INSTRUCTIONAL STRATEGY PREFERENCES IN THE CAREER AND TECHNICAL EDUCATION CLASSROOM

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Abstract

Purpose: *This study determined the extent to which demographic characteristics, school and course context, and academic discipline predict instructional strategy use in the career and technical education classroom.* ***Method:*** *This study implemented a correlational research design using survey research.* ***Results:*** *Findings revealed—in comparison to business teachers—writing projects were significantly more likely to be used by family and consumer sciences (FCS) and health occupations teachers; active-learning assessments were significantly more likely to be used by FCS teachers; online activities were significantly less likely to be used by agricultural, FCS, trade and industry, and health occupations teachers; real-world activities were significantly more likely to be used by trade and industry teachers; and knowledge acquisition activities were more likely to be used by engineering/technology and trade and industry teachers.*

Introduction

Both career and technical education (CTE) and academic teachers face considerable challenges in the contemporary classroom environment. Prior research has indicated the most critical predictor of students' achievement is the effectiveness of the classroom teacher (Auguste, Kihn, & Miller, 2010; Banks, Cochran-Smith, Moll, Richert, Zeichner, LePage, et al., 2005). However, high poverty urban schools, which oftentimes house large numbers of ethnic and racial minority students, are most likely to struggle in terms of attracting quality and effective teachers (Auguste et al., 2010; Smith & Smith, 2006). CTE teachers such as trade and industry and health ccupations rely heavily on alternative pathways to teacher certification/licensure, which frequently include credit for work experience (Fletcher & Zirkle, 2010; Zirkle, Fletcher, Sander, & Briggs, 2010; Zirkle, Martin, & McCaslin, 2007). However, agricultural, business and marketing, and family and consumer sciences teachers usually require a traditional pathway leading to licensure/certification, including graduating from a formal teacher preparation program and earning a baccalaureate degree in their content areas. Further, contemporary classrooms are comprised of students from a wide array of learning orientations as well as ethnic, racial, and linguistic backgrounds which lead to culturally diverse CTE programs (Rehm, 2008; Rayfield, Croom,

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Stair, & Murray, 2011). Based on a study using data from the National Center for Education Statistics' Schools and Staffing Survey, in terms of diverse ethnic and racial backgrounds of U.S. students for the 2007-08 school year, 41% of students were of color, while only 16.5% of their teachers were from similar racial and ethnic backgrounds (Ingersoll & May, 2011). African American students are significantly more likely to participate in CTE and dual tracks compared with their White counterparts (Fletcher & Zirkle, 2009).

Beyond working with an increasingly diverse student population and having many trade and industry as well as health occupations teachers with less teacher training compared with academic teachers, CTE teachers are faced with expanded roles and responsibilities to ensure their students are equipped with a much broader range of skills—including those which make their students college and career ready (Bottoms, Egelson, Sass, & Uhn, 2013; Cannon, Kitchel, & Duncan, 2013). Among the varied roles and responsibilities of current CTE teachers are (a) fostering career development—equipping students with an understanding of a variety of employment opportunities that are available post high school; (b) preparing students to meet higher academic achievement standards through curricular integration, with subjects such as math and science, as well as equipping students with 21st Century workforce skills; and (c) updating curricula to reflect changing workforce demands (Bottoms, Egelson, Sass, & Uhn, 2013).

Because CTE teachers must prepare an increasingly diverse group of students in terms of ethnic and racial backgrounds, linguistic backgrounds, and learning needs, as well as assist students to meet higher levels of academic performance, it is important to understand what pedagogical approaches CTE teachers are implementing in their classrooms to accommodate their ever diverse student body and to make the content comprehensible and meaningful to an array of student learning needs. To that end, Rehm (2008) noted:

Existing trends and studies have indicated that CTE teachers in the twenty-first century must approach their teaching with sensitivity to students from diverse linguistic and cultural backgrounds, build cooperative and dialogical skills, teach essential knowledge to students with various levels of proficiency with English, and maintain industry and educational standards. Although these challenges can seem daunting, individuals and the nation will benefit if teachers assume them with awareness and understanding. (p. 49)

However, there is limited empirical research within the field of CTE related to the issue of how CTE teachers are adapting to the diverse needs of their students. In fact, McCaslin and Parks (2002) emphasized, "an inadequate knowledge base is available regarding what the career and technical education teacher does in the classroom" (p. 2). Very few studies have been conducted since 2002. This gap in the literature presents a timely opportunity to examine the instructional practices of current CTE teachers to uncover the signature pedagogies—the most pervasive instructional strategies implemented by CTE teachers—within the various

disciplines of the field, as well as discover which factors explain instructional strategy use.

Purpose and Research Questions

Accordingly, the purpose of this research study was (a) to identify the potential signature pedagogies within the various disciplines of CTE and (b) to explain instructional strategy use by teachers' demographic characteristics, course delivery modes, and academic disciplines. To meet these objectives, the following research questions were examined:

1. What are the potential signature pedagogies within the various disciplines of CTE?
2. To what extent do demographic characteristics (i.e., age, gender, race/ethnicity, years of experience, degree attainment, and prior teacher preparation), school and course context (i.e., class size, grade level, delivery format, and school community), and academic discipline (i.e., agricultural education, business and marketing education, and family and consumer sciences education) predict instructional strategy use?

Based on the purpose and research questions of this study, the next section describes the literature related to CTE teachers. More specifically, the review of literature examines CTE teacher challenges and issues in preparing CTE teachers.

Review of Literature

As indicated previously, current CTE teachers have a plethora of challenges to prepare their students for the new knowledge economy. One of the most effective ways for CTE teachers to adequately prepare students for the challenge of this new economy is to select appropriate and meaningful instructional strategies that will engage students.

