham, & Ziomek, 1999; Guarino et al., 2006; Henke et al., 2000; Podgursky, Monroe, & Watson, 2004). Individuals possessing higher opportunity costs in the form of attractive alternatives to teaching would be less likely to enter the teaching profession. It is possible; however, that hiring personnel might not have considered academic ability, measured by ACT or SAT scores, as the main or most important trait found in a new teacher (Guarino et al., 2006).

The respondents were asked to discuss the desirable qualifications and personal attributes of business education teachers entering the profession. Generally speaking, the following characteristics were reported: (a) prior successful teaching experience, (b) excellent personality and attitude, (c) knowledge of cooperative education, (d) good classroom management skills, (e) highly committed to diversity in the classroom, (f) love and passion for teaching, and (g) knowledge of a wide array of instructional strategies. Further, the study's participants were asked to cite the various reasons that attracted business education teachers to the teaching profession. They reported love for teaching, increased family time, and making contributions to society. This finding is consistent with the work of Gaytan (2005). Finally, when asked about the reasons why many individuals do not enter the business education teaching profession, the respondents stated low salary, lack of safety particularly in urban areas, lack of professional growth opportunities, and the blame placed on teachers for the many problems that exist in education. Although the lack of support from administration was not cited by chairpersons, it has been found to play a major role in business education teachers' perceptions of the teaching profession (Gaytan, 2005).

Table 2
Business Education Department Chairpersons' Perceptions of the Quality of Business Teachers Entering the Teaching Profession.

Item	Function I		Suburban Schools		Urban Schools	
	Funct.	r_s	*M*	*SD*	*M*	*SD*
Least qualified teachers	-.245	-.251	3.79	1.41	4.15	1.25
Lower attrition rates	-.081	-.294	3.85	1.39	4.04	1.26
Teacher gender	-.063	-.218	4.32	1.26	4.10	1.27
Teacher ability	-.476	-.092	4.26	1.25	4.36	1.24
Desired teacher traits	.284	.039	.30	1.27	4.23	1.26
Reasons entering teaching	-.110	.028	4.75	1.07	4.70	1.13
Retention rates based upon certification route	.120	.036	4.41	1.24	4.35	1.25
Attrition for men and racial minorities	.398	.101	4.40	1.34	4.29	1.38
Working conditions	-.053	-.197	3.89	1.39	4.04	1.28

Note. r_s = Spearman correlation

Characteristics of Individuals Remaining in the Business Education Teaching Profession

Eighty-seven percent (n = 148) of the respondents indicated that attrition is higher for beginning (first 3 years) business education teachers (Guarino et al., 2006; Lambert, 2006; Tamberg, 2007), and for near-retirement business education teachers (Hanushek, Kain, & Rivkin, 2004). The MANOVAs indicated that statistically significant differences were present between urban (n = 75) and suburban (n = 95) schools, $F(4, 170) = 4.51$, $p = .001$, $n^2 = .03$. Table 2 shows that the respondents from urban schools (M = 4.04, SD = 1.26) reported higher attrition rates than those working in suburban schools (M = 3.85, SD = 1.39). It appears that the working conditions of business education teachers must improve to increase teaching effectiveness and reduce teacher attrition.

Ninety-three percent (n = 158) of the respondents reported that business education teachers prepared through alternative certification programs had a higher retention rate (Clewell & Villegas, 2001; Darling-Hammond, 2006; Guarino et al., 2006). It appears that alternate certification programs often recruit nontraditional students seeking a career change, generating higher teacher retention rates (Clewell & Villegas, 2001; Darling-Hammond, 2006; Guarino et al., 2006). Furthermore, 72% (n = 122) of the respondents perceived higher attrition rates in the teaching profession than in other professions. This finding is consistent with those found in Ingersoll's (2001) study.

Eighty-five percent (*n* = 145) of the respondents reported that men and racial minorities had lower attrition rates than women (Guarino et al., 2006; Ingersoll, 2001). Perhaps pregnancy and family issues were the reasons for women leaving the business education teaching profession (Trotman, 2006). Conversely, 87% (*n* = 148) of the survey respondents suggested that older teachers, not close to retirement age, had a higher retention rate than young or new teachers (Guarino et al., 2006). The respondents were also asked to compare the ability of business education teachers leaving with those remaining in the teaching profession. Seventy-four percent (*n* = 126) of the respondents reported that business education teachers with higher measured ability were more likely to leave the teaching profession. This finding is consistent with previous research (Guarino et al., 2006; Podgursky et al., 2004).

Characteristics of Schools that Successfully Recruit and Retain Business Education Teachers

The respondents cited the characteristics of schools that had been successful in the recruitment and retention of business education teachers. Ninety-two percent (*n* = 153) of the respondents stated that business education teachers engage regularly in the evaluation of their profession in terms of working conditions (Guarino et al., 2006); 86% (*n* = 146) believed that poor working conditions have a negative effect on teacher retention (Gaytan, 2005). It appears that schools must improve the overall working conditions of business education teachers to improve teaching effectiveness and increase retention rates (Gaytan, 2005; Guarino et al., 2006; Kelly, 2004).

Ninety-one percent (*n* = 155) of the respondents indicated that business education teachers located in low income areas with high levels of minority and low-achieving students were more likely to leave the teaching profession (Guarino et al., 2006; Smith & Ingersoll, 2004). This finding has a negative, direct impact on student achievement because high minority schools are forced to hire inexperienced, uncertified, or inappropriately certified teachers who are less effective than fully certified beginning teachers (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2005). A student having "three such teachers over the course of elementary school could lose a full year of achievement" (Darling-Hammond, 2006, p. 16).

In this study, 74% (*n* = 126) of the respondents believed that large or well financed schools have lower business education teacher attrition rates. This finding is consistent with the findings of other studies (Darling-Hammond, 2006; Ingersoll, 2001). Wealthy districts become wealthier and economically disadvantaged children continue to be marginalized from valuable resources. For instance, "There is a 10-to-1 ratio in spending between the highest-spending and lowest-spending schools in the nation, and a 3-to-1 ratio within most states" (Darling-Hammond, 2006, p. 13). Finally, 96% (*n* = 163) of the respondents agreed that the higher the quality of business education professional preparation programs, the lower the attrition rate.

This finding is supported by the National Commission on Teaching and America's Future (2003).

In summary, schools with higher levels of minority, low income, and low-performing students experience higher business education teacher attrition rates. In fact, research has shown that teachers prefer a school with good working conditions (e.g., supportive parents) than higher salaries "by a margin of 3 to 1" (Public Agenda, 2000, p. 46). The more difficult the working conditions are in a given school, the less attractive the school becomes to teachers (Guarino et al., 2006).

Conclusions and Recommendations

Business education teachers engage regularly in the evaluation of their profession with respect to comparing the intrinsic rewards and compensation levels in teaching with those of other professions. Because working conditions are essential to teachers' satisfaction with teaching and their careers, it is crucial for school administrators to gain a thorough understanding of their concerns. Otherwise, educational stakeholders will continue to implement what they believe to be promising recruitment and retention strategies, leading to the ineffective treatment of the problem, and new teachers continuing to leave the teaching profession (Gaytan, 2005). Based on the findings of this study and previous research, the following policies are recommended for implementation by educational stakeholders at various levels.

1. Increase business education teacher retention. "Increasing the number of teachers prepared without addressing these high attrition rates is like pouring water into a leaking bucket" (Darling-Hammond, 2006, p. 21). The costs associated with teacher attrition are exorbitant. The cost for Texas alone ranges from $300 million and $2 billion per year (Benner, 2000). These funds could be invested in education. The following five strategies for lowering teacher attrition rates should be implemented:

    A. Design high quality alternative business education teaching certification programs because, as research has shown, these certification programs often recruit nontraditional students, seeking a career change, generating higher teacher retention rates (Clewell & Villegas, 2001; Darling-Hammond, 2006; Guarino et al., 2006).

    B. Improve the overall working conditions of business education teachers to improve teaching effectiveness and increase retention (Gaytan, 2005; Guarino et al., 2006; Kelly, 2004). This is not a simple task because it involves ensuring that new teachers have appropriate assignments and manageable workloads, sufficient instructional resources, appropriate curriculum and assessment models, advice and support from colleagues, and a stable and dynamic working environment (Gaytan, 2005).

C. Provide a high level of autonomy and administrative support to business education teachers to obtain a positive effect on teacher retention (Gaytan, 2005; Guarino et al., 2006; Ingersoll, 2001; Johnson & Birkeland, 2003).

D. Engage in constant and consistent assessment of teaching effectiveness to reduce the number of students performing at low levels and who display higher rates of behavioral problems which, in turn, have a negative impact on business education teacher retention (Clotfelter, Ladd, Vigdor, & Diaz, 2004; Stockard & Lehman, 2004). Schools with high achievement levels have the following critical components: high quality teaching of content knowledge addressing the needs of a diverse group of students (Darling-Hammond & Bransford, 2005); access to a challenging curriculum (Oakes, 2005); and well-organized classes that support student learning (Darling-Hammond, 2006).

E. Increase the quality of programs involved in the professional preparation of business education teachers since preparation is linked to attrition. The better the preparation, the lower the attrition rates (National Commission on Teaching and America's Future, 2003).

2. Reduce the gap between wealthy and poor schools by developing policies for effective and equitable business education teaching and learning. The problem is that minority and low income students have the least qualified teachers, limited access to intellectually challenging curriculum, and are most likely to be placed in large classes (Darling-Hammond, 2004). Instead of increasing incentives to teaching, many states have lowered their standards to fill teaching vacancies which, in turn, has had a negative effect on student's access to highly qualified teachers (Darling-Hammond, 2006). Proposed policies for effective and equitable business education teaching and learning, designed to reduce the gap between wealthy and poor schools, must address the professional preparation of teachers and the governmental aspects involved in such preparation.

