**Determining Best Practices for the Integration of Academics in Career and Technical Education Programs at Career and Technical Centers**

by

Gary Dan Williams

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Approved by

Brian Parr, Chair, Associate Professor of Curriculum and Teaching
Gordon D. Patterson, Associate Professor of Curriculum and Teaching
David M. Shannon, Humana-Germany-Sherman Distinguished Professor of Educational Research and Evaluation
Donald R. Mulvaney, Associate Professor of Leadership Development, Growth and Development of Farm Animals

**Abstract**

The Southern Regional Education Board established the Technology Centers That Work (TCTW) in 2007. Since that time, the TCTW has sought to help Career and Technical Centers (CTCs) improve both the academic and technical skills of their students. By integrating academic concepts in the context of Career and Technical Education (CTE), learners become more prepared for college and career success.

TCTW promotes several key practices for school improvement which includes having high expectations, requiring students to complete rigorous CTE courses and college preparatory core academics, and requiring assignments that use research-based strategies and technology. Both academic and CTE teachers collaborate in order to make this experience worthwhile. The CTE studies must provide students access to intellectually challenging studies in high-demand fields that emphasize higher-level mathematics, science, literacy, and problem-solving skills needed in further education and in the workplace. Work-based learning that emphasizes real-world work experiences in the area of each student's career interest is also very important in the TCTW model.

Students and parents are involved in a guidance and advisement system that develops positive relationships and ensures completion of a CTE concentration with an approved sequence of at least four courses and an accelerated program of study. Each student is provided with an adult mentor who works with them to assist with setting goals, selecting courses, reviewing progress, and pursuing appropriate interventions as necessary. Students are provided with a system of extra help to assist them in completing accelerated programs of study with high-level

academic and technical content. Finally, a culture of continuous improvement is emphasized in the TCTW model through using student assessment, program evaluation data, technology center performance reports, program enrollment, retention and placement reports, college remediation reports, student follow-up reports, and advisory committee input to continuously improve school culture, organization, management, curriculum, and instruction to advance student learning.

TCTW recognizes bi-annually its member schools that achieve award-winning status with several distinctions which include TCTW Platinum High Achievement status, TCTW Gold Readiness status, the TCTW Gold Improvement Award, and the 15 Most Improved TCTW Centers. This study will identify integration practices that will help member TCTW schools as they seek to earn award-winning status.

This study will serve as an aid to CTCs across the country as they seek to improve their students' ability to apply academics in the context of real-world learning experiences in Career and Technical Education. This study identifies best practices of the integration of academic concepts in Career and Technical Education. Such information will be of great importance as Technology Centers That Work member schools seek to acquire award winning status which will put them among the best schools of their type in the nation.

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# Chapter 1

# Introduction

## Introduction and Background

It is crucial that the United States place an increased emphasis on workforce readiness. Today, we live in a global economy that is becoming increasingly complex and knowledge based. New participants must enter our nation's workforce, properly equipped with the applied skills and knowledge, if we are to remain competitive throughout the twenty-first century (The Conference Board, 2006). If high school students are to be sufficiently prepared for the workplace, sound critical thinking and problem solving must be instilled into modern CTE curriculum (Gordon, 2008).

Researchers have found high school students to be deficient in problem-solving and critical thinking skills. They generally agree that a curriculum that presents core academic subjects such as conceptual mathematics, science, and language arts in a more practical context allows students to grasp and value these important skills. Attention has been given to this issue throughout the years, yet there continues to be a problem. Ideally, the rigor of core academics should merge with the relevance of Career and Technical Education (CTE) (Stone, Alfeld, Pearson, Lewis, & Jenson, 2006).

Problem-solving and critical thinking deficiencies are also present in the CTE programs throughout the country. Students often have a difficult time synthesizing the math concepts studied and applied in practical situations. This is a problem not only for students' success in school, but also for their ability to use reasoning and critical thinking in their daily lives (Gordon, 2008).

Over the years we have created and nurtured a historically grounded dual-system of education, in which the core academics of mathematics, language arts, science, and social science have been completely separated from Career and Technical Education (CTE). These traditional structures have proven to be difficult if not incapable of reciprocal operation and collaboration with one another. Unfortunately, collegiality between these two groups is almost non-existent. This situation has been very problematic and our students have suffered because of these differences. These problems, in turn, have caused students to be ill-prepared for both higher-education and the workforce (Grubb, Davis, Lum, Philhal, & Moraigne, 1991).

Old mindsets about this dual-system are difficult to change. The current system frustrates on-going efforts to integrate academic content into the CTE curriculum.

> Vocational education and academic education have been growing apart at least since 1890; the split between the two is a deep one – one which affects content and purpose, teaching methods, teacher training and philosophy, the kinds of students in vocational and academic programs, and status. Healing this division is a difficult and time-consuming process (Grubb, et. al, 1991, p. 2).

**Statement of the Problem**

According to the Conference Board (2006), students are not prepared for the demands associated with applied academic skills in the workplace. The current generation of young Americans entering the workforce is not properly prepared for the challenges that await them. Business and industry leaders have become increasingly concerned about this growing problem. Many experts in the field propose that integrating mathematics, authentic literacy applications, and science concepts into the career and technical classroom will dramatically improve students' abilities to succeed in both higher education and in the workplace (The Conference Board, 2006).

**Theoretical Framework**

The theoretical framework for this research study was based on Dunkin and Biddle's (1974) model for classroom teaching (see Figure 1.1). Dunkin and Biddle's model is made up of the properties of teachers and learners. The model focuses on four major variable components: presage, context, process, and product. The arrows in the model represent contributory relationships (e.g., Teacher training experiences affect teacher behavior). The variable components in the model are placed in a particular order. The order also represents causative relationships (e.g., Teacher formative experiences affect and occur first or in conjunction with teacher training experiences) (Dunkin & Biddle, 1974).