CTE Teacher Challenges

One of the most important and difficult set of decisions a CTE teacher must make is how to deliver instruction—and make content comprehensible—to students in challenging and meaningful ways. Currently, teachers are increasingly becoming aware of the need to approach their teaching from a more learner-centered mindset instead of the more traditional teacher centered model, which has dominated instruction in both and higher education environments for decades (Lammers & Murphy, 2002). Teachers are encouraged to employ more active-learning strategies beyond simply having students listen to lectures and taking notes. Bonwell and Eison (1991) defined active-learning strategies as approaches

which "involve students in doing things and thinking about the things they are doing" (p. 2). In this learner-centered environment, students actively participate in the learning process and contribute to information and knowledge sharing in their courses.

Rehm (2008) found CTE teachers perceived challenges and difficulties–particularly with teaching students with limited English proficiency--with regard to building community and maintaining high standards for their culturally-diverse students. The educators also indicated a number of strategies they implemented when attempting to build community and increase standards. A number of strategies were identified, including teamwork, pairing students, sharing, laboratory projects, discussions, and applying content to the real-world. CTE teachers used hands-on practice, demonstrations, and visual aids to work with their limited English proficiency students. Rehm (2008) recommended teacher educators, curriculum specialists, and professional development leaders integrate practical experiences and strategies for addressing cultural and linguistic challenges.

Rayfield et al. (2011) studied how agricultural education—agriscience—high school teachers differentiate their instruction in the classroom. Interestingly, they found alternatively-licensed teachers were significantly more likely to tailor their instructions to meet diverse learning needs compared with traditionally-licensed teachers. Additionally, alternatively-licensed teachers were significantly more likely to use critical and creative thinking, as well as differentiated instructional approaches, group students based on learning needs, and use alternative instructional strategies when re-teaching. Rayfield et al. (2011) recommended teacher preparation programs focus on teaching their teacher candidates the principles of differentiated instruction.

Issues in Preparing CTE Teachers

Based on a national survey of CTE program chairs and teacher educators, Bruening et al. (2001) examined the status of 227 CTE teacher education programs from 164 higher education institutions. In addition to demographics and course delivery modes, Bruening et al. (2001) identified which instructional approaches were most frequently used. They found 83.2% of programs relied on traditional lectures or labs connected with student teaching internships, while 19% used the professional development school model. Designing meaningful instructional tasks based on real-world problems was identified as the most important critical competency needed by CTE teachers, and the second highest ranked competency was advancing student learning. Other competencies rated highly included integrating technology, teamwork skills, staying abreast of changes, and leadership skills. In regard to assessment skills needed, using authentic assessments and adapting programs for special needs' students ranked highest.

Similar to this study, Fletcher, Djajalaksana, and Eison (2012) surveyed 387 CTE faculty from the agricultural, business/marketing, engineering/technology, family and consumer sciences, health occupations, trade and industry, and workforce education disciplines to determine the most and least frequently used instructional strategies in higher education classrooms. The findings indicated that the instructional strategies used—in descending order of frequency—were interactive lecture, questioning, whole-group discussion, and guided practice. Question and answer methods using clickers, synchronous online lecturing, video creation, student-generated examinations and quizzes, and reflective blogs were the most infrequently used strategies. The researchers recommended further research examining instructional strategies used by CTE teachers.

Conceptual Frameworks

The concepts of differentiated instruction and signature pedagogies guided the conceptualization of this study. It is acknowledged that teachers should use differentiated instructional strategies to accommodate an increasingly diverse set of students (Rayfield et al., 2011). As such, this study was comprised of 34 instructional strategies for which participants were asked to identify their preferences in the context of implementation of a diverse set of pedagogical approaches. Additionally, Shulman's (2005) concept of signature pedagogies posited that different fields and disciplines rely on unique instructional strategies to emphasize concepts needed in their professions. To that end, this study sought to determine which instructional strategies are related to distinct disciplines within the field of CTE.

Differentiated Instruction

Similar to academic teachers, CTE teachers must attempt to prepare students from all sorts of backgrounds, including individuals who have psychological, social, emotional, and physical disabilities as well as academic or economic disadvantages (Rayfield et al., 2011). Gifted and general education students too need individualized instruction. To meet the needs of such varying learners, CTE teachers need to differentiate their instruction. The concept of differentiated instruction posits that instructional strategies should vary and be adapted based on the individual and diverse needs of students to maximize students' opportunities at success (Hall, Strangman, & Meyer, 2011). According to Hall et al. (2011), "to differentiate instruction is to recognize students' varying background knowledge, readiness, language, preferences in learning and interests; and to react responsively" (p. 3). Further, teachers must engage in informed decision making by selecting appropriate instructional approaches and resources based on lesson objectives and aligned assessment. Therefore, teachers must consider what content to teach, how best to teach it, and how to appropriately and accurately assess student proficiency

of the content learned while also paying close attention to their learners' readiness, interests, and learning preferences (Moon, 2005). However, little attention has been given in the field of CTE in terms of what instructional and assessment strategies teachers use to make the content comprehensible for the purpose of maximizing student learning.

Signature Pedagogies

It is quite likely that disciplines within the field of CTE–i.e., agriculture, business, family and consumer sciences, trade and industry–rely on different instructional approaches to prepare their graduates with the knowledge, skills, and dispositions needed to be successful within their content area. Shulman (2005) explained signature pedagogies are the unique but pervasive ways of teaching within a particular discipline or profession. He described the concept of signature pedagogies as:

> the types of teaching that organize the fundamental ways in which future practitioners are educated for their new professions. In these signature pedagogies, the novices are instructed in critical aspects of the three fundamental dimensions of professional work – to think, to perform, and to act with integrity. (p. 52)

Shulman discussed how signature pedagogies are the first pedagogies that come to mind when teachers are asked about the primary instructional approaches needed to adequately prepare their students for a particular profession. For example, having a senior physician teach by a patient's bedside while asking a group of interns about the symptoms and potential treatment options is the signature pedagogy in medical school. Shulman also explained a signature pedagogy should comprise three dimensions: surface structure strategies, which may be viewed at the time when teaching and learning takes place; deep structure strategies, used when the body of knowledge is being taught to prepare individuals in the profession; and implicit structure strategies, which are the moral dimensions which express professionalism within a profession.