A. Professional preparation: it must be based upon standards set by professional constituencies rather than by state governmental agencies. The standards must be based on performance-based assessments of teaching ability rather than passing a series of tests that have minimal impact on teaching ability. For instance, it is more appropriate for business educators to follow standards established by the National Business Education Association (NBEA) than to follow those designed by state constituencies; the process of developing and disseminating the business education knowledge base is more effectively managed by the profession itself. This process reflects that of other professions such as medicine. Research has shown that teachers lacking sound professional

teacher training: (a) possess little knowledge related to learning and child development, (b) use more ineffective teaching methods, (c) use more autocratic classroom management strategies, (d) use inadequate teaching strategies when deeper understanding is required, (e) possess little knowledge related to the various learning styles and needs of students, and (f) blame their students when learning is poor (Darling-Hammond, 2003). High quality programs responsible for the professional preparation of teachers engage their candidates in the following areas: learning theories, child growth and development, effective and challenging curriculum, cultural diversity, effective methods related to the delivery of instruction, and effective student internships hosted by teachers able to model outstanding teaching practices addressing the needs of a diverse group of students (Darling-Hammond, 2006).

B. For professional preparation policy to become effective, it must be coupled with appropriate governmental policy which includes the following strategies:

a. Establish higher teacher salaries because research has shown that better pay reduces teacher attrition (Guarino et al., 2006; Kelly, 2004; Podgursky et al., 2004; Stockard & Lehman, 2004) and it may increase teacher quality (Figlio, 2002; Loeb & Page, 2000).

b. Create monetary incentives and bonuses for highly qualified teachers as well as those educators teaching in low income, high minority schools and teaching in critical shortage fields (Humphrey, Koppich, & Hough, 2005).

c. Raise standards to ensure teachers have more content and pedagogical knowledge and are better equipped to support students with special needs (Guarino et al., 2006; Smith & Ingersoll, 2004).

d. Develop mentoring and induction programs linked to performance assessment because they lower teacher attrition rates (Guarino et al., 2006; Smith & Ingersoll, 2004).

e. Create professional development plans for teachers (Darling-Hammond, 2006).

f. Create a system of quality business education teaching by developing centers for teaching and learning, for the professional preparation of business education teachers, giving priority to educators teaching in critical shortage fields and to minority and low income students. “Virtually all of the positions currently filled by unqualified teachers could be filled in this way for only

> $800 million a year less than what the United States currently spends in a single week in Iraq" (Darling-Hammond, 2006, p. 20).

3. Business education teachers in the U.S. must have time to network with colleagues to engage in productive dialogue that may lead to the development of more effective curriculum and assessment methods. Assessments must "require students to construct and organize knowledge, consider alternatives, apply what they are learning and present and defend their ideas, rather than focusing largely on multiple-choice tasks" (Darling-Hammond, 2006, p. 21). Coaching each other in these and other areas is essential.

4. Schools must become attractive places for teachers to ensure that highly qualified individuals enter the teaching profession. To accomplish this goal, sufficient funding must come from state and federal governments. Problems associated with systematic funding inequalities must be resolved, and low income and minority students must have access to high quality teachers and schools.

5. Students and schools are held accountable to the government for achieving a certain performance as indicated by test scores. However, the government is not being held accountable to American students, families, and schools for providing a sound educational system that ensures the right to learn. This study recommends policies that will assist educational stakeholders, including business teacher educators, in their transition to a high quality educational system. As Darling-Hammond (2006) stated, "no society in a knowledge-based world can long prosper without supporting a thinking education for all of its people….or we will, within a short time, witness the contemporary equivalent of the Fall of Rome" (p. 15).

This study included business education department chairpersons from only one state. Therefore, it should be replicated using business education department chairpersons from across the nation with a larger, stratified sample. While the survey instrument used in this research study included both open-ended and multiple-choice items, more in-depth qualitative research including interviews and observations should be conducted. Observing and analyzing schools that have been successful in the recruitment and retention of business education teachers may provide useful information to more effectively respond to the recruitment and retention challenge, an essential step in the development of a system of high quality teaching and learning.

References

American Association of State Colleges and Universities. (2007). *2007 Christa McAuliffe awards.* Retrieved January 2, 2007, from http://www.aascu.org/programs/mcauliffe/07_default.htm

American Council on Education. (2006). *Addressing the challenges facing American undergraduate education*. Retrieved October 1, 2006, from http://www.acenet.edu/AM/Template.cfm?Section=Home&CONTENTID=18299&TEMPLATE=/CM/ContentDisplay.cfm

Ballou, D. (1996). Do public schools hire the best applicants? *Quarterly Journal of Economics, 111,* 97-133.

Benner, A. D. (2000). *The cost of teacher turnover*. Austin, TX: Texas Center for Educational Research.

Bok, D. (2005, December 18). Are colleges failing? Higher ed needs new lesson plans. *The Boston Globe*. Retrieved October 1, 2006, from http://www.boston.com/news/education/higher/articles/2005/12/18/are_colleges_failing/

Boyd, D., Grossman, P., Lankford, H., Loeb, S., & Wyckoff, J. (2005). How changes in entry requirements alter the teacher workforce and affect student achievement. *Education Finance and Policy, 1,* 176-216.

Broughman, S., & Rollefson, M. (2000). Teacher supply in the United States: Sources of newly hired teachers in public and private schools: 1987-88 to 1993-94. *Education Statistics Quarterly, 2*(3), 28-32.

Clewell, B., & Villegas, A. (2001). *Evaluation of the DeWitt Wallace*-Reader's Digest *fund's pathways to teaching careers program.* Washington, DC: Urban Institute.

Clotfelter, C., Ladd, H., Vigdor, J., & Diaz, R. (2004). Do school accountability systems make it more difficult for low-performing schools to attract and retain high quality teachers? *Journal of Public Policy Analysis and Management, 23,* 251-271.

Committee on Science, Engineering, and Public Policy. (2006). *Rising above the gathering storm: Energizing and employing America for a brighter economic future.* Washington, DC: National Academies Press.

Cronbach, L. J. (1951). Coefficient alpha and internal structure of tests. *Psychometrika*, 297-334.

Darling-Hammond, L. (2003). Access to quality teaching: An analysis of inequality in California's public schools. *Santa Clara Law Review, 43,* 101-239.

Darling-Hammond, L. (2004). The color line in American education: Race, resources, and student achievement. *W.E.B. Du Bois Review: Social Science Research on Race, 1,* 213-246.

Darling-Hammond, L. (2006, October). Securing the right to learn: Policy and practice for powerful teaching and learning. *Educational Researcher, 35*(7), 13-24.

Darling-Hammond, L., Berry, B., & Thoreson, A. (2001). Does teacher certification matter? Evaluating the evidence. *Educational Evaluation and Policy Analysis, 23,* 57.

Darling-Hammond, L., & Bransford, J. (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do.* San Francisco: Jossey-Bass.

Figlio, D. (2002). Can public schools buy better-qualified teachers? *Industrial and Labor Relations Review, 55,* 686-697.

Gay, L. R., Mills, G., & Airasian, P. (2006). *Educational research: Competencies for analysis and applications.* (8th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Gaytan, J. (2005). New business education teachers' experiences with teaching careers, professional culture, curriculum and assessment, and incentives and rewards. *NABTE Review, 32,* 48-54.

Gitomer, D., Latham, A., & Ziomek, R. (1999). *The academic quality of prospective teachers: The impact of admissions and licensure testing.* Princeton, NJ: Educational testing Service.

Guarino, C. M., Santibañez, L., & Daley, G. A. (2006). Teacher recruitment and retention: A review of the recent empirical literature. *Review of Educational Research, 76,* 173-208.

Hanushek, E., Kain, J., & Rivkin, S. (2004). Why public schools lose teachers. *Journal of Human Resources, 39,* 326-354.

Henke, R., Chen, X., Geis, S., & Knepper, P. (2000). *Progress through the teacher pipeline: 1992-93 college graduates and elementary/secondary teaching as of 1997.* Washington, DC: National Center for Education Statistics.

Humphrey, D. L., Koppich, J., & Hough, H. (2005). Sharing the wealth: National Board certified teachers and the students who need them most. *Education Policy Analysis Archieves, 13*(3). Retrieved January 20, 2007, from http://epaa.asu.edu/epaa/v13n3

Ingersoll, R. M. (2001). Teacher turnover and teacher shortages: An organizational analysis. *American Educational Research Journal, 38,* 499-535.

Johnson, S. M., & Birkeland, S. E. (2003, Fall). Pursuing a "sense of success": New teachers explain their career decisions. *American Educational Research Journal, 40,* 581-617.

Kelly, S. (2004). An event history analysis of teacher attrition: Salary, teacher tracking, and socially disadvantaged schools. *Journal of Experimental Education, 72,* 195-220.

Kendall, K. (2006). *Are U.S. colleges keeping up?* Retrieved October 1, 2006, from MSN Encarta Web site: http://encarta.msn.com/encnet/departments/elearning/?article=collegeskeepingup

Lambert, L. (2006, May 9). *Half of teachers quit in 5 years.* Retrieved January 7, 2007, from the Washingtonpost.com Web site: http://www.washingtonpost.com/wp-dyn/content/article/2006/05/08/AR2006050801344.html

Loeb, S., & Page, M. (2000). Examining the link between teacher wages and student outcomes: The importance of alternative labor market opportunities and non-pecuniary variation. *Review of Economics and Statistics, 82*, 393-408.

National Business Education Association. (2007). *National standards for business education*. Reston, VA: Author.

National Center for Educational Statistics. (2005*). Schools and staffing survey*. Retrieved December 1, 2006, from http://nces.ed.gov/surveys/sass/

National Commission on Teaching and America's Future. (2003). *No dream denied: A pledge to America's children*. New York: Author.

National Council for Accreditation of Teacher Education. (2006). *NCATE 101: A primer on accreditation.* Washington, DC: Author.