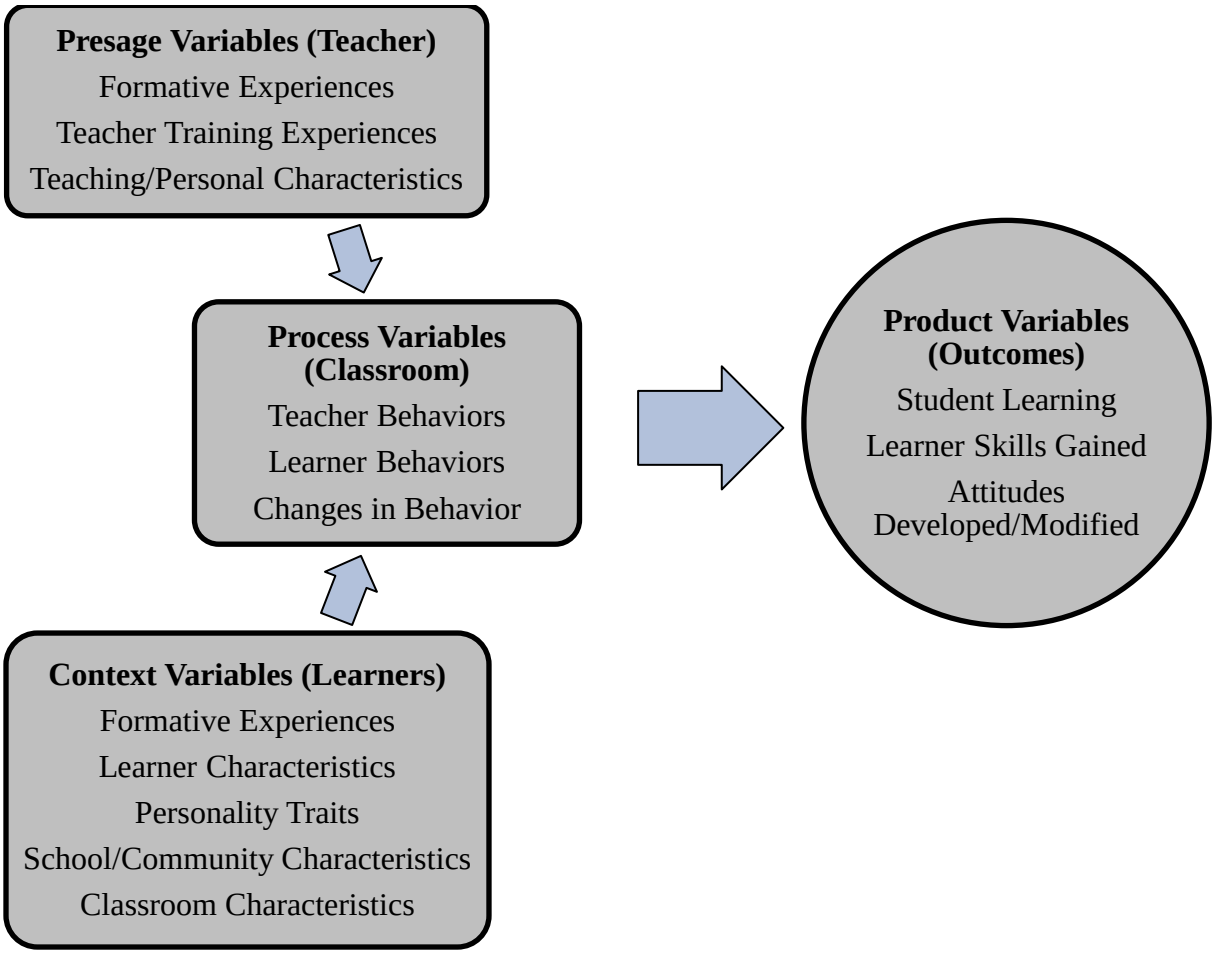



Illustration 1. A Model for Classroom Teaching (Biddle & Dunkin, 1974, p.38).

Presage variables will center on teacher characteristics and characteristics. These teacher variables consist of formative experiences, teacher training experiences (pre-service and in-service), teaching characteristics, and personal characteristics. Formative experiences are those experiences dealing with social class and other demographics such as age and gender. Teaching training experiences consist of preparatory programs which specifically deal with this study. Teaching characteristics represent teaching skills, styles, motivation, and confidence. Personal characteristics are personal traits and other characteristics such as psychological type, intelligence, and critical thinking ability. The presage variables affect the process variables (Dunkin & Biddle, 1974).

Context variables are concerned with learner experiences along with the many variables to which the teacher must adjust. The context variables include formative learner experiences, learner characteristics, personality traits, school and community characteristics, and classroom characteristics. Formative learner experiences represent gender, age, family, and social class but also include experiences such as coming from a stimulus rich or stimulus deprived home. Learner characteristics concern learner abilities (such as IQ), learning styles, and motivation. Learner personality traits represent personality styles. School and community characteristics deal with climate, school size, school classification size (based on school enrollment), and school setting and atmosphere (e.g., rural, suburban, and urban). Classroom characteristics concern class size (student to teacher ratio), curriculum, and even noise level. Context variables affect process variables (Dunkin & Biddle, 1974).

Process variables regard occurrences in the classroom. These are the actual activities that take place in the classroom. Process variables consist of observable changes in teacher and learner behaviors. Process variables concern teacher-learner interactions. Examples of

occurrences and behaviors in the classroom include classroom management techniques and a teacher's dislike for a particular student. Process variables affect product variables (Dunkin & Biddle, 1974).

Product variables are the last variable in Dunkin and Biddle's (1974) model. Product variables concern outcomes in the teaching and learning process. Product variables represent changes that occur in learners as a result of involvement in the classroom through interaction with the teacher and other learners. Product variables consist of student learning, learner skills gained, and attitudes developed and modified (Dunkin & Biddle, 1974).

This study examined the presage variables dealing with professional development efforts to prepare teachers for the implementation of integrating academic concepts into the CTE curriculum, teachers' mindsets concerning curriculum integration, and demographic information of the teachers such as age and gender. These variables were measured and determined by survey instrumentation.

The context variables measured in this study were learner, school, community, CTE program characteristics, curriculum, and classroom characteristics. These characteristics were measured by a researcher developed survey instrument.

Process variables were also measured in this study. These variables included the teaching of the material and teacher effectiveness levels. Teacher effectiveness, also known as teacher efficacy, is essentially the teacher's belief in his or her teaching abilities to perform typical teaching tasks. Teacher effectiveness was also measured by a researcher developed survey instrument.

Product variables were measured from the participating Technology Centers That Work schools' results from the 2012 High Schools That Work's Student Assessment and Teacher

Surveys. The TCTW award categories include Platinum High Achievement, Gold Readiness, Gold Improvement, and 15 Most Improved Centers. In order to obtain award-winning status, schools were required to meet criteria including high or increased mean scores in reading, mathematics, and science on the 2012 High Schools That Work Assessment. They must also have completed the recommended curriculum, attained the readiness goals, and attained guidance and advisement goals (SREB, 2012). This study determined what the 18 award-winning TCTW schools do differently to promote success when compared to the other 148 CTCs in the consortium. Using the Dunkin and Biddle model, this research study showed how the presage, context, and process variables of certain TCTW schools contribute to the product variables of obtaining award winning status in 2012.

**Purpose of the Study**

The purpose of this study was to create a consensus among award-winning Career and Technical Centers that are members of the Technology Centers that Work consortium regarding what constitutes best practices in the integration of core academic concepts into the CTE curriculum. These were also compared to non-award winning schools in order to determine what those schools did differently. These factors were used to determine if they are predictors for group membership as an award-winning TCTW school or comparison TCTW school. The end result may now be used as a formula for schools to employ as they strive to achieve an award-winning status. The information acquired from this research may be used by CTCs across the country to improve existing CTE curriculum for the boosting of student achievement.

In order to better prepare our youth for future success in a variety of careers, this study explored how the best practices of the integration of core academics into the Career and Technical Education curriculum has improved students' achievement.

Existing within the Technology Centers That Work (TCTW) network of schools are many curriculum integration practices that will benefit other Career and Technical Centers (CTCs) in our nation. This network, developed as a division of the Southern Regional Education Board's (SREB) High Schools That Work (HSTW) initiative, included 166 sites in 17 states in 2012. Founded in 1987, HSTW is a comprehensive school reform initiative that combines modern CTE studies and challenging academic courses to improve the achievement of high school students (Frome, 2001). According to SREB (2012), HSTW is the largest school improvement initiative in the country involving over 1,200 schools in 30 states and the District of Columbia.