Within the field of CTE, little is known of which instructional strategies teachers within individual disciplines rely on to make their content comprehensible to students preparing for their profession. Further, little is understood about the factors that contribute to the use of particular instructional approaches. Within that context, this study was undertaken to attempt to determine the signature pedagogies within the disciplines of CTE and to uncover the extent to which demographic characteristics, school and course context characteristics, and academic discipline explain instructional strategy use of CTE teachers.

Methods

The next section articulates the methods used in this study, specifically the research design, procedures, participants, data analysis, and instrumentation.

Research Design

This study implemented a correlational research design using survey research and inferential statistics. Specifically, factor analysis and simultaneous multiple regression analyses were performed to examine the research questions: (a) what are the signature pedagogies used by CTE teachers; and (b) to what extent do demographic characteristics (i.e., age, gender, race/ethnicity, years of experience, degree attainment, and prior teacher preparation), school and course context (i.e., class size, grade level, delivery format, and school community), and academic discipline (i.e., agricultural education, business education, and family and consumer sciences education) predict instructional strategy use.

Procedures

This study employed non-probability sampling (Ary, Jacobs, Razavieh, & Sorensen, 2006), specifically utilizing a purposive sampling procedure (as participants were required to be current P-12 CTE teachers and professional association members of the Association for Career and Technical Education to qualify for participation in this study). Online surveys using Survey Monkey were sent to a non-stratified sampling frame of 7,682 CTE teachers from the Association for Career and Technical Education professional association database. Of the 7,682 individuals who were sent e-mails, 6,979 were successfully delivered. Of the 6,979 e-mails delivered, 1,066 individuals opened their e-mails. Two follow-up emails were sent to non respondents. A total of 362 respondents completed the survey for a 30% response rate, which was calculated based on the 1,066 total of individuals who opened their e-mails. Cook, Heath, and Thompson (2000) found average response rates for Internet-based surveys ranged from 25% to 35%. Therefore, it is important to note that given the descriptive nature of this study, research findings can be generalized only to the 362 respondents in this study.

Participants

Demographics. All participants were currently teaching in a classroom setting in the United States. Of the total respondents, 61.9% were female and 35.9% were male. In terms of ethnicities, 84.8% were Caucasian, 8.0% were Black or African American, 2.5% were Multi-racial, 1.7% were Hispanic, 0.6% were American Indian or Alaska Natives, and 0.3% were Native Hawaiian or Other Pacific Islanders, as shown in Table 1. The average age was 50.

Professional Backgrounds. Participants had a range of credentials in terms of highest degree attained: 0.6% had a high school diploma or GED, 4.4% had an associate's degree, 23.8% had a bachelor's degree, 52.8% had a master's degree, 9.4% had an educational specialist's degree, and 6.9% had a doctorate. The average years of teaching experience was 18.6 years. In regard to current professional positions, 69.9% completed a traditional teacher preparation program, 22.7% completed an alternative licensure program, and 6.4% did not participate in an alternative licensure or teacher preparation program. Participants

also taught in a variety of settings: 57.7% taught in a comprehensive school, 23.8% taught in a CTE center, 3.3% indicated "other", 1.4% taught in an alternative school, 0.8% taught in a charter school, and 0.3% taught in a private school. With regard to school community, 42.5% taught in a small urban setting, population of 2,501 to 50,000; 25.4% taught in a rural setting, population of less than 2,500; 22.7% taught in a large urban setting, population 50,001 to 2 million; and 4.7% taught in a metropolitan setting, population greater than 2 million. With respect to disciplines in which the respondents taught, 26.2% taught business and/or marketing education, 21.5% were in family and consumer sciences education, 16.6% were in trade and industrial education, 9.1% were in engineering and/or technology education, 8.3% were in health occupations education, 8.0% were in agricultural education, and 8.3% indicated they were in other disciplines, as shown in Table 1.

Course Context. Participants taught at various levels: 85.9% taught high school, 12.4% taught middle school, and 0.3% taught elementary. In terms of delivery format, participants taught in the following modes: 92.0 % taught face-to-face, 4.7% taught online, and 2.2% indicated "other". With regard to class size, 18.0% taught classes with 1 to 14 students, 60.5% taught classes with 15 to 29 students, 14.9% taught classes with 30 to 49 students, and 2.2% taught classes with 50 or more students, as shown in Table 1.

Table 1

Characteristics of CTE Teachers and Course and School Contexts

Characteristics	*n*	%
Gender		
Female	224	61.9
Male	130	35.9
Ethnicity		
American Indian or Alaska Native	2	0.6
Asian	0	0.0
Black or African American	29	8.0
Hispanic	6	1.7
Multi-racial	9	2.5
White or Caucasian	307	84.8
Teacher Preparation		
Alternative	82	22.7
None	23	6.4
Traditional	253	69.9
Discipline		
Agricultural Education	29	8.0

Table 1 *(continued)*
Characteristics of CTE Teachers and Course and School Contexts

Characteristics	*n*	%
Business and/or Marketing Education	95	26.2
Engineering/Technology Education	33	9.1
Family and Consumer Sciences Education	78	21.5
Health Occupations Education	30	8.3
Trade and Industrial Education	60	16.6
Other	30	8.3
Highest Degree Achieved		
High School Diploma or GED	2	0.6
Associate's	16	4.4
Bachelor's	86	23.8
Master's	191	52.8
Educational Specialist's	34	9.4
Doctorate (Ed.D. or Ph.D.)	25	6.9
Course Level**		
Elementary (K-5th grades)	1	0.3
Middle School (6th-8th grades)	45	12.4
High School (9th-12th grades)	311	85.9
Delivery Format**		
Face-to-face	333	92.0
Blended/Hybrid	8	2.2
Online	17	4.7
Class Size		
1-14 students	65	18.0
15-29 students	219	60.5
30-49 students	54	14.9
50 or more students	8	2.2
Community (population)		
Rural (< 2,500)	92	25.4
Small urban (2,501-50,000)	154	42.5
Large urban (50,0001-2 million)	82	22.7
Metropolitan (> 2 million)	17	4.7