National Education Association. (2006). *A report on the status of Hispanics in education: Overcoming a history of neglect*. Retrieved January 5, 2007, from http://www.nea.org/mco/images/hispaniced.pdf

Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.

Oakes, J. (2005). *Keeping track: How schools structure inequality* (2nd ed.). New Haven, CT: Yale University Press.

Podgursky, M., Monroe, R., & Watson, D. (2004). The academic quality of public school teachers: An analysis of entry and exit behavior. *Economics of Education Review, 23*, 507-518.

Public Agenda. (2000). *A sense of calling: Who teaches and why*. New York: Author.

Scanlan, J. S. (2006). *The effect of Richard Paul's universal elements and standards of reasoning on twelfth grade composition*. Retrieved December 1, 2006, from The Critical Community Thinking Web site: http://www.criticalthinking. org/research/Abstract-JSCANLAN.cfm

Secretary of Education's Commission on the Future of Higher Education. (2006). *A test of leadership: Charting the future of U.S. higher education*. Retrieved September 5, 2006, from http://www.ed.gov/about/bdscomm/list/hiedfuture/ reports/pre-pub-report.pdf

Smith, T., & Ingersoll, R. (2004). Reducing teacher turnover: What are the components of effective induction? *American Educational Research Journal, 41*, 687-714.

Stockard, J., & Lehman, M. (2004). Influences on the satisfaction and retention of 1st-year teachers: The importance of effective school management. *Educational Administration Quarterly, 40*, 742-771.

Tamberg, M. B. (2007). *Teachers are using the Internet to find jobs and then keep them with online support from mentors and peers*. Retrieved January 5, 2007, from http://www.edtechmag.com/k12/issues/fall-2005/teacher-to-teacher.html

Trotman, J. (2006, Summer). Women teachers in Western Australian "Bush" schools, 1900-1939: Passive victims of oppressive structures. *History of Education Quarterly, 46*, 248-273.

United States Department of Commerce. (2004). *U.S. interim projections by age, sex, race, and Hispanic origin*. Retrieved October 1, 2006, from http://www.census.gov/ipc/www/usinterimproj/

United States Department of Education. (2006). *Teacher shortage areas nationwide listing*. Retrieved January 10, 2007, from http://studentaid.ed.gov/PORTALSWebApp/students/english/cancelperk.jsp?tab=repaying

Wenglinsky, H. (2002). How schools matter: The link between teacher classroom practices and student academic performance. *Education Policy Analysis Archives, 10*(12). Retrieved, February 3, 2003, from http://epaa.asu.edu/epaa/v10n12

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The Impact of Dual and Articulated Credit on College Readiness and Retention in Four Community Colleges

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Abstract

Using Astin's I-E-O model, relationships among the input (I) variables of gender, high school percentile rank, Tech Prep participation, and high school course-taking; environmental (E) variables of academic, career and technical education (CTE), and total dual credit and articulated credit; and output (O) variables of college readiness and total credit hours were investigated with a sample of 1,141 students drawn from an extant dataset called Community College and Beyond (CC&B). Multiple regression results showed a significant effect for dual credit hours and articulated credit hours earned on total college-level credit hours earned, while controlling for gender and educational background. Logistics regression revealed differences among the four community colleges on students being college ready in reading, writing, and mathematics.

Introduction

Community colleges contribute greatly to expanding students' access to higher education with their geographic proximity and competitive cost (Cohen & Brawer, 2003). The National Center for Education Statistics (NCES) (2006) reported that 4 of 10 undergraduate students in the U.S. enrolled in community colleges in 2003-2004. Almost all community colleges maintain an open door policy to provide greater opportunities for students to enroll in college (Cohen & Brawer, 2003). However, as Rosenbaum (1998) pointed out, the notion of an open door that aligns closely with open access is sometimes linked to lower standards and the enrollment of students who are not prepared academically. Indeed, the lack of academic preparation of students entering community colleges is a troubling national dilemma, with the percentage of students taking at least one remedial reading, writing, or mathematics course ranging from about 40% to over 60% (Adelman, 2006; Lewis, Farris, & Greene, 1996).

Along with remediation, student retention and completion is problematic for community colleges. Only about one-third of beginning full-time students earns associate degrees (Tinto, Russo, & Kadel, 1994). The NCES (1998) reported that

over 40% of students who enrolled originally in a two-year college left during their first year. Reporting similar findings, the Southern Regional Education Board (SREB, 2003) reported only 45% of community college first-time, full-time freshmen graduated in the period from 1998 to 2001, and that 32% of the students who completed their first year failed to return for their second year. These statistics suggested that, although an open door policy provides greater opportunities for students to engage in a collegiate experience, community college attendance is associated strongly with inadequate preparation and lowered student retention and completion.

Over the past two decades, numerous efforts have been made to assist students to transition from the secondary to the postsecondary level. Examples include Tech Prep supported by the Carl D. Perkins Career and Technical Education legislation and school-to-career (STC) or education-to-career (ETC) initiatives supported by the federal School to Work Opportunities legislation. Other educational reform initiatives include High Schools That Work (HSTW), career academies, middle college high schools, and dual and articulated credit programs and courses. Of these, Tech Prep and dual credit have received attention nationwide as potential solutions to the less than optimal transition experiences of high school students, including students who have not participated in a college preparatory curriculum. Through dual credit, students receive both high school and college credit for a college-level class completed successfully (Kim, Barnett, & Bragg, 2003). While Clark (2001), Greenberg (1989), and Puyear (1998) claimed that dual credit promotes better student transition, little is known about the impact of dual credit on student transition from high school to college. Even less is known about the impact of student experiences with respect to dual credit, articulated credit, and Tech Prep on college readiness; adequate levels of preparation to enroll in college-level courses; and college retention and performance. This study addresses this gap in the literature.

Literature Review

Dual credit has received considerable attention nationwide as a potential solution to the less than optimal transition of students (Andrews, 2001; Bailey, Hughes, & Karp, 2003; Pierce, 2001). According to Waits, Setzer, and Lewis (2005), about 71% of all public high schools offer courses that award dual credit, with approximately 1.2 million enrollments in dual credit courses in 2002-03. Kleiner and Lewis (2005) reported that 98% of public two-year institutions had high school students taking courses for college credit in 2002-03.

The literature and research studies are rich in claims of positive outcomes for dual credit (e.g., Andrews, 2001; Bailey, Hughes, & Karp, 2003; Boswell, 2000; Cartron, 2001; Chatman & Smith, 1998; Greenberg, 1989; Hugo, 2001; Karp, Calcagno, Hughes, Jeong, & Bailey, 2007; Pierce, 2001). Realizing the transitional problems students experience between secondary and postsecondary education, these

studies have suggested that dual credit programs have the potential to resolve disconnected curriculum, senioritis, high school dropout, and college remediation and attrition. However, like other educational programs, several issues have emerged as dual credit programs have evolved. Among these are limited access for low income and low achieving students, low academic quality, liability with underage high school students on the college campus, and inconsistent dual credit funding practices (Andrews, 2001; Clark, 2001; Fincher-Ford, 1996; Greenberg, 1989; Hughes, Karp, Fermin, & Bailey, 2005; Krueger, 2006; Oregon Joint Boards of Education, 2000).

Indeed, the dual credit literature abounds with positive and negative claims but is scarce with outcome studies. With a limited research base, it is unreasonable to generalize results on dual credit for several reasons. Most importantly, dual credit opportunities are often restricted to high school students with higher academic abilities and course-taking patterns (e.g., college preparatory). Additionally, higher academic achievers typically are more successful in college than less academically prepared students (e.g., Chatman & Smith, 1998). Without controlling for ability differences between dual credit and nondual credit students, it is not possible to know whether positive outcomes can be attributed to the program or to students' academic abilities. Only a few studies have controlled for students' prior academic performance in examining the influence of dual credit on academic performance. Four studies (Kotamraju, 2005; Nitzke, 2002; Richardson, 1999; Spurling & Gabriner, 2002) reported that dual credit students performed better; whereas, two studies (Chatman & Smith, 1998; Eimers & Mullen, 2003) found no differences in outcomes. Among three studies that controlled for students' academic ability in examining the influence of dual credit on student retention, two (Crook, 1990; Eimers & Mullen, 2003) reported a higher retention rate for dual credit students than all other comparison groups, while one (Nitzke, 2002) revealed that dual credit students earned less college credits than nondual credit students. Most recently, Karp et al. (2007) supported dual credit participation as a way to promote retention in postsecondary education. Given the growing concern for college remediation and claims made by dual credit advocates, it is perplexing that no studies were found that controlled for prior academic performance while investigating the influence of dual credit on college remediation. Given the growing interest in dual credit and the potential for substantial new investments into dual credit programs, empirical studies focusing on student outcomes are needed for further implementation of dual credit programs.

Conceptual Framework

This study uses Astin's Input-Environment-Outcome (I-E-O) model for its conceptual framework, providing three major components: Input variables, environment variables, and outcome variables (Astin, 1991, 1993). *Inputs* refer to those personal qualities the student brings initially to the educational program.

Environment refers to the student's actual experiences during the educational program. *Outcomes* refer to the gains made as a result of the educational program. Input variables are also called control variables; whereas, environment variables are independent variables, and outcome variables are dependent variables. Astin and Sax (1998) pointed out that in educational research, students may have different characteristics before participating in an educational program; therefore, the outcomes may not reveal the impact of program participation, but may simply represent differences in the characteristics of students. Considering this perspective, the I-E-O model controls for input differences, resulting in a more accurate estimate with respect to how environment variables influence student outcomes. Utilizing Astin's I-E-O model, the impact of dual credit on students' college outcomes was investigated while controlling for gender and educational background characteristics.

Purpose of the Study

The purpose of this study was to investigate how dual credits and articulated college credit hours influence college outcomes, while controlling for student gender and educational background characteristics. Accordingly, the following research question was posited: Are dual credit hours and articulated credit hours earned significant predictors of students' placement in remedial courses and college-level credit hours earned, controlling for student gender, high school percentile rank, Tech Prep participation, and high school course-taking?