The TCTW school improvement initiative, developed by SREB, has existed since 2007 and was designed to help schools review and implement the actions needed to produce high-demand, high-wage graduates who will be leaders in their selected careers. The SREB administers the HSTW academic student assessment and teacher surveys in the spring of even-numbered years. The academic assessment is given to a sample or the entire population of senior students at participating TCTW schools. This assessment evaluates students' competencies in mathematics, reading, and science. Students' ability levels are grouped as either below basic, basic, proficient, or advanced with the basic level being the minimum goal for all students to reach. Students who reach this level are considered ready for college level coursework without the need for remediation. Teachers at these schools are also surveyed bi-annually to determine benchmark areas (SREB, 2014).

**Research Questions**

Through the best practices of integrating mathematics, literacy, and science into the career and technical curriculum, this study answered the following research questions:

1. What were the selective demographics for award-winning and non-award-winning TCTW schools?
2. Do administrators from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools?
3. Do teachers from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools?
4. What factors did the CTE administrators and teachers at award-winning agree contributed to their success?
5. Could a predictive model be established that can predict group membership (award-winning TCTW schools and non-award-winning TCTW schools) using presage, process, context, and TCTW professional development.

**Null Hypothesis**

To test research questions one and two, the null hypothesis stated that there were no differences between the practices of award-winning TCTW schools and non-award-winning TCTW schools, specifically the presage variables (teacher variables), context variables (student variables), and process variables (classroom variables).

**Significance of the Study**

With the prevalence of a global economy, it is becoming increasingly important for the United States' workforce to be highly-skilled. More stringent demands are being placed on workers to be savvy at critical thinking and problem solving. This issue is a matter of national security as we look to remain a leader in economic prosperity in the years to come. The way we out-compete the world economically is by having the best trained workforce in the world. The

current state of secondary education in the United States has led us into teaching either conceptual knowledge or contextual knowledge. This approach will not be sufficient to maintain our status of having the largest economy in the world (The Conference Board, 2006).

The study identified best practices of integrated career and technical curriculum. The data was compiled and analyzed and can be utilized by various education entities which include state departments of education and SREB. The data may be utilized by local education agencies to implement the integration approach to boost student achievement which will lead to better trained students for the workforce and post-secondary education, an increase in high school graduation rates, and an increase in standardized test scores. Career and Technical Education will gain respect statewide for the many benefits it has to offer to students of all types of backgrounds, abilities, interests, and career goals.

**Limitations**

This study has few limitations:

1. For the award-winning group, data were only collected at the eighteen award-winning TCTW schools compared to a much larger comparison group of non-award-winning TCTW schools.
2. Since so few CTCs (approximately 166 out of 1000 CTCs nationwide) have adopted the Technology Centers That Work concept, this data may be limited.
3. Only 17 states in the country had schools that participated in the Technology Centers That Work schools consortium in 2012.

## Assumptions

The following assumptions relate to this study:

1. The responses to the survey instruments were truthful.
2. The responses to the survey were career and technical teachers and career and technical administrators at current Technology Centers That Work schools in the United States.
3. The data were entered correctly.

## Definitions

The following terms appear throughout this dissertation. This portion of the research document identifies and gives the definition to terms that are commonly used in career and technical education.

**Applied Skills**. Those skills which are based on cognitive abilities such as critical-thinking, problem-solving, as well as more social and behavioral skills, such as professionalism and work ethics. Applied skills also include oral communications, teamwork, and collaboration (Casner-Lotto & Barrington, 2006).

**Authentic Literacy**. Any activity that "real" readers and writers would do outside of a school setting (Authentic Literacy Instruction, 2014).

**Career Cluster**. A context for studying traditional academics, learning skills specific to a career, and providing schools in the United States with an organizing or restructuring curriculum structure, and focusing class make-up by a common theme such as interest. In the United States Department of Education model, 16 career clusters link to over 70 more specific career pathways with each having its own knowledge and skills requirements (Ruffing, 2006).

**Career and Technical Education (CTE)**. An educational program that provides learning experiences that help prepare students for employment, advanced education, and independent living. CTE provides opportunities to develop foundational skills such as basic skills, thinking skills, personal qualities, a common core of workplace competencies, and specific skill competencies required for occupational areas (Scott & Sarkees-Wirkcenski, 2008).

**Career Pathway**. A workforce development strategy used in the United States to support workers' transitions from education into and through the workforce. This strategy has been adopted at the federal, state, and local levels in order to increase education along with training and learning opportunities for America's current and emerging workforce (Ruffing, 2006).

**Chronbach's Alpha**. Also referred to as coefficient alpha, a formula which estimates internal consistency based on the relationship of how all items on a test relate to other items as well as to the total test (Gay, Mills, & Airasian, 2006).

**Common Core**. A set of high-quality academic standards in mathematics and English language arts/literacy (ELA). These learning goals outline what a student should know and be able to do at the end of each grade. The standards were created to ensure that all students graduate from high school with the skills and knowledge necessary to succeed in college, career, and life, regardless of where they live (Common Core States Standards Initiative, 2014).

**Contextual Learning**. Learning that involves students connecting the content with the context in which that content could be used (Berns & Erickson, 2001).

**Critical-thinking**. The ability to conceptualize, apply, analyze, synthesize, and/or evaluate information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action (Schriven and Paul, 1987).

**Curriculum**. An intentional design for learning negotiated by faculty in light of their

specialized knowledge and in the context of social expectations and student needs (Toombs and Tierney, 1991).

**Delphi Method**. A structured process for collecting and distilling knowledge from a group of experts by means of a series of questionnaires interspersed with controlled opinion feedback (Adler and Ziglio, 1996).

**High Schools That Work (HSTW)**. The nation's largest and fastest growing effort to combine challenging academic courses and modern vocational studies in order to raise the achievement of high school students. The HSTW program now has more than 1100 sites in 27 states (Scott and Sarkees-Wircenski, 2008).

**Integration of Academic and Career and Technical Education.** The combination of academic and career and technical philosophies, curriculum, and instructional strategies to form a single learning experience (Blank, Holmes, and Scaglione, 1992).

**Literacy**. The ability to read and write (Literacy, 2014).

**Mathematics**. The science of numbers and their operations, interrelations, combinations, generalizations, and abstractions of space configurations and their structure, measurement, transformations, and generalizations (Mathematics, 2014).

**Math-In-CTE**. A curriculum model that uses practical applications of mathematics instruction arising out of an authentic text. The model consists of a three-step process that guides students to make links between math concepts and the task or problem at hand: solving a real, relevant problem, practicing on several similar examples, and applying the concept to a more abstract problem, with core mathematics concepts taught within the context of real-world application in CTE (Stone et al., 2006).

**MAX Teaching Approach**. Motivation, Acquisition, and Extension, is an acronym for the three steps of the teaching framework that any teacher can use to help all students better learn their subject matter and to help improve the literacy skills of all students. The essential goal of teachers who use the MAX Teaching framework is to level the playing field by raising the bar for all students in a classroom environment through providing skill instruction that enable improved performance while engaging all students in active learning from textbooks and other forms of textual matter (Forget, 2004).