Table 1 *(continued)*
Characteristics of CTE Teachers and Course and School Contexts

Characteristics	*n*	%
Type of School		
Alternative school	5	1.4
Career center	86	23.8
Charter school	3	0.8
Comprehensive school	238	57.7
Private school	1	0.3
Other	12	3.3

Note. $n = 362$; **Participants were allowed to check one or more answers

Data Analysis

An exploratory factor analysis was conducted to examine the dimensions of the subscales for the purpose of validating the instrument. In addition, a simultaneous multiple regression analysis was performed to assess the significance of the model and the significance of the predictor variables in the model to respond to the research questions of this study. All data were analyzed using SPSS 20.0 software.

Instrumentation

A questionnaire was developed which consisted of 13 demographic and 54 items—with associated descriptions—targeting instructional strategies CTE teachers employ in their courses. To determine whether items on the questionnaire represented a comprehensive list of instructional strategies as well as captured areas the instrument was designed to measure, content validity was measured (Ary, Jacobs, Razavieh, &Sorensen, 2006; DeVellis, 2003) by a panel of six expert judges who were CTE teachers, CTE curriculum specialists, and CTE teacher educators. Based on the expert panel's recommendations, revisions were made to 11 items of the instrument accordingly. Further, construct validity was obtained for the instrument through the execution of exploratory factor analysis. Based on the factor analysis output, six factors emerged: *Writing and Conceptualization Projects*, *Active-Learning Assessments, Online Activities*, *Real-World Activities*, *Knowledge Acquisition Activities,* and *Teacher-Centered Activities*. With regard to frequency of instructional strategy use, the questionnaire was based on a 54-item six-point summated rating scale (1 = *never*; 2 = *rarely*; 3 = *occasionally*; 4 = *frequently*; 5 = *almost always*; and, 6 = *always*). Each instructional strategy was defined for the participants. The participants were able to point their mouse over the description and a definition appeared.

Writing and Conceptualization Projects Scale. As a result of factor analysis, nine items emerged, which were identified as *Writing and Conceptualization Projects.* These items included the following instructional strategies: concept/mind maps, short papers, original research proposals, literature reviews, minute papers, informal writing, annotated bibliographies, major writing projects, and brainstorming. Reliability was measured by using Cronbach's alpha for the *Writing and Conceptualization Projects* construct, which produced a coefficient of 0.85. The generally agreed upon rule for the lower limit of Cronbach's alpha is .70, although it decreases to .60 for exploratory factor analysis (Hair, Black, Babin, Anderson, & Tatham, 2006).

Active-Learning Assessments Scale. As a result of factor analysis, 17 items emerged which were identified as *Active-Learning Assessments*. These items included the following learning strategies: small group discussions, debates, student presentations, student-generated quizzes and exams, think/pair/share, role plays, case studies, lecture not comparison, film/video critiques, student attitude surveys, personal reflection journals, games, student peer assessments, cooperative learning, whole group discussions, video creations, and self assessments. Cronbach's alpha for the *Active-Learning Assessments* construct was 0.88.

Online Activities Scale. As a result of factor analysis, 13 items emerged that were identified as *Online Activities*. These items included the following learning strategies: online formative quizzes, online discussions, online collaborative projects, reflective blogs, synchronous online lectures, asynchronous online lectures, e-portfolios, computer-based learning exercises, games and simulations, background knowledge probes, self-directed learning, social networking, and podcasts/webcasts/YouTube videos. Cronbach's alpha for the *Online Activities* construct was 0.85.

Real-World Applications Scale. As a result of factor analysis, five items emerged that were identified as *Real-World Applications*. These items included the following learning strategies: field trips, service-learning projects, job shadowing/externships/internships, guest lectures, and school events. Cronbach's alpha for the *Real World Applications* construct was 0.81.

Knowledge Acquisition Activities Scale. As a result of factor analysis, six items emerged that were identified as *Knowledge Acquisition Activities.* These items included the following learning strategies: project-based learning, demonstrations, lab activities, student peer teaching, problem-based learning, and guided practice. Cronbach's alpha for the *Knowledge Acquisition Activities* construct was 0.76.

Teacher-Centered Activities Scale. As a result of factor analysis, five items emerged which were identified as *Knowledge Acquisition Activities.* These items included the following learning strategies: review sessions, quizzes, interactive

lectures, lecture, and questioning. Cronbach's alpha for the *Knowledge Acquisition Activities* construct was 0.66.

Based on the responses to the questionnaire, several findings emerged in response to the two research questions of this study. Next is an articulation of the findings presented based on each factor. In terms of discipline, business and marketing education served as the reference group because it constituted the largest group of participants.

Findings

Writing and Conceptualization Projects. A simultaneous multiple regression analysis produced a nonsignificant model to explain the implementation of writing and conceptualization projects in courses based on a linear combination of predictor variables ($R^2 = .11$, $F_{(26, 340)} = 1.46$, $p > .05$, as shown in Table 2. The regression model with 26 independent variables accounted for 11% of the variance in the use of writing and conceptualization projects by CTE teachers. Three independent variables significantly predicted teachers' use of writing and conceptualization projects: family and consumer sciences teachers were significantly more likely ($b = .34$; $p > .01$) to use writing and conceptualization projects in their courses compared with business and marketing teachers; health occupations teachers were significantly more likely ($b = .46$; $p > .01$) to use writing and conceptualization projects in their courses compared with business and marketing teachers; and teachers in career centers were significantly more likely to use writing and conceptualization projects compared with CTE teachers in comprehensive schools ($b = .32$; $p > .01$).