Method

This study used a quantitative research design with an existing dataset from the *Community College and Beyond* (CC&B) study. The CC&B study examined secondary academic performance; transition from high school to the community college; community college participation, retention, and completion; and employment. The dataset contains approximately 4,700 student records representing students in local Tech Prep consortium in the states of California, Florida, Illinois, Ohio, Oregon, North Carolina, and Texas, and an anonymous state in the Northeast. A panel of experts selected these eight consortia, which were comprised of high schools with a community college district having one or more campuses. In the eight selected consortia, the student sample was selected based on systematic random sampling to ensure that the Tech Prep participant and nonparticipant groups were similar on high school academic performance. The CC&B study tracked high school graduates over a four-year period, collecting data using surveys and high school and community college transcripts. The study identified participants who earned dual or articulated credit hours in the Tech Prep and nonparticipant groups.

Of the eight original consortia included in the CC&B dataset, the Ohio, Texas, Florida, and Oregon consortia were selected for this study. The other four consortia were excluded because students in these sites did not have adequately detailed

records to ascertain dual or articulated credit course enrollment. The four consortia selected had an original sample size as follows: Ohio (n = 347), Texas (n = 583), Florida (n = 597), and Oregon (n = 483). To qualify as a participant in dual credit and articulated credit courses, individuals who enrolled in a community college must have had both high school and college transcripts showing enrollment in the courses and had to provide adequate evidence for transcript analysis. Thus, the sample was restricted as follows: Ohio (n = 188), Texas (n = 341), Florida (n = 339), and Oregon (n = 273). The sample was similar to the original total sample in terms of gender, educational background characteristics, and college outcomes. All identified students who graduated from high school in 1995, 1996, or 1997 and matriculated into the lead community college.

Further, documents and transcripts collected by the CC&B study provided the raw data essential to create the variables for this study. To identify dual and articulated course-taking and ensure accuracy, course catalogues, student handbooks, and information from high school and college websites were used. In some cases, student handbooks provided the list of dual credit or articulated credit courses. Information from these documents also confirmed the interpretation of dual credit and articulated credit status for the purpose of performing the transcript analysis. Dual and articulated course-taking included the variables of academic, career and technical education (CTE), and total dual and articulated credit hours earned. Students in the Texas consortium had all four types of credit, while the Ohio students had only articulated credit. Students in Florida and Oregon had the dual credit variables, only.

The dual and articulated credit variables served as the independent (environment) variables. The dependent variables were placement in remedial reading, writing, and mathematics serving as the measures of college readiness; and total college-level credit hours earned in which remedial credit hours, exam credit hours, and dual and articulated credit hours were excluded. Each consortium employed different types of placement tests, so the readers were cautioned against making a direct comparison of placement cutoff scores between the four consortia. It is also important to note that, in determining college readiness in mathematics, different cutoff scores were used for students enrolled in the community college, CTE, and transfer programs. In all four consortia, higher cutoff scores were required in mathematics for students in transfer programs. In addition, 10 control (input) variables were used and arranged into 4 categories: (a) gender, (b) high school percentile rank, (c) Tech Prep participation, and (d) high school course-taking, including seven variables associated with the quantity and rigor of mathematics and English courses, and the number of semesters of science and CTE courses.

Statistical analyses were performed separately for each consortium and the results were compared descriptively; therefore, the differences between consortium results were not tested. This approach was selected because the phenomena under investigation, particularly dual and articulated credit, were known to differ from

consortium to consortium. Accordingly, this investigation focused on the examination of group differences within consortia. Descriptive and inferential statistical analyses were used to answer the research question. In conducting multiple and logistic regression analyses, the block variable entry method was used (Pedhauser, 1997). All tests of statistical significance were conducted at an alpha level of .05, which is considered a reasonable level of accuracy for educational research (Glass & Hopkins, 1996).

The findings across the four consortia were presented to address the research question. The findings revealed within consortia were also discussed because of the insights they provided. In interpreting the magnitude of correlation coefficients, the range from 0.10 to 0.29 was considered a weak association, from 0.30 to 0.49 a moderate association, and from 0.50 to 0.69 a strong association (Davis, 1971).

Findings

Student Characteristics and Dual and Articulated Credit Hours

In the Ohio and Oregon consortia, males comprised the majority of the student sample. In the Texas and Florida consortia, females were the majority of the sample. Tech Prep participants comprised approximately 56% of the sample in Texas, 47% in Florida, 52% in Oregon, and 86% in Ohio. The mean High School Percentile Rank (HSPR) of students in the Ohio and Oregon consortia was 55%; whereas, the students in the Texas and Florida consortia had higher HSPRs, averaging about 67%.

Students in the Ohio consortium showed the highest mean number of semesters of mathematics and Oregon students showed the lowest. Analysis of the mean number of semesters of English revealed that students in the Florida consortium reported the highest mean and Ohio the lowest. In terms of the number of semesters of science, students in Ohio had the highest mean, with Oregon showing the lowest. The mean number of semesters of CTE courses was higher relative to the mean number of semesters of mathematics, English, and science for students in the Ohio, Florida, and Oregon consortia. Similar to mathematics and science, students in the Ohio consortium showed the highest mean number of semesters of CTE courses taken, as indicated by the significant correlation coefficient between Tech Prep participation and number of semesters of CTE courses taken ($r = 0.70$, $p < 0.001$).

With respect to the number of the highest mathematics course taken on a scale of 1 for basic mathematics to 13 for Advanced Placement (AP) Calculus and AP Statistics, students in the Texas consortium revealed the highest average, and students in the Oregon consortium reported the lowest average. A mean of 7.48 is equivalent to being between Honors and Analytic Geometry and Algebra II and 5.85 is approaching 6, which is Geometry. In terms of the mean percentage of AP/Honors mathematics and English courses, Texas students had the highest mean, while Ohio students revealed the lowest mean.

Dual and articulated credit course-taking included academic, CTE, and total dual credit and articulated credit hours earned. Regarding academic dual credit, about 5% of the student sample had academic dual credit in Texas, 38.9% in Florida, and 10.6% in Oregon. Florida students had a higher average on academic dual credit hours earned (M = 3.12, SD = 5.11) than students in Texas (M = 0.21, SD = 0.94) and Oregon (M = 0.77, SD = 2.38). Concerning CTE dual credit, about 1.5% of the Texas student sample had CTE dual credit, 19.8% of the Florida sample, and 23.4% of the Oregon sample. Oregon students had a higher average on the CTE dual credit hours earned (M = 0.98, SD = 2.03) than Texas (M = 0.06, SD = 0.51) and Florida (M = 0.75, SD = 1.70) students. In terms of total dual credit, only about 6% of the student sample had either academic or CTE dual credit hours in Texas, 42% in Florida, and 32% in Oregon. Students in the Florida consortium had a higher average number of total dual credit hours earned (M = 3.87, SD = 5.77) then students in Oregon (M = 1.75, SD = 3.03) and Texas (M = 0.26, SD = 1.09). Approximately 25% of the student sample had articulated credit in Texas. In the Ohio consortium, approximately 52% of the student sample had articulated credit. Ohio students also had a higher average number of articulated credit hours earned (M = 2.77, SD = 5.42) than the Texas students (M = 1.67, SD = 3.32).

With respect to the relationships between student characteristics and dual and articulated credit hours, the findings revealed a statistically significant mean difference in the Oregon consortium by gender, only with total dual credit hours earned. Higher average total dual credit hours were found for females compared to males, supporting the findings of Cesta (2003) and Windham (1996). In terms of the relationship between dual credit hours earned and Tech Prep participation, the Florida non-Tech Prep participants had a higher average number of academic dual credits than Tech Prep participants (M = 3.86, SD = 2.28 for non-Tech Prep participants; M = 2.28, SD = 4.76 for Tech Prep participants), and the difference was significant (t = -2.88, p = 0.004). In order to take academic dual credit courses, a minimum 3.0 unweighted grade point average (GPA) was required in Florida; non-Tech Prep participants had higher academic performance than Tech Prep participants based on cumulative GPA. Such contextual background needs to be considered when interpreting the data.

Oregon Tech Prep participants showed a higher average of CTE dual credit than non-Tech Prep participants (M = 1.63, SD = 0.27 for Tech Prep participants; M = 0.27, SD = 1.11 for non-Tech Prep participants), and the difference was significant (t = 5.84, $p \leq 0.001$). Considering that college credits associated with Tech Prep are CTE-oriented and students enrolled in a 2 + 2 Tech Prep sequence could earn dual credit in Oregon, these results are not surprising. In Texas, Tech Prep participants had more articulated credits than non-Tech Prep participants. In this consortium, course level articulation agreements form the basis for Tech Prep programs, giving Tech Prep participants more opportunity to take articulated credit courses than nonparticipants.

Table 1 summarizes the Pearson product-moment correlation coefficients between HSPR and high school course-taking and dual credit and articulated credit hours in the four consortia. In terms of HSPR, significant positive relationships were found between HSPR and the academic dual credit hours earned in Texas ($r = 0.23$), Florida ($r = 0.22$), and Oregon ($r = 0.31$). Although not strong, a significant positive correlation was found for HSPR and CTE dual credit hours earned in Texas ($r = 0.16$) and Florida ($r = 0.13$). In the Florida consortium, this finding is likely related to requirements that students who enroll in dual credit courses must have a 3.0 unweighted GPA. In the Texas consortium, students had to demonstrate a certain level of academic competency in high school such as passing one or more sections of the Texas Academic Skills Program (TASP) tests. Similar to Florida, the statistically significant relationships between dual credit and HSPR represent a logical consequence of dual credit students demonstrating higher academic performance.