**Perkins IV**. The Carl D. Perkins Career and Technical Education Improvement Act of 2006 provided federal funding to secondary and post-secondary Career and Technical Programs. The Perkins Act extended through the year 2012 and provided more than $1.2 billion in federal support for CTE programs in all 50 states (Gordon, 2008).

**Post-secondary Education**. Formal education that occurs after high school (Alabama State Department of Education, 2006).

**Problem-solving**. Objectively identifying the causes of a problem and proposing potential, often creative solutions to the problem (The Quality Assurance Project, 2014).

**Southern Regional Education Board (SREB).** A nonprofit, nonpartisan organization founded in 1987 that established a vocational education consortium. A partnership of SREB states, school systems, and school sites launched the High Schools That Work (HSTW) initiative, which has become the nation's largest and fastest growing effort to combine challenging academic courses and modern vocational studies while raising the achievement of high school students across the nation (Scott and Sarkees-Wircenski, 2008).

**Smith-Hughes Act**. A legislative act that provided for the promotion of vocational education, cooperation with the states in the promotion of such education in agriculture and the

trades and industries, cooperation with the states in the preparation of teachers of vocational subjects, and in appropriation of money and regulation of its expenditure (Gordon, 2008).

**Technology Centers That Work**. A school improvement initiative of the Southern Regional Education Board (SREB) that was formed in 2007 to help United States' Career and Technical Centers review and implement the actions needed to produce high-demand, high-wage graduates who will be leaders in their selected careers (SREB, 2014).

**Workforce Development**. The coordination of school, company, and governmental policies and programs as a collective that enables individuals the opportunity to realize a sustainable livelihood and organizations the opportunity to achieve exemplary goals consistent with the history, culture, and goals of the societal context (Jacobs, 2002).

## Organization of the Study

Chapter 1 introduces the study and presents the problem, purpose, research questions, assumptions, limitations, and definitions of terms. Chapter 2 is a review of related literature concerning the integration of core academic concepts into Career and Technical Education. Chapter 3 reports the methods utilized in this study, including the population and sample, instrumentation, data collection, and the data analysis. Chapter 4 presents the findings of the study. Chapter 5 includes a summary of the study, conclusions, implications, and recommendations for further practice and research.

# CHAPTER 2

## Review of Literature

This literature review focuses on the effects of integrating academic concepts in mathematics, literacy, and science into the context of Career and Technical Education. The review consisted of eighteen main areas: (a) historical overview, (b) career clusters framework, (c) the need for a redesigned education system, (d) what is curriculum integration, (e) keys to success, (f) collaboration is essential, (g) stages of integration, (h) models of integration, (i) Math-in-CTE model, (j) reading: the key to all other learning, (k) literacy defined, (l) the MAX Teaching Approach, (m) benefits of an integrated career and technical curriculum, (n) Carl Perkins funding mandate, (o) barriers to integration success, (p) traditional vs. contextual, (q) Technology Centers That Work (TCTW) key practices, and (r) TCTW goals/conditions for continuous improvement. These areas enforce the need for this study by showing the tremendous potential for integrating academics into CTE curriculum.

### Historical Overview

#### Early formalized vocational education.

A system of youth apprenticeships was established centuries ago in which young people worked long hours for low pay in order to gain the skills needed for a successful career in the skilled trades (Kliebard, 1999). In the early 1800s, it was still common for young people to begin their career working as the apprentice to a master craftsman as a first step on the rung of the career ladder (Shinn & Briers, 2010). This form of education was the precursor to vocational education or Career and Technical Education (CTE) as it is now know. This early form of formalized career training prepared young workers for careers in skilled areas such as blacksmiths, farmers, cobblers, welders, and printers (Kliebard, 1999).

In response to the need to have vast numbers of skilled workers educated for the ever-increasing demands of the Industrial Revolution, formal vocational education began to be formulated in Europe in the 1800s. During that time, European elites typically wanted their children to be educated in the traditional liberal sense in order to pursue careers in law and theology, while the parents of middle class children typically wanted them to gain the necessary skills and credentials to help them attain careers in managerial positions or some type of civil service (Benavot, 1983).

**The evolution of career and technical education.**

Gordon (2008) gives us a timeline that explains how CTE has evolved in the United States over the years. As in Europe, the Industrial Revolution played a major role in affecting America's education system by spawning trade and technical job training for working class people in the early part of the nineteenth century. Gordon states five major periods occurred since then in the growth of CTE in America. These stages include

1. The application of power to machines at the beginning of the nineteenth century.
2. The introduction of the mass production of manufactured goods in the mid-1800s.
3. The influence of automation through multi-connected machines.
4. The miniaturization of electronic techniques.
5. Global networking and the technological explosion of the 1980s and 1990s.

Gordon (2008)

From its inception as a system of educating the lower class workers, CTE has evolved dramatically over the years to help prepare young people with the applied skills, such as critical thinking and problem-solving, needed for success in the modern workplace (Casner-Lotto & Barrington, 2006).

In the early part of the twentieth century, business and industry leaders, governmental leaders, and educational reformers began to join forces for the common cause of advocating for federal funding to establish school curricula to prepare young people for employment in fields such as agriculture, home economics, trade and industries, and commerce. After a decade of garnering support, the coalition of leaders was successful in making its desires known to the United States Congress (Gordon, 2008).

**Pertinent legislation.**

With the passing of the Smith-Hughes Act of 1917, federal funding to support vocational education, now known as Career and Technical Education (CTE), was established (Scott, 2008). With its passage, this law provided the basis both for the promotion of vocational education and its isolation from the rest of the curriculum in most school settings. The act called for a system of education, apart from the classical curriculum, that emphasized preparing children for working class jobs (Lynch, 2000). Although progress toward creating vocational education in the United States was well on its way prior to the passage of the Smith-Hughes Act, this milestone legislation standardized and provided funding for vocational education as a separate track of education, designed specifically to meet the educational needs of the working class in our country (Lazerson & Grubb, 2004; Wirth, 1980).

Over the next six decades, the act received several modifications, increasing the funding to expand programs to improve the areas of science, math, foreign languages, and to establish support programs related to helping national defense interests, reducing unemployment, assisting post-secondary workforce training efforts, assisting students preparing for occupations not traditional to their gender, and establishing work study programs (Gordon, 2008).

The Perkins-Morse Bill, also known as the Vocational Education Act of 1963 was passed, which ushered in a new era for vocational education. The purpose of this law was to provide all persons within a community with an opportunity to obtain access to vocational training and/or re-training in high-quality programs that best met their personal interests, abilities, and needs (Gordon, 2008).

The Carl D. Perkins Vocational Education Act was first authorized by the federal government in 1984 and reauthorized in 1990 and 1998 (Lynch, 2000). Named for Carl D. Perkins, a Democratic Kentucky congressman, the act sought to improve skills for the labor workforce and to better prepare special needs learners for career opportunities (Gordon, 2008). On August 12, 2006, President George D. Bush, signed into law the reauthorization of the act of 1998. The new law, entitled the Carl D. Perkins Career and Technical Education Improvement Act of 2006, brought similar funding allocations as in 1984 and 1998; however, there were significant changes in content and focus of CTE (ACTE & Brustein, 2006). With the passage of this revision, the term vocational education was essentially replaced with the term Career and Technical Education to adapt to the changing times.