Active-Learning Assessments. A simultaneous multiple regression analysis produced a significant model to explain the use of active-learning assessments in courses based on a linear combination of predictor variables ($R^2 = .12$, $F_{(26, 340)} = 1.71$, $p > .05$, as shown in Table 2. The regression model with 26 independent variables accounted for 12% of the variance in the use of active-learning assessments among CTE teachers. Three independent variables were significantly related to the use of active-learning assessments in courses. These variables included the following: family and consumer sciences teachers were significantly more likely ($b = 0.28$; $p < .01$) to use active-learning assessments compared with business and marketing teachers; teachers who teach in face-to-face courses were significantly more likely ($b = .46$; $p < .05$) to use active-learning assessments compared with teachers who teach online courses; and teachers in career centers were significantly more likely ($b = 0.26$; $p < .01$) to use active-learning assessments compared with those in comprehensive schools.

Online Activities. A simultaneous multiple regression analysis produced a significant model to explain the use of online activities based on a linear combination of predictor variables ($R^2 = .19$, $F_{(26, 340)} = 2.74$, $p < .001$, as shown in Table 2. The regression model with 26 independent variables accounted for 19% of the

variance in the implementation of online activities in CTE teachers' courses. Five independent variables were significantly related to the use of online activities in courses: agricultural education teachers were significantly less likely ($b = -0.41$; $p < .05$) to integrate online activities within their courses compared with business and marketing teachers; trade and industry teachers were significantly less likely ($b = -0.34$; $p < .05$) to integrate online activities compared with business and marketing teachers; health occupations teachers were significantly less likely ($b = -0.39$; $p < .05$) to integrate online activities compared with business and marketing teachers; online teachers were significantly more likely ($b = 0.51$; $p < .01$) to use online activities compared with face-to-face teachers; and teachers in career centers were more likely to use online activities ($b = 0.26$; $p < .01$) compared with teachers who teach in comprehensive schools.

Real-World Activities. A simultaneous multiple regression analysis resulted in a significant model to explain the use of real world activities based on a linear combination of predictor variables ($R^2 = .19$, $F_{(26, 340)} = 2.74, p < .001$ as shown in Table 3. The regression model with 26 independent variables accounted for 19% of the variance in the use of real world activities in CTE teachers' courses. Four independent variables were significantly related to use of real world activities in courses: trade and industry teachers were significantly more likely ($b = 0.40; p < .05$) to use real-world activities compared with business and marketing teachers; the higher the degree attained ($b = 0.13$; $p < .05$), the more likely the teacher would use real-world activities; elementary teachers were significantly less likely ($b = -2.35; p<.05$) compared with high school teachers; teachers in career centers are significantly more likely ($b = 0.46$; $p < .001$) to use real-world activities in their courses compared with teachers in comprehensive schools.

Knowledge Acquisition Activities. A simultaneous multiple regression analysis resulted in a significant model to explain the use of knowledge acquisition activities based on a linear combination of predictor variables ($R^2 = .19$, $F_{(26, 340)} = 2.90$, $p < .001$, as shown in Table 3. The regression model with 26 independent variables accounted for 19% of the variance in the use of knowledge acquisition activities. Five independent variables were significantly related to use of knowledge acquisition activities in courses. These variables included the following: engineering and technology teachers were significantly more likely ($b = 0.43$; $p < .01$) to use knowledge acquisition activities in their courses compared with business and marketing teachers; trade and industry teachers were significantly more likely ($b = 0.37$; $p < .05$) to use knowledge acquisition activities in their courses compared with business and marketing teachers; Native Hawaiian or other Pacific Islanders were significantly more likely ($b = 1.63; p < .05$) to use knowledge acquisition activities compared with White teachers; face-to-face teachers were more likely ($b = 0.48$; $p < .05$) to use knowledge acquisition activities compared with online teachers; teachers in metropolitan areas were significantly more likely ($b = 0.60$; $p < .01$) to use

knowledge acquisition activities compared to those in rural areas; and teachers who taught in career centers are significantly more likely ($b = 0.21$; $p < .05$) to use knowledge acquisition activities in their courses compared to teachers in comprehensive schools.

Teacher-Centered Activities. A simultaneous multiple regression analysis resulted in a significant model to explain the use of teacher-centered activities based on a linear combination of predictor variables ($R^2 = .13$, $F_{(26, 340)} = 1.76$, $p < .01$, as shown in Table 3. The regression model with 26 independent variables accounted for 13% of the variance in the use of teacher centered activities by CTE teachers. Two of the independent variables were significantly related to use of teacher-centered activities. These variables included the following: African American and Black teachers are significantly more likely ($b = 0.32$; $p < .05$) to use teacher centered activities in their courses compared with White teachers; face-to-face teachers are more likely ($b = 0.66$; $p < .01$) to use teacher centered-activities compared with online teachers.

Table 2

Variables Predicting Instructional Strategy Use of Writing, Active-Learning, and Online Activities

Predictor	Dependent Variables								
	Writing and Conceptualization Projects			Active-Learning Assessments			Online Activities		
	b	*SE (b)*	*β*	*b*	*SE (b)*	*β*	*b*	*SE (b)*	*β*
(Constant)	2.05***	.45		2.35***	.38		2.64***	.40	
No Teacher Preparation Program[a]	.20	.20	.06	.32	.17	.12	.28	.18	.09
Alternative Licensure Program[a]	.03	.13	.02	.12	.11	.08	.22	.11	.12
Agricultural Education[b]	.03	.19	.01	-.06	.16	-.02	−.41*	.17	−.16
Family and Consumer Sciences Education[b]	.34**	.13	.18	.28**	.11	.17	−.25*	.11	−.14
Engineering/ Technology Education[b]	.20	.17	.07	.27	.14	.12	.21	.15	.08

Table 2 *(continued)*
Variables Predicting Instructional Strategy Use of Writing, Active-Learning, and Online Activities