The course-taking variables displayed interesting relationships with academic dual credit and CTE dual credit across the four consortia. With respect to results for the three consortia in Texas, Florida, and Oregon, statistically significant relationships were found between semesters of science and academic dual credit ($r = 0.25$ for Texas, $r = 0.13$ for Florida, and $r = 0.29$ for Oregon), highest mathematics level taken and academic dual credit ($r = 0.14$ for Texas, $r = 0.31$ for Florida, and $r = 0.32$ for Oregon), and Advanced Placement (AP) or Honors English and academic dual credit ($r = 0.18$ for Texas, $r = 0.20$ for Florida, and $r = 0.51$ for Oregon).

In regard to the relationship between HSPR and articulated credit, a significant but weak correlation was found among students in consortia in Texas ($r = 0.17$) and Ohio ($r = 0.17$). The number of semesters of mathematics revealed a significant but weak relationship with articulated credit in both of these consortia ($r = 0.12$ for Texas and $r = 0.15$ for Ohio). The number of semesters of CTE courses also showed a significant but weak relationship with articulated credit in both consortia ($r = 0.20$ for Texas and $r = 0.21$ for Ohio). Considering that all articulated credit courses offered in both consortia were CTE-oriented, this result is not surprising.

Dual and Articulated Credit Hours and College Readiness and Total College-Level Credit Hours Earned

Students in all four consortia showed a fairly high level of college readiness in reading (about 88.5% in Texas, 72.3% in Florida, 88.4% in Oregon, and 83.6% in Ohio) and writing (about 90.1% in Texas, 70.8% in Florida, 86.2% applying career standard and 40.9% applying transfer standard in Oregon, and 83.6% in Ohio). In all four consortia, readiness in mathematics was lower than reading and writing applying the career standard (about 81.1% in Texas, 67.1% in Florida, 76.4% in Oregon, and 61.0% in Ohio) and even lower applying transfer standard (about 51.4% in Texas, 17.3% in Florida, 10.4% in Oregon, and 33.9% in Ohio).

Table 1
Correlations between HSPR and High School Course-Taking and Dual Credit and Articulated Credit Hours

Characteristics	Academic DC	CTE DC	Total DC	Articulated Credit
	Texas			
HSPR	0.23**	0.16**	0.27**	0.17**
Semesters of mathematics	0.04	0.04	0.06	0.12*
Semesters of English	0.07	-0.07	0.02	0.04
Semesters of science	0.25**	0.08	0.25**	0.13*
Semesters of CTE	-0.04	-0.11*	-0.08	0.20**
Highest mathematics level	0.14*	0.11*	0.17**	0.14*
% AP/Honors mathematics	0.22**	0.21**	0.29**	0.12*
% AP/Honors English	0.18**	0.18**	0.24**	0.12*
	Florida			
HSPR	0.22**	0.13*	0.23**	-
Semesters of mathematics	0.27**	0.03	0.25**	-
Semesters of English	0.42**	0.06	0.39**	-
Semesters of science	0.13*	-0.09	0.09	-
Semesters of CTE	-0.18**	-0.17**	-0.21**	-
Highest mathematics level	0.31**	0.10	0.31**	-
% AP/Honors mathematics	0.09	0.07	0.10	-
% AP/Honors English	0.20**	0.06	0.20**	-
	Oregon			
HSPR	0.31**	0.004	0.24**	-
Semesters of mathematics	0.23**	-0.13*	0.10	-
Semesters of English	-0.03	-0.05	-0.06	-
Semesters of science	0.29**	-0.02	0.22**	-
Semesters of CTE	-0.14*	0.40**	0.15*	-
Highest mathematics level	0.32**	-0.07	0.20**	-
% AP/Honors mathematics	0.22**	-0.02	0.16**	-
% AP/Honors English	0.51**	-0.06	0.36**	-

Table 1 *(continued)*
Correlations between HSPR and High School Course-Taking and Dual Credit and Articulated Credit Hours

Characteristics	Academic DC	CTE DC	Total DC	Articulated Credit
		Ohio		
HSPR	-	-	-	0.17*
Semesters of mathematics	-	-	-	0.15*
Semesters of English	-	-	-	0.15*
Semesters of science	-	-	-	0.01
Semesters of CTE	-	-	-	0.21**
Highest mathematics level	-	-	-	0.11
% AP/Honors mathematics	-	-	-	-0.07
% AP/Honors English	-	-	-	-0.04

* $p < 0.05$. ** $p < 0.01$.

The range of the average of total credit hours earned was between 21.5 and 46.4 (about 29.1 in Texas, 20.5 in Florida, 32.4 in Oregon, and 46.4 in Ohio). It should be noted that the Ohio and Oregon community colleges use the quarter system; whereas, the community colleges in the Texas and Florida consortia use the semester system. Therefore, under the same conditions, students in Ohio and Oregon would receive more credit hours than those in the other two consortia. In general, full-time students take about 15 credit hours per quarter in quarter systems and 12 credit hours per semester in semester systems. Five credits are usually converted as 3.3 credit hours when students transfer from quarter to semester systems. Since this study did not test the differences between consortium results, no attempt was made to convert total credit hours earned into the same credit system to make them comparable. Given the different credit systems, it was important to note that Texas surpassed Florida and Ohio surpassed Oregon.

Dual credit and articulated credit hours and college readiness. Overall, dual credit hours earned and articulated credit hours earned had significant relationships with college readiness. Articulated credit hours earned had a significant positive relationship with being college ready in reading and writing; whereas, academic dual credit hours earned had a significant positive relationship with college readiness in mathematics. Table 2 summarizes the results.

When the transfer major criterion was applied, academic dual credit hours earned yielded a significant positive relationship with college readiness in mathematics in Texas ($r = 0.15$) and Oregon ($r = 0.19$), and the strongest relationship in Florida ($r = 0.34$). When the career major criterion was applied, a significant but

Table 2
Correlations between College Readiness and Dual Credit and Articulated Credit Hours

College Readiness	Academic DC	CTE DC	Total DC	Articulated Credit
		Texas		
Reading	0.07	0.01	0.06	0.12*
Writing	0.06	0.00	0.06	0.17**
Mathematics (Transfer)	0.15**	0.09	0.18**	0.07
Mathematics (Career)	0.10*	0.03	0.10	0.18**
		Florida		
Reading	0.12	0.12	0.14*	-
Writing	0.08	0.12	0.11	-
Mathematics (Transfer)	0.34**	0.02	0.30**	-
Mathematics (Career)	0.23**	0.13*	0.24**	-
		Oregon		
Reading	0.09	0.04	0.09	-
Writing (Transfer)	0.20**	-0.07	0.09	-
Writing (Career)	0.09	0.05	0.10	-
Mathematics (Transfer)	0.19**	-0.03	0.11	-
Mathematics (Career)	0.06	-0.02	0.03	-
		Ohio		
Reading	-	-	-	0.17*
Writing	-	-	-	0.16*
Mathematics (Transfer)	-	-	-	0.01
Mathematics (Career)	-	-	-	0.14

* $p < 0.05$. ** $p < 0.01$.

weak positive relationship was found with total dual credit hours earned and being college ready in mathematics in Texas ($r = 0.10$) and Florida ($r = 0.23$). A possible explanation is that, in Florida, according to course catalogs, to be eligible for admission to a dual credit course, Florida students must be placed at the college-level on the SAT, ACT, or the Florida Placement Test. In Texas, students were required to satisfy college admission requirements and pass the college Texas Academic Skills

Program (TASP) test or TASP equivalent test. These admission requirements helped explain why a statistically significant relationship was found between dual credit hours earned and college readiness in mathematics. With respect to the relationship between articulated credit hours earned and college readiness, significant but weak positive relationships were found between college readiness in reading and writing in Texas (r = 0.12 for reading and r = 0.17 for writing) and Ohio (r = 0.17 for reading and r = 0.16 for writing).

Dual and articulated credit hours and college-level credit hours earned. Significant weak correlation coefficients were found between total college-level credit hours earned and different types of dual credit hours earned. Academic dual credit hours earned had a significant, weak, and negative relationship with total college-level credit hours earned in Texas (r = -0.17) and Florida (r = -0.13). The CTE dual credit hours earned had a significant, weak, and negative relationship with total college credit hours earned in Oregon (r = -0.14). These findings concurred with findings of Nitzke (2002) who revealed that dual credit students earned fewer college credits than nondual credit students, but contradict the findings of Guruel (1996) who found students taking more dual credit hours earned more college credits than nondual credit students. The findings from this study may reflect that students who took academic dual credit while in high school were oriented towards attending four-year institutions; they transferred to four-year colleges after a short time in the community college, resulting in their earning fewer total college credits on the community college transcript. A similar situation was found in Oregon for students who took CTE dual credit courses; they tended to obtain less college-level credit hours. This finding was attributed to many CTE dual credit courses being core requirements in Oregon for two certificate programs: the secretarial certificate and the office software application specialist certificate. Because it takes students only one year to complete these certificate programs, students with higher CTE dual credits would be expected to enroll in fewer total college credit hours.

Unlike dual credit hours earned, articulated credit hours earned had a significant positive relationship with total college-level credit hours earned in the Ohio (r = 0.41) and Texas (r = 0.15) consortia where articulated credit was offered. In these consortia, articulated credit courses were provided as part of a career pathway, a sequence of courses connecting high school and community college curricula and leading to a postsecondary degree and employment. A career pathway was a four-year program spanning the junior year in high school through two years of the community college. For example, in the Ohio consortium, if students chose an allied health career pathway program, they could earn up to 18 articulated credits during the junior and senior years in high school and obtain the remaining required credit hours during the two years in the community college. Therefore, participation in this type of program could have contributed to this significant positive relationship.