**Two segregated curriculum tracks.**

The difficulty in infusing academic and CTE curriculum is a problem that has lingered for over a century due to legislation, established paradigms in school systems, and the traditions that have consequently separated vocational and academics into two distinctively different curriculums. This dual system of education is at the heart of the difficulty in integrating academics and CTE (Grubb, et al., 1991)

At that time, Charles A. Prosser, an administrator at Teacher's College, Columbia University, who authored the Smith-Hughes Act, and David Snedden, a powerful voice for the

social efficiency doctrine, were champions of progressive vocational education reform (Gordon, 2008). They advocated for a separate system of schools in which training programs prepared graduates for specific occupations. Wirth (1980) noted this important distinction made by Snedden: "Vocational education was designed to make an efficient consumer and liberal education was intended to train the efficient consumer" (p. 158).

With the passage of the Smith-Hughes Act in 1917, academic and vocational education students and curriculum were essentially segregated. This practice also led to specific programs being established within vocational education, which in turn led to further segregation according to the subject matter (Hayward & Benson, 1993).

There have always been two frames of education: academic and career technical in the secondary schools (Carter, 2001). Throughout the years, teachers have rarely exchanged ideas or teaching methods with colleagues. In 1990 the federal Carl Perkins Act provided funding to attempt to integrate academic and career technical education. According to Carter, the integration was never carried through correctly. CTE is now making an attempt not only to integrate academics into the curriculum but also to overcome these traditions in education that have been historically legislated, organized, and funded to operate as two separate systems (Grubb, et al., 1991).

Officials on both the state and national level are beginning to realize the great potential that CTE has to offer in transforming the American education system to meet the needs of our workforce demands, in transitioning students from secondary to post-secondary education, remediation, and in correcting the problem of too few graduating with a high school diploma (DeWitt, 2008).

In June 2000 the United States Department of Education Office of Vocational and Adult Education introduced the career clusters framework. The office identified 16 career clusters, which are career-related classifications with industry-based knowledge and skills sets that describe what students must know and be able to accomplish in order to attain success in a chosen field. The clusters were designed to help school systems address the academic and career needs of all students. Career pathways are sub-categories found within each of the 16 clusters. Each pathway gives a detailed outline of sequenced courses, both academic and career and technical, which students should take in high school in preparation for higher levels of education and more skilled positions in various career fields (Office of Vocational and Adult Education, 2003).

**Career Clusters Framework**

CTE has become more focused on infusing rigorous academic content, employability skills, and specific workplace skills sets into each pathway, since the implementation of the career clusters framework. This implementation brought about a major shift in the way CTE is structured. Specific technical areas are no longer the focus of the curriculum, but rather the 16 cluster areas (Ruffing, 2006). Academic and occupational skills sets are now organized though broad-based curricula that concentrates on a wide-array of inter-related occupational areas which include

**Career Clusters and Descriptions**

**Agriculture, Food & Natural Resources** The production, processing, marketing, distribution, financing, and development of agricultural commodities and resources including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

**Architecture & Construction** Careers in designing, planning, managing, building and maintaining the built environment.

**Arts, Audio Visual Technology & Communications** Designing, producing, exhibiting, performing, writing, and publishing multimedia content including visual and performing arts and design, journalism, and entertainment services.

**Business Management & Administration** Careers in planning, organizing, directing and evaluating business functions essential to efficient and productive business operations.

**Education & Training** Planning, managing and providing education and training services, and related learning support services such as administration, teaching/training, administrative support, and professional support services.

**Finance** Planning and related services for financial and investment planning, banking, insurance, and business financial management.

**Government & Public Administration** Planning and executing government functions at the local, state and federal levels, including governance, national security, foreign service, planning, revenue and taxation, and regulations.

**Health Science** Planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development.

**Hospitality & Tourism** Preparing individuals for employment in career pathways that relate to families and human needs such as restaurant and food/beverage services, lodging, travel and tourism, recreation, amusement and attractions.

**Human Services** Preparing individuals for employment in career pathways that relate to

families and human needs such as counseling and mental health services, family and community services, personal care, and consumer services.

**Information Technology** Building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support and management of hardware, software, multimedia and systems integration services.

**Law, Public Safety, Corrections & Security** Planning, managing, and providing legal, public safety, protective services and homeland security, including professional and technical support services.

**Manufacturing** Planning, managing and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering.

**Marketing** Planning, managing, and performing marketing activities to reach organizational objectives such as brand management, professional sales, merchandising, marketing communications and market research.

**Science, Technology, Engineering & Mathematics** Planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering) including laboratory and testing services, and research and development services.

**Transportation, Distribution & Logistics** The planning, management, and movement of people, materials, and goods by road, pipeline, air, rail and water, and related

professional and technical support services such as transportation infrastructure planning and management, logistics services, mobile equipment and facility maintenance. (Ruffing, 2006 p. 4-6).

**The Need for a Redesigned Education System**

A great need exists to redesign America's current educational system. Our students must be prepared in secondary schools for post-secondary education and the demands of the twenty-first century workforce. The manufacturing and technical workers of today need be highly trained, highly skilled, and highly creative as in no other time in history. Much like their counterparts in other settings, such as health-care facilities and laboratories, workers in technical fields are now "knowledge workers" who must constantly use critical thinking skills in order to complete workplace tasks. These workers must be able to comprehend complex processes and be able to foresee potential outcomes in order to prevent or solve problems that may arise. All of this must be done in a high-pressure environment. Therefore, high-level, multidisciplinary technical training is of utmost importance in the training of future workers. In order to produce students with the potential to become the type of skilled workers desired in industry, conceptual academics must be taught in the context of the modern workplace (NGA Center for Best Practices, 2010).

The way we evaluate teacher effectiveness is also questionable. According to Medley and Coker (1987, p. 14) in many cases there is a no real correlation between principals' judgments on teachers' effectiveness and the knowledge and skills attainment of students. Medley and Coker suggest that a principal's judgment has little to do with a teachers' ability to promote student achievement, therefore, these expert opinions may lack validity. If this truly is the case, we must create a better construct for evaluating teacher effectiveness.

## What is Curriculum Integration?

According to the Association for Supervision Curriculum and Development (2003), integration is a philosophy of teaching and learning that pulls together content from several subject areas as a means of focusing on one particular theme or topic. A school that has adopted the integrated academic and CTE approach will have certain characteristics. Integrated curriculum schools have teachers that work in teams, in order to develop inter-curricular goals, learning activities, and assessments rather than in isolation as traditional approaches would have it. The schools also incorporate a great deal of flexibility in the length of class periods, rather than the traditional forty-five minute blocks. Ideally both academic and CTE teachers are given common planning times in order to collaborate on developing curriculum. A strong emphasis is placed on developing the students' core skills in both academic concepts and CTE applications (Zirkle, 2004).

### Keys to success

To be successful with integrating occupational and academic skills, schools need support from the community. The approach must not be seen as a passing fad in education, but must be fully embraced by the stakeholders. Many CTCs that are successful with this curriculum have both CTE and academic teachers on staff and students that attend the school for the entire day (Zirkle, 2004).