Predictor	Dependent Variables								
	Writing and Conceptualization Projects			Active-Learning Assessments			Online Activities		
	b	*SE (b)*	*β*	*b*	*SE (b)*	*β*	*b*	*SE (b)*	*β*
Trade and Industrial Education[b]	−.02	.15	-.01	.02	.13	.01	−.34*	.14	−.17
Health Occupation Education[b]	.46**	.18	.16	.19	.15	.08	−.39*	.16	−.15
Years of Experience Teaching	.01	.01	.08	.01	.01	.14	.00	.01	.06
Gender[c]	.03	.12	.02	.12	.10	.09	.08	.11	.05
Age	.00	.01	−.06	−.01	.00	−.11	−.01	.00	−.10
Black or African American[d]	.14	.17	.05	.10	.15	.04	−.12	.15	−.04
American Indian or Alaska Native[d]	.21	.58	.02	.24	.49	.03	.51	.52	.05
Native Hawaiian or Other Pacific Islander[d]	.53	.82	.04	.21	.70	.02	−.07	.73	−.01
Hispanic[d]	.11	.34	.02	.18	.29	.03	.59	.30	.11
Highest Degree Attained	.01	.05	.01	-.02	.04	-.03	.01	.05	.01
Course Level Elementary[e]	−1.52	.87	−.10	−.83	.74	−.07	−.72	.77	−.05
Course Level Middle School[e]	.19	.14	.08	.10	.12	.05	.17	.13	.08
Delivery Face-to-Face[f]	.17	.25	.04	.46*	.21	.12	−.51*	.22	−.13
Class Size	.04	.07	.04	−.01	.06	−.01	.05	.06	.05

Table 2 *(continued)*
Variables Predicting Instructional Strategy Use of Writing, Active-Learning, and Online Activities

Predictor	Dependent Variables								
	Writing and Conceptualization Projects			Active-Learning Assessments			Online Activities		
	b	*SE (b)*	*β*	*b*	*SE (b)*	*β*	*b*	*SE (b)*	*β*
Small Urban Community[g]	−.02	.11	−.02	.02	.09	.02	−.08	.10	−.05
Large Urban Community[g]	.01	.13	.00	.05	.11	.03	.05	.11	.03
Metropolitan Community[g]	.32	.24	.09	.29	.20	.09	.04	.21	.01
Alternative School[h]	−.54	.41	−.07	−.16	.35	−.03	.44	.37	.06
Charter School[h]	−.79	.49	−.09	−.59	.42	−.08	−.49	.44	−.06
Private School[h]	−.23	.80	−.02	−.36	.68	−.03	−.56	.71	−.04
Vocational/ Technical (Career) School[h]	.32**	.11	.17	.26**	.09	.16	.26**	.10	.15
R^2	.11			.12			.19		
F	1.46			1.71*			2.74***		

Note. $n = 340$. * $p < .05$, ** $p < .01$, *** $p < .001$

[a]No Teacher Preparation and Alternative Licensure Program are dummy variables created for Teacher Preparation Program, in reference to the response Yes in Teacher Preparation program. The Yes in Teacher Preparation program was coded 0 and when selected, each other type of teacher preparation was coded 1..

[b]The Discipline variable responses were dummy coded in reference to the Business and Marketing Education. The Business and Marketing Education was coded 0, and when selected, each discipline was coded 1.

[c]Gender was coded 0 for male and 1 for female

[d]The Ethnicity variable responses were dummy coded in reference to the White or Caucasian. The White or Caucasian was coded 0, and when selected, each ethnicity was coded 1.

[e]Course level variable responses were dummy coded in reference to High School level. The High School was coded 0, and when selected, each level was coded 1.

[f]Delivery variable responses were dummy coded in reference to Online delivery. The online delivery was coded 0, and the Face-to-Face delivery was coded 1.

[g]Community variable responses were dummy coded in reference to the Rural Community. Rural community was coded 0, and when selected, each community was coded 1.

[h]The choices of type of school were dummy coded in reference to Comprehensive school. The Comprehensive school was coded 0, and when selected, each school type was coded 1.

Table 3

Variables Predicting Instructional Strategy Use of Real-World, Knowledge Acquisition, and Teacher-Centered Activities

Predictor	Dependent Variables								
	Real-World Activities			Knowledge Acquisition Activities			Teacher-Centered Activities		
	b	*SE (b)*	*β*	*b*	*SE (b)*	*β*	*b*	*SE (b)*	*β*
(Constant)	1.41**	.53		3.10***	.43		3.05***	.39	
No Teacher Preparation Program[a]	.15	.23	.04	.04	.19	.01	.18	.17	.07
Alternative Licensure Program[a]	.20	.15	.08	.08	.12	.04	.14	.11	.08
Agricultural Education[b]	.39	.22	.11	−.27	.18	−.10	−.02	.16	−.01
Family and Consumer Sciences Education[b]	.20	.15	.08	−.05	.12	−.03	−.14	.11	−.09
Engineering/ Technology Education[b]	.03	.20	.01	.43**	.16	.16	−.15	.15	-.06
Trade and Industrial Education[b]	.40*	.18	.15	.37*	.15	.18	.02	.13	.01
Health Occupation Education[b]	.24	.21	.07	−.19	.17	−.07	.13	.15	.05
Years of Experience Teaching	.01	.01	.07	.00	.01	.06	.00	.01	.05
Gender[c]	.21	.14	.10	.07	.11	.04	.01	.10	.01
Age	.01	.01	.06	.00	.01	.05	.00	.00	−.01
Black or African American[d]	.22	.20	.06	.12	.16	.04	.32*	.15	.12
American Indian or Alaska Native[d]	.75	.68	.06	−.46	.55	−.04	.03	.50	.00

Table 3 *(continued*
Variables Predicting Instructional Strategy Use of Real-World, Knowledge Acquisition, and Teacher-Centered Activities