Students' Gender and Educational Background and College-Level Credit Hours Earned and College Readiness

Overall, high school course-taking variables had significant positive relationships with college readiness. The variables related to mathematics course-taking, including number of semesters of mathematics, highest mathematics level, and percentage of AP or Honors mathematics, revealed significant positive relationships with college readiness in mathematics at the $\alpha = 0.01$ level across the consortia. This suggested that the more semesters of mathematics and advanced mathematics courses taken, students were more likely to pass the college placement test in mathematics. These findings supported the results of Berry (2003) who reported that 73% of the students who took rigorous high school mathematics, were beyond Algebra 2, and placed into college-level mathematics, compared to 29% of these students whose highest mathematics course taken was Algebra 2 and placed into college-level mathematics. The highest high school mathematics course level also had significant positive relationships with college readiness in reading and writing in all four consortia except Ohio, where the highest mathematics level was related to college readiness in reading, only. The percentage of AP or Honors mathematics had significant positive relationships with college readiness in reading in Texas ($r = 0.20$) and Florida ($r = 0.18$) and with college readiness in writing in Texas ($r = 0.21$), Florida ($r = 0.15$), and Oregon ($r = 0.29$) as well. These results supported the importance of high school mathematics preparation for college-level education.

The percentage of AP or Honors English had significant positive relationships with college readiness in reading and writing in Texas ($r = 0.21$ for reading and $r = 0.23$ for writing) and Florida ($r = 0.26$ for reading and $r = 0.29$ for writing). This result was consistent with findings of Holton (1998) that showed students who completed rigorous courses in high school English such as AP English increased their probability of passing placement tests in reading and writing, while controlling for student characteristics such as race/ethnicity, gender, and high school GPA. In addition, the number of semesters of high school science had a significant but weak positive relationship with mathematics readiness in all consortia except Ohio in both applying transfer criteria ($r = 0.28$ in Texas, $r = 0.15$ in Florida, $r = 0.36$ in Oregon) and career criteria ($r = 0.30$ in Texas, $r = 0.26$ in Florida, $r = 0.15$ in Oregon). The number of semesters of science courses taken also had a significant positive relationship with reading in all consortia except Florida ($r = 0.23$ in Texas, $r = 0.16$ in Ohio, and $r = 0.20$ in Oregon) and writing readiness in all consortia except Florida, ($r = 0.22$ in Texas, $r = 0.17$ in Ohio, and $r = 0.24$ applying transfer criteria and $r = 0.15$ applying career criteria in Oregon). These results indicated that the more semesters of science taken, the more likely students were ready for a college education. They supported the findings from ACT (2004) that taking science courses such as biology, chemistry, and physics increased greatly the likelihood of college readiness of students, regardless of their academic achievement levels. In terms of

the total college-level credit hours earned, no significant relationships were found for any consortia.

Total College-Level Credit Hours Earned and College Readiness

The findings from the multiple regression and logistics regression analysis are presented in Tables 3, 4, and 5. Model 1 included only the gender variable. Model 2 included HSPR and the gender variable. Model 3 included the Tech Prep participation variable and the variables included in Models 1 and 2. Model 4 included seven high school course-taking variables, added to the variables in Models 1-3. High school course-taking included the total numbers of mathematics (HSMTHSEM), English (HSENGSEM), science (HSSCISEM), and CTE (CTETOT) courses taken, level of highest mathematics course taken (MATHHI), percentage of all mathematics courses taken that were Advanced Placement or Honors mathematics courses (PCTMTHAP), and percentage of all English courses taken that were Advanced Placement or Honors English courses (PCTENGAP). Finally, Model 5 included the dual and articulated credit hours variables as well as the gender and educational background characteristics variables specified for Models 1-4. The block entry method allowed for the examination regarding how much each block of variables such as gender, HSPR, Tech Prep participation, high school course-taking, and the independent variables of dual and articulated credit hours added power in predicting college retention and readiness.

The multiple regression analysis results revealed a significant effect for dual and articulated credit hours earned on total college-level credit hours earned, controlling for gender and educational background characteristics. The block of dual and articulated credit hours earned variables accounted for a significant portion of the variance of college-level credit hours earned and significantly improved the fit of the model. Academic dual credit hours earned had a significant negative effect on the college credit hours earned over and above what other variables accounted for in Texas and Florida. The CTE dual credit hours earned revealed a significant negative effect on total college-level credit hours earned in Oregon. In contrast, articulated credit hours earned had a significant positive effect on total college credit hours earned in both Ohio and Texas. These results were consistent with the correlation analysis findings that examined relationships between the independent and dependent variables. The results further confirm the direct effect of dual and articulated credit on retention at the college-level while controlling for the influence of gender and educational background characteristics (see Table 3).

The logistics regression analysis results differed for students being college ready in reading, writing, and mathematics for the four consortia. Ohio was the only consortium that articulated credit hours earned accounted for a significant portion of the variance of college readiness in reading and writing. Table 4 summarizes the results for Ohio, starting with the fourth block. Academic and CTE dual credit hours earned variables accounted for a significant portion of the variance of college

Table 3

Multiple Regression Analysis of Total College-Level Credit Hours Earned for the Texas, Florida, Oregon, and Ohio Consortium

Variable	*B*	*SE B*	*t*
	Texas (Model 5)[a]		
Female	3.56	2.91	1.23
HSPR	0.30	0.10	2.87**
TP	0.36	2.86	0.13
HSMTHSEM	0.87	1.08	0.81
HSENGSEM	-0.89	1.10	-0.82
HSSCISEM	-2.06	0.96	-2.15*
CTETOT	0.31	0.35	0.87
MATHHI	1.68	1.04	1.61
PCTMTHAP	-0.11	0.08	-1.50
PCTENGAP	0.01	0.06	0.23
Academic dual credit	-5.24	1.52	-3.44**
CTE dual credit	-2.87	2.76	-1.04
Articulated credit	1.05	0.45	2.35*
	Florida (Model 5)[b]		
Female	4.15	3.00	1.39
HSPR	0.08	0.11	0.70
TP	-4.05	3.30	-1.23
HSMTHSEM	0.12	1.31	0.09
HSENGSEM	0.60	0.92	0.66
HSSCISEM	-0.27	1.15	-0.24
CTETOT	0.37	0.30	1.24
MATHHI	1.80	0.95	1.91
PCTMTHAP	0.00	0.07	-0.04
PCTENGAP	-0.04	0.05	-0.72
Academic dual credit	-1.05	0.35	-3.04**
CTE dual credit	0.39	0.89	0.44
	Oregon (Model 5)[c]		
Female	-9.64	5.28	-1.83
HSPR	0.36	0.14	2.51*
TP	-14.00	6.41	-2.18*
HSMTHSEM	3.11	2.18	1.43
HSENGSEM	-0.32	3.05	-0.10
HSSCISEM	1.44	1.79	0.80
CTETOT	0.92	0.69	1.33
MATHHI	-3.15	1.61	-1.95
PCTMTHAP	-0.18	0.15	-1.24

Table 3 *(continued)*
Multiple Regression Analysis of Total College-Level Credit Hours Earned for the Texas, Florida, Oregon, and Ohio Consortium

Variable	*B*	*SE B*	*t*
Oregon (Model 5)[c] *(continued)*			
PCTENGAP	-0.32	0.15	-2.20*
Academic dual credit	0.18	1.22	0.14
CTE dual credit	-2.81	1.34	-2.09*
Ohio (Model 5)[d]			
Female	1.76	6.83	0.26
HSPR	0.48	0.14	3.51**
TP	10.99	13.59	0.81
HSMTHSEM	4.04	2.75	1.47
HSENGSEM	-1.44	2.80	-0.51
HSSCISEM	-0.07	2.03	-0.04
CTETOT	-0.36	1.31	-0.27
MATHHI	-0.79	1.95	-0.41
PCTMTHAP	-0.02	0.41	-0.05
PCTENGAP	-0.04	0.23	-0.16
Articulated credit	2.85	0.57	4.98**

[a] $R^2 = 0.147$, F (Model) = 4.232**, F (ΔR^2) = 5.95 ($p < 0.001$). [b] $R^2 = 0.050$, F (Model) = 1.43, F (ΔR^2) = 4.64 ($p < 0.05$). [c] $R^2 = 0.121$, F (Model) = 2.43**, F (ΔR^2) = 2.21 ($p < 0.11$). [d] $R^2 = 0.259$, F (Model) = 5.38**, F (ΔR^2) = 24.75 ($p < 0.001$).
* $p < 0.05$. ** $p < 0.01$.

readiness in mathematics in only one consortium, Florida, and then only when applying the transfer major criterion. Table 5 summarizes the results for Florida, starting with the third block. The academic dual credit hours earned was especially meaningful in explaining mathematics readiness over and above what other variables explained. Several correlations were not found to be significant when controlling for the influence of gender and educational background characteristics.

In terms of the effect of other blocks of variables, HSPR and high school course-taking were significant predictors of college readiness in writing and mathematics. The block of HSPR significantly improved the fit of the model for placement in college-level writing in three consortia (Texas, Ohio, and Oregon) and in college-level mathematics applying the transfer criteria in three consortia (Texas, Ohio, and Florida), after accounting for gender. The block of high school course-taking variables contributed to the prediction of being college ready in writing in three consortia (Texas, Florida, and Oregon), while controlling for gender, HSPR, and Tech Prep participation. It also added to the prediction of the odds of being college ready in mathematics applying the transfer major criterion in all four

consortia and applying the career major criterion in three consortia (Texas, Florida, and Oregon).