Harwell (1998) attempted to identify which teacher traits would best determine the level of success in the science integration process. He stated that there was no correlation between the educational level of the teacher and the desire to integrate. In addition, no relationship was found between years of experience and desire to integrate. The main predictor of successful integration was determined by each teacher's set of personal beliefs and opinions toward the integration

process. Not surprisingly, the teacher's personal knowledge of the science subject matter proved to be a huge indicator toward the success of the program. The key for an administrator who wants to integrate science into the CTE curriculum is to affirm that the prospective teacher is interested and excited about the integration process (Harwell, 1998).

**Collaboration is essential**

If curriculum integration is accomplished as intended, teachers of both CTE and academics must be interested in working together. Academic and CTE teachers must work together to jointly support one another in delivering high-quality instruction that is of great benefit to the students. Administrators' provision of the required resources and support to make integration work is crucial. One way to support the efforts is to provide substitute teachers so that academic and CTE teachers can spend time planning together to find similar programs in other school systems to mimic, and to provide stipends for work that occurs outside of normal school time (Gibbs, 2006).

One study conducted by Schmidt, Finch, & Faulkner (1992) attempted to assist educators in determining their roles and responsibilities in the integration process. In this study, over 100 teachers were interviewed who had proven to be effective integrators. The common thread that seemed obvious was the level of teacher cooperation. CTE and academic teachers alike must first collaborate if they are to obtain an approved amount of success. Collaboration teams may include academic and CTE teachers in the same classroom teaching together (Schmidt, Finch, & Faulkner, 1992).

Also, if integration is to be successful, academic and CTE teachers must become very familiar with one another's curriculum. As one might imagine, this concept is often met with a sense of antagonism when parties realize that change is required. Yet, in time, when success is

accomplished together, the hostility is diminished or eliminated altogether. In time, both academic and CTE teachers begin to realize that each other's assistance and expertise is important (Schmidt, et al., 1992).

When teachers begin to build trust with one another, work together, and realize that they are on the same team, the next step in the process is developing the curriculum. Curriculum development with the integration concept requires CTE and academic teachers to change their teaching philosophy. With integration, all lesson plans, instruction, activities, assignments, and assessments must be mutually agreed upon by the academic and CTE teachers (Schmidt, et al., 1992).

### Stages of integration

Kisner (1998) believed that in order to be most effective, integration must occur in stages. The first stage of integration is for all stakeholders to be aware of the importance of integrating academic skills into the CTE curriculum. For CTE students to have success, they must have a strong academic foundation. The next stage is for CTE teachers to try their hand at determining how they can best implement curriculum enhancement techniques. This step should be done cautiously and deliberately so that teachers can develop their own personal integration strategies. Thirdly, CTE and academic teachers are to collaborate and plan together. This stage must begin with the CTE teacher. This key component has been emphasized by many researchers and outlined as a key component to success (Kisner, 1998).

## Models of Integration

McNeir (1994) encouraged others to implement an integration model after studying the findings of Schmidt and Grubb and combining them into a so called ladder of integration. This first rung in the ladder is referred to as basic infusion. This concept addresses integration at its

most basic level by giving students in CTE programs advanced academic knowledge. Experts differ on whether this step is effective or not. The second rung is advanced infusion. In this stage, academic teachers work with CTE teachers to integrate academics into the CTE lesson plan and throughout the curriculum. This technique has proven to be more effective than the first technique. Applied academics is the third rung of the ladder. At this point, academic teachers attempt to blend career and technical skills into academic classes. The team teaching approach between an academic and career technical teacher is the best way to perform this task. Curriculum alignment is the fourth rung. Curriculum alignment modifies both academic and CTE curriculum to teach the same content at the same time. The intended outcome of true crossover begins to take shape at this stage due to the occurrence of horizontal and vertical alignment of the curriculum (McNeir, 1994).

**Math-in-CTE model**

The first scientifically based curriculum integration study was called Math-in-CTE. This study was conducted from 2003-2005 to assist CTE teachers in implementing more explicit mathematics concepts in the occupational curriculum as necessary tools for solving workplace problems. This model was developed to improve students' math skills and to reinforce their general mathematics understanding (Stone, et al., 2006).

The seven-element pedagogic framework lays out a simple approach to developing lesson plans in the Math-in-CTE model. The key is to always begin with the CTE content and then extend the math concepts to other contextual examples and traditional examples. The seven elements are as follows:

1. Introduce the CTE lesson.

2. Assess students' math awareness as it relates to the CTE lesson.

3. Work through the math example embedded in the CTE lesson.

4. Work through related, contextual math-in-CTE examples.

5. Work through traditional math examples.

6. Students demonstrate their understanding.

7. Complete the lesson with a formal student assessment.

(Stone, et al., 2006).

Researchers attempted to capture the classroom experience and determine the reliability of the implementation process through the collection of data from multiple sources. These sources included observations, lesson plans, recorded videos, student work, teacher interviews, and teacher focus groups. Throughout the original Math-in-CTE study, direct input from the teachers was valuable in helping identify what made the integration work (Stone, et al., 2006). Researchers analyzed these data and generated five core principles supporting curriculum integration. These core principles of curriculum integration are

1. Develop a community of practice among the teachers and sustain it.

2. Always begin with the CTE curriculum, not the academic.

3. All must understand that academics are essential to workplace knowledge and skills.

4. Maximize the academics in the CTE curriculum.

5. Recognize that CTE teachers are not academic teachers but are teachers of academic content in CTE. (Pearson, D., Sawyer, J. Park, T., Santamaria, L. van der Mandele, E. Keene, B., Taylor, M., 2010, p. 15)

**Reading: The Key to All Other Learning**

The Conference Board (2006) concluded that young people entering the workforce have major problems with their writing skills. Around 27 percent of recent high school graduates are

considered deficient in basic writing skills such as syntax and spelling.

Twenty-six percent of American twelfth graders cannot read at a basic level and only 38 percent are considered to be proficient readers. Around half of students that completed the ACT are ready for college-level reading. The females out-perform males in all three reading tasks which include reading for information, reading for literacy experience, and reading to perform a task (NCES, 2010).

Reading is the gateway skill that provides learners the opportunity to learn all other disciplines. Students who become good readers are also normally able to write and speak well, are good problem-solvers, can analyze solutions, and develop a love for learning new things throughout their lives (Pearson, et al., 2010). Richard Ferguson, CEO of American College Testing said, "If students can't read well, we can't expect that they're going to do well in math and science courses" (Marklein, paragraph 2). While all of this is true, a great lack of instructional support for reading comprehension exists among CTE students. As students progress through school, literacy demands increase significantly, especially in many highly technical CTE courses (Pearson, et al., 2010).

The use of authentic text makes assignments more interesting and engaging for students. In CTE courses, students commonly read many different types of texts which include diagrams, charts, blueprints, and recipes. Oftentimes, a textbook presents ideas in large chunks of information while lacking these different text types. This effect does little to prepare students for the types of reading they will encounter in the workplace. Teachers may encounter less reading resistance from their students if text is presented in shorter bits of information, as in magazine or journal articles. Teachers should recognize the importance of providing a variety of sources of text that students will recognize as valuable and applicable to their lives. Students

will, in turn, willingly read, especially when they can make the relevance connection. CTE teachers can use these findings to engage students in reading in their courses (Pearson, et al., 2010).