Predictor	Dependent Variables								
	Real-World Activities			Knowledge Acquisition Activities			Teacher-Centered Activities		
	b	*SE (b)*	*β*	*b*	*SE (b)*	*β*	*b*	*SE (b)*	*β*
Native Hawaiian or Other Pacific Islander[d]	−.30	.97	−.02	1.63*	.78	.11	.18	.71	.01
Hispanic[d]	.46	.40	.06	.16	.32	.03	.44	.29	.08
Highest Degree Attained	.01	.05	.01	−.02	.04	−.03	.01	.05	.01
Course Level Elementary[e]	−1.52	.87	−.10	−.83	.74	−.07	−.72	.77	−.05
Course Level Middle School[e]	.19	.14	.08	.10	.12	.05	.17	.13	.08
Delivery Face-to-Face[f]	.17	.25	.04	.46*	.21	.12	−.51*	.22	−.13
Class Size	.04	.07	.04	−.01	.06	−.01	.05	.06	.05
Small Urban Community[g]	−.02	.11	−.02	.02	.09	.02	−.08	.10	−.05
Large Urban Community[g]	.01	.13	.00	.05	.11	.03	.05	.11	.03
Metropolitan Community[g]	.32	.24	.09	.29	.20	.09	.04	.21	.01
Alternative School[h]	−.54	.41	−.07	−.16	.35	−.03	.44	.37	.06
Charter School[h]	−.79	.49	−.09	−.59	.42	−.08	−.49	.44	−.06
Private School[h]	−.23	.80	−.02	−.36	.68	−.03	−.56	.71	−.04
Vocational/ Technical (Career) School[h]	.32**	.11	.17	.26**	.09	.16	.26**	.10	.15

Table 3 *(continued*
Variables Predicting Instructional Strategy Use of Real-World, Knowledge Acquisition, and Teacher-Centered Activities

Predictor	Dependent Variables								
	Real-World Activities			Knowledge Acquisition Activities			Teacher-Centered Activities		
	b	*SE (b)*	*β*	*b*	*SE (b)*	*β*	*b*	*SE (b)*	*β*
R^2	.11		.12		.19				
F	1.46		1.71*		2.74***				

Note. n = 340. * p < .05, **p < .01, ***p < .001

[a] No Teacher Preparation and Alternative Licensure Program are dummy variables created for Teacher Preparation Program, in reference to the response Yes in Teacher Preparation program. The Yes in Teacher Preparation program was coded 0 and when selected, each other type of teacher preparation was coded 1

[b]The Discipline variable responses were dummy coded in reference to the Business and Marketing Education. The Business and Marketing Education was coded 0, and when selected, each discipline was coded 1.

[c]Gender was coded 0 for male and 1 for female

[d]The Ethnicity variable responses were dummy coded in reference to the White or Caucasian. The White or Caucasian was coded 0, and when selected, each ethnicity was coded 1.

[e]Course level variable responses were dummy coded in reference to High School level. The High School was coded 0, and when selected, each level was coded 1.

[f]Delivery variable responses were dummy coded in reference to Online delivery. The online delivery was coded 0, and the Face-to-Face delivery was coded 1.

[g]Community variable responses were dummy coded in reference to the Rural Community. Rural community was coded 0, and when selected, each community was coded 1.

[h]The choices of type of school were dummy coded in reference to Comprehensive school. The Comprehensive school was coded 0, and when selected, each school type was coded 1.

Discussion

In comparison to family and consumer sciences as well as health occupation teachers, business and marketing education teachers were significantly less likely to use writing and conceptualization projects including concept/mind maps, short papers, original research proposals, literature reviews, minute papers, informal writing, annotated bibliographies, major writing projects, and brainstorming. This finding was rather unexpected and points to the need for understanding the unique disciplinary context of different program areas. It leads to the question of what makes family and consumer sciences and health occupation teachers use writing and conceptualization projects more than in the business and marketing classes. In business and marketing classrooms, there is a need for students to communicate effectively in writing. Therefore, understanding why family and consumer sciences and health occupation teachers are significantly more likely to integrate writing and conceptualization projects in their courses is critical.

When comparing family and consumer sciences education teachers and engineering and technology education to business and marketing education teachers, the business and marketing education teachers were significantly less likely to use active-learning assessments including small group discussions, debates, student presentations, think/pair/share, role plays, case studies, cooperative learning, and whole group discussions. This finding was quite unexpected as well. Again, it leads to the need for understanding the disciplines of family and consumer sciences and engineering and technology. Business and marketing students do indeed need to develop 21st century workforce skills, which requires group cooperation, interaction, innovation and the development of critical thinking and problem solving skills (Partnership for 21st Century Skills, 2010). Therefore, more research is needed to uncover the common practices of teachers within disciplinary contexts.

It was, however, not surprising to find business and marketing education teachers were significantly more likely to use online activities such as online quizzes, discussions, collaborative projects, blogs, asynchronous and synchronous lectures, portfolios, exercises, games and simulations, social networking, and podcasts/webcasts/YouTube videos compared with agricultural, trade and industry, and health occupations teachers. Similarly, Kotrlik and Redmann (2009) found business and marketing education teachers were stronger than agriscience teachers in the exploration, adoption, and integration of technology in their courses. Additionally, Kotrlik and Redmann (2009) found business education teachers were more likely to have a teacher computer with Internet at school and a computer lab for students. The finding that business and marketing teachers are using online activities is expected given the nature of the discipline and the charge for many business teachers to prepare students to use computer applications as well as computer programming for business as well as in postsecondary education.

However, trade and industry teachers were significantly more likely to use real-world activities such as field trips, service learning projects, job shadowing/externships/internships, guest lectures, and school events compared with business and marketing education teachers. This could be related to the connection trade and industry teachers might have with business and industry. For example, cosmetology and heating, ventilation, and air conditioning (HVAC) teachers are more likely to have frequent visits to local businesses as well as bring practitioners into their classrooms more often than business and marketing education teachers, particularly because trade and industry fields tend to be more specialized and focused on a certain industry compared with the exposure of a more broad array of careers within business and marketing.