Table 4
Logistic Regression Analysis of College Readiness in Reading and Writing for Ohio

Variable	*B*	*SE B*	Wald	Exp (*B*)
		Reading (Model 4)[a]		
Female	-1.36	0.54	6.37*	0.26
HSPR	0.04	0.01	9.52*	1.04
TP	2.18	1.13	3.74	8.86
HSMTHSEM	0.11	0.20	0.32	1.12
HSENGSEM	-0.26	0.21	1.55	0.77
HSSCISEM	0.05	0.15	0.10	1.05
CTETOT	-0.08	0.10	0.63	0.93
MATHHI	0.00	0.13	0.00	1.00
PCTMTHAP	0.02	0.02	0.76	1.02
PCTENGAP	0.04	0.02	2.42	1.04
		Reading (Model 5)[b]		
Female	-1.46	0.57	6.71**	0.23
HSPR	0.03	0.01	7.42**	1.03
TP	1.96	1.13	2.98	7.07
HSMTHSEM	0.11	0.20	0.30	1.12
HSENGSEM	-0.30	0.21	2.09	0.74
HSSCISEM	0.09	0.15	0.34	1.09
CTETOT	-0.10	0.10	1.02	0.90
MATHHI	-0.04	0.14	0.08	0.96
PCTMTHAP	0.02	0.02	0.66	1.02
PCTENGAP	0.04	0.02	2.31	1.04
Articulated credit	0.17	0.13	1.73	1.19
		Writing (Model 4)[c]		
Female	-0.38	0.48	0.62	0.68
HSPR	0.03	0.01	9.67**	1.03
TP	0.33	1.00	0.11	1.40
HSMTHSEM	-0.01	0.17	0.00	0.99
HSENGSEM	-0.16	0.18	0.80	0.85
HSSCISEM	0.14	0.13	1.12	1.15
CTETOT	-0.02	0.09	0.08	0.98

Table 4 *(continued)*
Logistic Regression Analysis of College Readiness in Reading and Writing for Ohio

Variables	*B*	*SE B*	Wald	Exp (*B*)
		Writing (Model 4)[c]		
MATHHI	0.07	0.12	0.38	1.08
PCTMTHAP	0.01	0.01	0.89	1.01
PCTENGAP	0.00	0.02	0.06	1.00
		Writing (Model 5)[d]		
Female	-0.43	0.50	0.74	0.65
HSPR	0.03	0.01	7.34**	1.03
TP	0.08	1.01	0.01	1.09
HSMTHSEM	-0.02	0.18	0.01	0.98
HSENGSEM	-0.20	0.18	1.29	0.82
HSSCISEM	0.19	0.14	1.76	1.20
CTETOT	-0.04	0.09	0.18	0.96
MATHHI	0.05	0.12	0.14	1.05
PCTMTHAP	0.01	0.01	0.99	1.01
PCTENGAP	0.00	0.02	0.06	1.00
Articulated credit	0.14	0.09	2.27	1.15

Note. [a]-2 LL = 121.828, χ^2 (Model) = 33.49**, χ^2 (- 2LLΔ) = 7.96 (p = 0.34). [b]-2 LL = 117.477, χ^2 (Model) = 37.84**, χ^2 (- 2LLΔ) = 4.35 (p = 0.04). [c]-2 LL = 151.545, χ^2 (Model) = 21.33**, χ^2 (- 2LLΔ) = 4.96 (p = 0.66). [d]-2 LL = 147.031, χ^2 (Model) = 25.84**, χ^2 (- 2LLΔ) = 4.51 (p = 0.03). * $p < 0.05$. ** $p < 0.01$.

Conclusions and Implications

The findings of this study supported prior studies that suggested dual credit positively impacts college readiness (Crook, 1990; Monroe Community College, 2003); however, the findings for Monroe community college are not entirely comparable because the differences associated with student characteristics were not controlled. Correlation analysis revealed that academic dual credit was related significantly to being college ready in mathematics in all three consortia (Texas, Florida, and Oregon) that offered academic dual credit, while articulated credit was related significantly to reading and writing in the two consortia (Ohio and Texas) offering articulated credit. This finding is confounded by significant correlation coefficients between academic dual credit hours earned and articulated credit hours earned and HSPR in all four consortia; students with higher grades were more likely to be enrolled in academic dual credit courses and articulated credit courses. These significant correlation coefficients explained why different results were revealed from the regression analysis while controlling for gender, HSPR, and high school

Table 5
Logistic Regression Analysis of College Readiness in Mathematics for Florida Based on Transfer Major Criteria

Variable	*B*	*SE B*	Wald	Exp (*B*)
		Model 3[a]		
Female	-0.68	0.36	3.58	0.51
HSPR	0.03	0.01	5.82*	1.03
TP	-0.84	0.38	4.92*	0.43
		Model 4[b]		
Female	-0.59	0.40	2.18	0.55
HSPR	0.00	0.01	0.03	1.00
TP	-0.41	0.46	0.81	0.66
HSMTHSEM	0.12	0.17	0.48	1.12
HSENGSEM	0.03	0.12	0.08	1.03
HSSCISEM	-0.07	0.14	0.21	0.94
CTETOT	0.04	0.04	0.92	1.04
MATHHI	0.53	0.16	11.19**	1.70
PCTMTHAP	0.01	0.01	1.58	1.01
PCTENGAP	0.00	0.01	0.43	1.00
		Model 5[c]		
Female	-0.69	0.42	2.62	0.50
HSPR	-0.01	0.02	0.97	0.99
TP	-0.31	0.49	0.41	0.73
HSMTHSEM	0.04	0.17	0.05	1.04
HSENGSEM	-0.27	0.16	2.83	0.76
HSSCISEM	-0.07	0.16	0.20	0.93
CTETOT	0.06	0.05	1.78	1.06
MATHHI	0.44	0.16	7.12**	1.55
PCTMTHAP	0.02	0.01	3.50	1.02
PCTENGAP	0.00	0.01	0.20	1.00
Academic dual credit	0.17	0.05	11.18**	1.19
CTE dual credit	-0.12	0.15	0.65	0.89

Note. [a]-2 LL = 205.947, χ^2 (Model) = 12.00**, χ^2 (- 2LLΔ) = 5.23 (p = 0.02). [b]-2 LL = 170.944, χ^2 (Model) = 47.00**, χ^2 (- 2LLΔ) = 35.00 ($p < 0.001$). [c]-2 LL = 157.676, χ^2 (Model) = 60.27**, χ^2 (- 2LLΔ) = 13.27 ($p < 0.01$).
* $p < 0.05$. ** $p < 0.01$.

course-taking. That is, academic dual credit hours earned had a direct effect on college readiness in mathematics after controlling for gender, HSPR, and high school course-taking; however, this finding was found in Florida, only.

Students' articulated credit course-taking enhanced their college retention in the two consortia that offered articulated credit. A significant positive relationship was found between articulated credit hours earned and total college-level credit hours earned in both Ohio and Texas. The same results were obtained while controlling for gender and educational background, confirming a significant direct effect of articulated credit course-taking on college retention. This finding might suggest that students who took more articulated credit hours while in high school were more motivated to obtain an advanced CTE degree than those without such experiences, resulting in a longer stay in the community college. Furthermore, the Texas consortium's requirement for students to receive articulated credit by completing three credit hours of additional college-level course work at the lead community college may have contributed to more college-level credit hours earned.

Students' academic and CTE dual credits also impacted their college retention, but requires careful interpretation. A significant negative relationship between academic dual credit hours earned and total college credit hours earned was found in the Texas and Florida consortia. While controlling for gender and educational background, academic dual credit hours earned was a significant negative predictor of college retention in both consortia. Based on these results, students' academic dual credit course-taking was likely to shorten their stay in the community college. A possible explanation for this finding is that students receiving academic dual credit could have been oriented more towards the four-year degree, resulting in shorter stays in community college and transfers to four-year institutions. In terms of CTE dual credit, only Oregon reported a significant negative relationship for retention; CTE dual credit was a significant negative predictor of retention while controlling for gender and educational background characteristics.

Both articulated credit courses and CTE dual credit courses (were CTE-oriented) and articulated credit hours earned had a significant positive impact on retention in Ohio and Texas. However, the CTE dual credit hours earned showed a significant negative impact on retention in Oregon. In both Ohio and Texas, articulated credit courses were offered as part of career pathways leading to two-year Associate in Applied Sciences (AAS) degree programs at the lead community college, possibly influencing retention. The finding of a significant negative relationship between CTE dual credit and total college-level credit hours earned may have reflected the circumstances in Oregon, where most of the CTE dual credit courses were requirements for two one-year certificate programs. These results suggest the length and credential offered by the program awarding the dual credit courses and articulated credit courses may be more influential to retention – students' obtainment of college-level credit hours subsequent to their entering the community college – than the type of college credit.

Further inquiry was conducted to determine how the type of dual credit was related to students' college readiness and retention. According to the results of this study, academic dual credit hours earned were more likely to enhance college mathematics readiness than CTE dual credit hours earned. Nonetheless, this finding did not point to the greater advantage of academic dual credit compared to CTE dual credit relative to being ready for college-level mathematics. In Florida, where academic dual credit hours earned predicted college mathematics readiness, about 18% of total academic dual credit courses taken were college-level mathematics courses and more than two-thirds of them were completed with A or B grades (about 34% of grade A and 33% of grade B). Therefore, students who took academic dual credit courses in high school were already academically well prepared, successfully completing college-level courses while in high school. This is a logical result since well prepared students would be expected to demonstrate a higher level of college mathematics readiness than students less prepared academically. Another possible explanation was found in the relationship between HSPR and academic and CTE dual credit hours earned. That is, the strength of the relationship between academic dual credit and HSPR was stronger than that of CTE dual credit and HSPR, suggesting students who took academic dual credit had higher grades and were academically better prepared than students who took CTE dual credit, leading to better readiness for college-level education. In terms of college retention, a negative relationship was found in two consortia (Texas, Florida) between academic dual credit hours earned and college-level credit hours earned; a negative relationship was found with CTE dual credit in one consortium (Oregon). These mixed results make it difficult to generalize about the effectiveness of one college credit type over another.