If students find their reading assignments interesting and authentic to the CTE context, they tend to be more open-minded readers. Consequently, they likely make wiser choices in the focus area of their CTE concentration. Many students prefer to read in their CTE classes because the subject matter relates to their potential career choices and is therefore more relevant to their future (Pearson, et al., 2010).

**Literacy defined**

The National Assessment of Literacy identifies three main types of literacy which include prose literacy, document literacy, and quantitative literacy and attempts to define each (2007).

First, prose literacy is the "knowledge and skills needed to perform prose tasks (i.e., to search, comprehend, and use information from continuous texts) (The National Assessment of Literacy, 2007, p.2). Common styles of prose writing include expository, narrative, procedural, and persuasive. Reading and comprehending texts such as editorials, news stories, technical magazines, and instructional resources are examples of prose literacy tasks (Pearson, et al., 2010).

Document literacy is defined as the "knowledge and skills needed to perform document tasks (i.e., to search, comprehend, and use information from non-continuous texts in various formats)" (NAAL, 2007, p. 2). Completing job applications, developing schedules, and reading tables for a set of engine specifications are all examples of document literacy tasks (Pearson, et al., 2010).

Lastly, quantitative literacy is "knowledge and skills required to perform quantitative tasks (i.e., to identify and perform computations, either alone or sequentially, or using numbers embedded in print materials)" (U.S. Department of Education, 2007 p. 2). Examples of tasks that would be considered quantitative literacy include completing an order in a supervised experience and balancing a checkbook (Pearson, et al., 2010).

**The MAX teaching approach**

The MAX Teaching Approach, developed by Forget (2004), is now being infused into the newer TCTW Initiative through the work of the SREB. The HSTW network of schools and professional development model advocates the MAX Teaching Model as a framework for developing reading and writing skills in all courses. MAX is an acronym for **M**otivation, **A**cquisition, and e**X**tension, a three-pronged teaching concept. In the **M**otivation (before reading) stage the teacher essentially seeks to help lower student stress and improve on the likelihood that students experience success in reading. With the **A**cquisition (during reading) stage of the plan, students read silently and seek to develop a personal interpretation of the text. Lastly, in the e**X**tension (after reading) portion of the lesson, students join forces to formulate the meaning of the text through group discussion, writing activities, etc. (Pearson, et al., 2010).

As previously mentioned, the MAX model focuses on the periods before reading, during reading, and after reading. The first component, **M**otivation, is the focus during the before reading stage. During this stage teachers are to strive to make students feel comfortable with the text they are about to read. This is done by activating background knowledge, giving a specific purpose for the reading assignment, and lastly, building student interest in the assignment. In the next segment in the strategy, **A**cquisition, the student is guided through the reading strategy and assisted in organizing information he or she is reading in order to more effectively comprehend

the material. Finally, the **E**xtension component is utilized. After the reading assignment is completed, students are encouraged to discuss, reflect, and elaborate on their ideas from the reading. According to Forget, this stage helps students to utilize already developed social learning adaptations in order to improve reading skills (Forget, 2004).

> Use of authentic text was defined as teachers utilizing text that CTE students do or will encounter in their professional careers beyond high school, all in an effort to enhance the authenticity of CTE learning and to improve students' willingness to read. In essence, the use of authentic text in CTE provided a great starting point for implementing the literacy frameworks, without the students or teachers feeling like something new or additional was being added to the classroom instruction. Teachers who were interviewed discussed the use of authentic text as important to the CTE classroom. They felt that the students were motivated by the connections between the text with which they interacted and their current lives and future careers. (Pearson, et al., 2010 p. 37)

## Benefits of an Integrated Career and Technical Curriculum

### Relevance is experienced.

There are some challenges to the traditional curriculum approach in our schools. Many students lose interest when they perceive that their courses have little or no real-world relevance. Academic courses in mathematics, science, and language arts are frequently presented as totally separate from the CTE curriculum and as lacking a real world application (Dewitt, 2008).

In his report, Gibbs (2006) describes Kentucky's Corbin High School as an institution that exemplifies quality academic and CTE integration. He received acclaim from the Association of Career and Technical Education in its positional paper entitled Reinventing the American High School for the 21st Century. Integration became the main method in which

instruction was given. Corbin High, though many students there lived in poverty, soon became the shining star of the entire school district. The goal of the school was to prepare students for college and to enter the workforce directly. According to principal Joyce Phillips, the school made an effort to find a way to interest every student with something that would connect them with a pathway in education (Gibbs, 2006).

Gibbs (2006) went on to explain how the integration of academics into CTE helps students become more interested in school and in achieving success:

> In the Public Broadcasting Service documentary, "Making Schools Work," that aired in October 2005, Phillips says, "Twenty percent of the students will learn no matter what. Eighty percent need a hook--something that makes them wants to come to school and want to learn" (Gibbs, 2006, p. 24).

Gibbs (2006) also explained that

> Corbin's hook was connecting with each individual student through an Individual Graduation Plan (IGP), and making time spent with students focused, intentional and designed to provide multiple supports (Gibbs, 2006, p. 24).

Half the students were enrolled in the system's Career and Technical Center. The documentary explains that in this setting, students work on real-world projects, which is a key component in this school's success. Corbin began with the integration of academics and CTE with the IGP (Gibbs, 2006).

**Higher achievement.**

According to the Southern Regional Education Board, schools that placed a high emphasis on integrated academics and CTE programs have significantly higher student

achievement levels in science, math, and reading than schools that do not place an emphasis on the integration approach (Bottoms, Presson, & Han, 2004). As Hyslop (2007) explained,

> Integration of academic competencies into career and technical education curricula and of real-world content and applied methods and examples into traditional classes can raise student achievement levels and increasing understanding of rigorous content. (p. 40)

In 2005, the National Research Center for Career and Technical Education conducted a study entitled Building Academic Skills in Context: Testing the Value of Enhanced Math Learning in CTE. This study showed that a CTE program enhanced with math could significantly raise math test scores (Stone, et al., 2006). Through Hoachlander's (1999) study, he came to believe that CTE and academic curriculum should be integrated in order to increase student achievement. He also determined that the integration approach was especially useful for students who might lack interest and who have performed poorly with the traditional curriculum.