Engineering and technology education and trade and industry teachers were significantly more likely to use knowledge acquisition activities—project based learning, demonstrations, lab activities, peer teaching, problem-based learning, and guided practice—in comparison to business and marketing education

teachers. In the case of trade and industry courses, this finding might be attributed to the nature of the fields within trade and industry as they essentially focus on applied, hands-on learning as well as laboratory work in comparison to business and marketing areas. Students in engineering and technology as well as trade and industry are oftentimes required to understand a large amount of highly technical material and will need to apply that knowledge through various learning strategies, such as demonstrations—to show they comprehend the content and are able to transfer it to a real-world project. With that stated, business and marketing education teachers can still use knowledge acquisition activities to check for student understanding of content and to ensure they are able to transfer their learning within a real-world setting.

In terms of school context, teachers teaching within career centers were significantly more likely to use writing and conceptualization projects, active-learning assessments, online activities, real-world activities, and knowledge acquisition activities in comparison to those teachers who teach in comprehensive schools. These findings point to the beneficial nature of students learning in career centers and indicate these teachers are engaging students in relevant and meaningful ways. Career centers typically provide students with real-world settings and co-curricular student organizations. Stated differently, students in career centers benefit from a workplace-like setting in which learners typically wear appropriate attire consistent with their work environment. For example, culinary arts students wear chef hats (toques) and clothing simulating a real working environment. Prior research using case studies has pointed to separate vocational schools as providing better quality programs for students compared with comprehensive schools primarily due to the greater depth of programming, having more experienced teachers, the priority they afford to vocational training, and their partnerships with business and industry (Weinsberg, 1983). Career centers typically have equipment needed to simulate the actual workplace setting. For example, students in auto mechanic programs work on actual cars in garages that simulate their work environment. Additionally, career center teachers often have strong advisory boards with community members as well as individuals from business and industry to offer guidance on the curriculum and to transform instruction to better reflect the demands of their fields. Forming partnerships with business and industry assists their students in gaining real-world experiences through activities such as field trips, job shadowing, and work based learning. Based on the findings of this study, teachers in career centers also rely on a variety of instructional approaches to maximize student learning. Thus, career centers might be a more promising schooling environment for students compared with comprehensive schools. On the other hand, comprehensive schools tend to deemphasize CTE course offerings and course taking and focus primarily on academic courses–particularly for White students (Oakes, Selvin, Karoly, & Guiton, 1992). Oakes et al. (1992) explained this situation within the context of comprehensive schools:

> At best the current context for high school vocational education is characterized by benign neglect of its programs and students and at worst by disdain for programs, teachers, and students. In either case, vocational programs are unlikely to receive school-level support or resources for program or staff development or to be perceived as offering exciting curriculum challenges to any but the least motivated and least skilled students. At the same time, these programs are likely to be the first casualties of resource constraints or changes in curriculum polices, and, with the possible exception of business courses, they are often perceived as appropriate only for students with serious academic or behavioral problems. (p. xi)

While research comparing career centers and comprehensive schools is dated, further research has not ensued on this topic. Therefore, a need exists for further research examining the benefits and disadvantages of teaching and learning in career centers compared to comprehensive schools.

It was surprising to find teachers' preparation for the field of teaching did not significantly impact their instructional strategy use. This finding was unexpected given the results of a prior agricultural education study that found significant differences between alternatively and traditionally-licensed teachers, with alternatively licensed teachers using critical and creative thinking strategies in their courses as well as whole group instruction (Rayfield, Croom, Stair, & Murray, 2011). On the other hand, traditionally-licensed teachers were more likely to use small group instruction, as reported in Rayfield et al.'s (2011) study. This finding certainly raises the question of whether teacher preparation influences the pedagogical approaches to which their teacher candidates implement in their future practice.

Implications for Future Research

It is important to note limitations to this study. First, this study did not use a random sample of CTE teachers. Therefore, the findings of this study can be generalized only for the 340 CTE teachers who chose to participate. This study was an initial attempt to identify potential signature pedagogies in the field of CTE. However, to be viewed as signature pedagogies (Shulman, 2005), research should include the following dimensions: (a) surface structure: the operational conduct in teaching and learning which can be viewed concretely; (b) deep structure: assumptions on how to transfer knowledge and practices of the field; and (c) implicit structure: moral aspects that include attitudes, values, and characters of the field. Thus, the present study should be viewed as exploratory in that it identified only which instructional strategies CTE teachers purport to use in their classrooms as well as assessed which demographic characteristics, school and course context, and academic disciplines predict instructional strategy use. Subsequent research will need to systematically explore the underlying deep and implicit structures of teaching CTE courses. This research would then assist

teachers in understanding why certain signature pedagogies are used in respective disciplines as well as how signature pedagogies relate to critical competencies of students in each discipline.

Further, qualitative research utilizing interviews and observations with selected CTE teachers is needed to study exemplary practices within the CTE disciplines. The selection of participants for such continuing studies can come from CTE teachers who might have been recognized and won teaching awards. Potential interview questions to investigate deep and implicit structures of their preferred pedagogies may include items exploring their fundamental assumptions: (a) what constitutes teaching excellence within the CTE field; (b) why teachers prefer to use specific instructional strategies for teaching their courses; (c) what instructional practices and strategies will maximize students' learning of essential CTE dispositions, knowledge, and skills; (d) what soft skills and ethical practices are most needed by CTE professionals in each discipline; and (e) how these soft skills and ethical practices can best be taught to CTE students.

Moreover, researchers need to better understand the pedagogical approaches and practices of teachers in career centers compared with those who teach in comprehensive schools. Observations; an examination of curriculum documents; and interviews with administrators, curriculum specialists, teachers, guidance counselors, students, and parents would be especially useful to compare the teaching practices between career centers and comprehensive schools.

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