Along with dual and articulated credit hours earned, students' high school course-taking played an important role in preparation for postsecondary education, supporting the findings by Adelman (1999), Cabrera, La Nasa, & Burkum (2001), Eimers and Mullen (2003), Horn, Kojaku, and Carroll (2001), and Roth, Crans, Carter, Ariet, & Resnick (1999). In particular, the quantity and rigor of high school mathematics course-taking were influential variables for college readiness. Students who took more semesters and more advanced mathematics courses showed better college readiness in mathematics in all four consortia. The level number of the highest mathematics course taken had significant relationships with college readiness in mathematics, reading, and writing. Moreover, students who took more science courses (in high school) in Ohio, Texas, and Florida, and more mathematics in Texas, Florida, and Oregon showed higher college readiness in reading and writing. These findings concurred with the results of ACT (2004) that showed taking rigorous mathematics beyond Algebra II and science such as biology, chemistry, and physics had a significant effect on college readiness, while controlling for students' academic achievement. Students' AP or Honors English course-taking was also related positively to their college readiness in reading, writing, and mathematics in two consortia (Texas, Florida). This finding supported Roth et al. (1999) who reported that English academic resources were related positively to college readiness in

English after controlling for race/ethnicity, gender, and high school GPA. Consequently, to increase students' college readiness, the rigor and quantity of high school curriculum should be ensured. Additionally, careful guidance and counseling in course selection is essential.

High school course-taking was a significant predictor of college readiness in mathematics, too. In all four consortia, the seven variables of high school course-taking: semesters of mathematics taken, highest mathematics course, percentage of AP or Honors mathematics, semesters of English taken, percentage of AP or Honors English, semester of science taken, and semesters of CTE courses taken accounted for a significant portion of variance on college mathematics readiness. It appears that as the rigor and quantity of course-taking increase, the probability of being college ready in reading, writing, and mathematics increases significantly.

References

ACT (2004). *Crisis at the core: Preparing all students for college and work*. Iowa City, IA: Act, Inc.

Adelman, C. (1999, June). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment.* Washington DC: U.S. Department of Education, Office of Educational Research and Improvement.

Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Washington DC: U.S. Department of Education, Office of Educational Research and Improvement.

Andrews, H. A. (2001). The dual-credit explosion at Illinois' community colleges. *Community College Journal, 71*(3), 12-16.

Astin, A. W. (1991). *Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education*. Phoenix, AZ: The Oryx Press.

Astin, A. W. (1993). *What matters in college? Four critical years revisited*. San Francisco, CA: Jossey-Bass.

Astin, A. W., & Sax, L. J. (1998). How undergraduates are affected by service participation. *Journal of College Student Development, 39,* 251-263.

Bailey, T. R., Hughes, K. L., & Karp, M. M. (2003). *Dual enrollment programs: Easing transition from high school to college*. Community College Research Center Teachers College, Columbia University.

Berry, L. (2003). Bridging the gap: A community college and area high schools collaborate to improve student success in college. *Community College Journal*, *27,* 393-407.

Boswell, K. (2000). Building bridges or barriers: Public policies that facilitate or impede linkages between community colleges and local school districts. *New Directions for Community Colleges, 111,* 3-15.

Cabrera, A., La Nasa, S., & Burkum, K. (2001). *On the right path: The higher education story of one generation.* University Park, PA: Pennsylvania State University, Center for the Study of Higher Education.

Cartron, R. (2001). Dual enrollment in Virginia. *New Directions for Community Colleges*, *113*, 51-58.

Cesta, J. L. (2003). Dual enrollment: The effects of an accelerated academic program on community college student graduation rates and time-to-degree. (Doctoral Dissertation, University of South Florida, 2003). *UMI Dissertation Abstracts, AAT 3079975*.

Chatman, S., & Smith, K. (1998, April). Dual-credit preparation for further study in foreign languages. *NASSP Bulletin, 82*(597), 99-107.

Clark, R. W. (2001, June). *Dual credit: A report of programs and policies that offer high school students college credits.* Seattle, University of Washington: Institute for Educational Inquiry.

Cohen, A. M., & Brawer, F. B. (2003). *The American community college* (4th ed.). San Francisco, CA: Jossey-Bass, Inc.

Crook, D. (1990). *The impact of College Now: An update: retention and academic progress among program participants who entered CUNY in fall 1987 and fall 1988*. New York: Kingsborough Community College, Office of Institutional Research and Analysis.

Davis, J. A. (1971). *Elementary survey analysis*. Englewood Cliffs, NJ: Prentice-Hall.

Eimers, M. T., & Mullen R. (2003). *Dual credit and advanced placement: Do they help prepare students for success in college?* Paper Presented at the 43rd Annual Association of Institutional Research (AIR) Conference, Tampa, FL.

Fincher-Ford, M. (1996). *High school students earning college credit: A guide to creating dual-credit programs.* Thousand Oaks, CA: Corwin Press.

Glass, G. V., & Hopkins, K. D. (1996). *Statistical methods in education psychology* (3rd ed.). Needham Heights, MA: A Simon and Schuster Company.

Greenberg, A. R. (1989). *Concurrent enrollment programs: College credit for high school students, Fastback 284*. Bloomington, Ind.: Phi Delta Kappa Educational Foundation.

Gurule, J. M. (1996). A study of high school to community college dual enrollment for underprepared/moderate student achievers. (Doctoral dissertation, Arizona State University). *Dissertation Abstracts International, 57,* 3A, 0990.

Holton, J. M. (1998). *High school course choice, performance, and readiness for college*. Frederick, MD: Frederick Community College. (ERIC Document Reproduction Service No. ED 419 567)

Horn, L., Kojaku, L. K., & Carroll, C. D. (2001). *High school academic curriculum and the persistence path through college.* NCES 2001-163. Washington DC: U.S. Department of Education.

Hughes, K., Karp, M., Fermin, B., & Bailey, T. (2005). *Pathways to college access and success.* Washington, DC: Office of Vocational Adult Education, U.S. Department of Education.

Hugo, E. B. (2001). Dual enrollment for underrepresented student populations. *New Directions for Community Colleges, 113*, 67-72.

Karp, M. M., Calcagno, J. C., Hughes, K. L., Jeong, D. W., & Bailey, T. R. (2007). *The postsecondary achievement of participants in dual enrollment: An analysis of student outcomes in two states*. St. Paul, MN: National Research Center for Career and Technical Education, University of Minnesota.

Kim, J., Barnett, E., & Bragg, D. (2003). *Dual credit in Illinois: Results of expert panel deliberations and a delphi study of definitions and priorities.* Champaign, IL: Office of Community College Research and Leadership, University of Illinois at Urbana Champaign.

Kleiner, B., & Lewis, L. (2005). *Dual enrollment of high school students at postsecondary institutions: 2002-03*. U.S. Department of Education. Washington, DC.

Kotamraju, P. (2005). *The Minnesota post-secondary enrollment options program: Does participation in dual enrollment programs help high school students attain career and technical education majors and degrees in college*? Paper Presented at the Council for the Study of Community Colleges, 47th Annual Conference, April 7-9, 2005, Boston, MA.

Krueger, C. (2006). *Dual enrollment: Policy issues confronting state policymakers*. Denver, Colo.: Education Commission of the States, 2006.

Lewis, L., Farris, E., & Greene, B. (1996, October). *Remedial education at higher education institutions in fall 1995.* Washington DC: U.S. Department of Education, Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 402 896).

Monroe Community College. (2003). [Dual credit tracking]. Rochester, NY: Monroe Community College, Office of Institutional Research. Unpublished raw data.

National Center for Education Statistics. (1998). Stopouts or stayouts? *Undergraduates who leave college in their first year*. Washington, DC: Author.

National Center for Education Statistics. (2006). *Profile of undergraduates in U.S. postsecondary education institutions: 2003-04, with a special analysis of community college students*. Washington, DC: Author.

Nitzke, J. E. (2002). A longitudinal study of dual credit enrollment of high school students as an accelerator for degree completion (Doctoral Dissertation, Iowa State University, 2002). *UMI Dissertation, AAT 3061852*.

Oregon Joint Boards of Education. (2000). *Oregon early options study.* Retrieved Dec 15, 2003, from http://www.ous.edu/aca/earlyoptions.htm

Pedhauser, E. J. (1997). *Multiple regression in behavioral research: Explanation and prediction* (3rd ed.). Fort Worth, TX: Harcourt Brace College Publishers.

Pierce, D. R. (2001, June). *Student pathways through high school to college*. Denver, CO: Education Commission of the States. Retrieved September 25, 2003, from http://www.ecs.org/c/earninghouse/26/71/2627.htm.

Puyear, D. (1998). *Concurrent and dual enrollment of high school students in Arizona community college: A status report*. Arizona State Board of Directors for Community College. Phoenix (ERIC Document Reproduction Service No. ED 423 930)

Richardson, R. M. (1999). *Community college and AP credit: An analysis of the impact on freshman grades*. A report prepared for the University of Arizona. Tucson, AZ.

Rosenbaum, E. E. (1998, September). *Unrealistic plans and misdirected efforts: Are community colleges getting the right message to high school students?* New York: Community College Research Center, Teacher College, Columbia University

Roth, J., Crans, G. S., Carter, R. L., Ariet, M., & Resnick, M. B. (1999). *Effect of high school course-taking and grades on passing college placement test.* Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Quebec, Canada. (ERIC Document Reproduction Service No. ED 428 817)

Southern Regional Education Board. (2003, January). *Fact book bulletin*. Atlanta, GA: Southern Regional Education Board.

Spurling, S., & Gabriner, R. (April 2002). The effect of concurrent enrollment programs upon student success at City College of San Francisco: Findings. City College of San Francisco, CA. Office of Institutional Development, Research, and Planning.

Tinto, V., Russo, P., & Kadel, S. (1994). Constructing educational communities: Increasing retention in challenging circumstances. *Community College Journal, 64,* 26-30.

Waits, T., Setzer, J. C., & Lewis, L. (2005). *Dual credit and exam-based courses in U.S. public high schools: 2002-03*. U.S. Department of Education. Washington, DC.

Windham, P. (1996). *What happens to community college dual enrollment students?* Paper presented at the Annual Conference of the Southern Association for Community College Research, Panama City, Florida, August 5-7, 1996. (ERIC Document Reproduction Service No. ED 398 950)

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