**Dropout prevention.**

The question of whether CTE can help students stay in school and earn a diploma is an old one. Kulik (1998) reviewed many major studies about the possible impacts of CTE on graduation rates from the 1960s until the early 1990s. In his research, he concluded that non-college bound students that participate in CTE are more likely to complete high school when compared to similar students that are not enrolled in CTE. A study by Bishop and Mane (2004) provided a summary statement concerning the power of CTE to positively impact the likelihood that participants will graduate high school:

> Career and technical education empowers students by providing students a range of learning opportunities that serve different learning styles. CTE relies on a powerful mode of teaching and learning that cognitive scientists call contextual or situated learning, both

> in classrooms and in workplaces. For many students, applying academic and technical skills to real-world activities, using computers and other tools, and being able to see how their learning is related to the world of work make CTE Classes more interesting and motivating, and more educationally powerful than standard academic classes. A career focus often gives students a sense of direction and motivates them to achieve and to stay in school. Practically inclined students can be hooked on academic learning through CTE study. Just having the option of being able to concentrate in CTE in high school results in more young people staying in school because more individually relevant choices are available to them. (Advisory Committee for the National Assessment of Vocational Education, 2003, p. 2)

Plank, S., DeLuca, S. and Estacion, A. (2005) suggested that as CTE courses are added to students' curriculum up to the ratio of one CTE course per two academic courses, the risk of dropping out of school is reduced significantly. Their report, entitled Dropping Out of High School and the Place of Career and Technical Education, suggested that mixing CTE and academic courses effectively lowers the drop-out rate because students are offered the proper balance of experiences that can promote and encourage them on a path to success in their future. The study also says that high risk students enrolled in CTE courses are eight to ten times more likely to earn a high school diploma than high risk students enrolled in general education courses alone. Also, the evidence showed that a quality CTE program can produce students that have higher attendance rates and better course passing rates (Plank, et al., 2005).

**Workforce development.**

Gruis (2002) explained that most human resource managers from various sectors of business and industry stress the importance of attracting employees who excel in science, math,

and communication skills. They believe that employees with such an understanding of academic skills are best suited to succeed in a quickly changing workplace. Most human resource managers will hire an individual with a strong academic background regardless of his or her technical skill over someone with highly technical skills with little academic background. The academically-advanced individual is assumed to be raw material that can quickly be molded to a successful, long-lasting employee who needs little supervision. NGA Center for Best Practices, (2010) makes the following statement concerning the methods CTE often uses:

> Technical education often takes place in a classroom environment. Instructors are often teaching material (or utilizing equipment) that is outdated or somewhat irrelevant. . . . It requires excellent critical thinking and problem-solving skills in a pressure-packed environment on the factory floor, the hospital wing, or wherever the work takes place. (NGA Center for Best Practices, 2010, p. 10)

**Stronger collegiality.**

Gibbs (2006) explained the collegiality benefits from the integration of academics into CTE. When we as educators are aware of the big issues in education and focus on what is best for students, we cannot help but get involved in these types of activities. Academic teachers must realize that taking advantage of the knowledge, expertise, and resources of their technical education counterparts can not only make learning more meaningful for students, but can also make their job easier and more rewarding! When technical teachers partner with academic counterparts to develop an awareness of what students must know to be successful in the world of work, they gain a greater appreciation for their academic peers, and students become the real winners. Most industries employ a team approach to

their manufacturing processes; the same approach could very well work in education (Gibbs, 2006, p. 28).

Benefits available to teachers include the following: each discipline becomes stronger on its own merit, mutual respect increases among CTE and academic teachers, teaching skills are improved, teachers expand their abilities to implement challenging teaching and learning strategies, and enthusiasm and motivation for teaching increases. The fact that the integration approach may cause more work than traditional teaching techniques cannot be denied, yet the teacher benefits alone outweigh the added work (Lankard, 1993).

In the Math-in-CTE model, academic math teachers are surprised by the depth and amount of math embedded in CTE courses. They are also pleased to finally be able to provide an answer to the age-old question, "Why do I need to learn this?" CTE teachers also gain confidence in their newly found abilities as well as a new appreciation for the math teachers who helped them learn the language of academic math and math in the workplace (Stone, Alfeld, Pearson, Lewis, & Jensen, 2007).

A CTE teacher working with a math teacher will have more effectiveness than either will when working alone. Also, if that teacher is able to work well with several others who are focused on wanting to integrate academics and CTE, the effect will increase tremendously. Therefore, there is a great need to develop communities of practice in order to repeat successes (Stone, et al., 2007, p. 69).

"In their follow-up study, Lewis and Pearson (2007) shared this thought:

The teachers connected their participation in the study to the goal of improving the mathematics skills of their students. They developed learning resources that made mathematics tangible and useful to their students. As they worked together to develop

and improve these lessons, a community of practice emerged within each of the five occupational areas that motivated and supported their efforts and encouraged mutual accountability (p. 6)."

## Carl Perkins Funding Mandate

The Carl D. Perkins Vocational and Technical Education Act (referred to as Perkins IV) required the integration of rigorous and challenging academics and career and technical education (Hoachlander, 1999). As many from the Baby Boom generation leave the workforce, a new report finds that the incoming generation are deficient in many needed workplace skills which include the three "R's" of core academics and applied skills such as critical thinking, problem solving, teamwork, and communication. High school and college graduates alike must master essential academics and applied skills if they are to succeed in the modern workplace (The Conference Board , 2006). The new economy requires not just white-collar workers but also workers with outstanding technical skills and highly developed problem-solving abilities. These workers will be the backbone of tomorrow's prosperity (NGA Center for Best Practices, 2010).

## Barriers to Integration

### Dual system.

The historically grounded dual system of education frustrates current efforts to integrate curriculum and instruction into CTE programs. The endeavor to integrate academics and Career and Technical Education curriculum together, though very desirable, challenges the education establishment and stands in stark contrast to longstanding traditions. Many people still have fixed in their minds the image of vocational education as an inferior educational tract as compared to the rigor of the academics tract (Pearson, et al., 2010).

**Integration is difficult work.**

Integration is a hard, time-consuming task, and it requires individuals who may have been perceived as enemies in the past to work together as teams. There are several reasons that integration is so difficult. First, an integration activity must accomplish an important, well-defined educational objective if it is to be effective. Next, though some perceive that effective integration depends on simply identifying work-related applications of academic knowledge, much more than that is required. Third, finding authentic applications that really excite students, day after day, week after week, is difficult for any teacher. Integration in constructing an effective curriculum that helps students master academic concepts in CTE is time-consuming as well (Hoachlander, 1999).

The SREB (2009) states that there are many hurdles on the pathway to creating secondary schools that infuse career and technical studies with challenging academic studies. To fully implement such a model and not just its components is necessary, or the stakeholders in the reform may consider the model not to be working and may encourage those that are resistant to change to hold out for a return to the status quo. The academy concept, recommended by the SREB, requires dividing large schools into small ones, designing flexible schedules, and preparing teachers to use academically integrated CTE assignments. The recommendation may make for a difficult transition. With this concept, schools must also seek to bridge deep divides that may exist between various school programs and teachers with different professional experiences, certifications, and mindsets (The Southern Regional Education Board, 2009).

Other stakeholders' interests may also present a barrier to implementing change. The support for the change must be present from parents, business and industry leaders, and community members alike, if success is to be achieved. Schools that plan on implementing a

blended academic and CTE curriculum must understand that any agreements with local community colleges for articulated or dual-enrollment credit may be threatened (SREB, 2009). Johnson, Charner, and White (2003) stated that the integration of academics into CTE requires flexibility on the part of administrators, students, teachers, and the entire school community. Reshuffling full academic schedules and reallocating resources can create discontentment in the minds of those who are the most resistant to change.

**Biases.**

At the core of the multiple-pathways model, we find the belief that all students can master complex academic concepts and occupational applications when taught in the proper learning environment. This opportunity gives students a wide array of both post-secondary education and career options upon high school graduation. Due to deep-seated biases toward certain racial, ethnic, genders, or classes of people, traditional views of human intellectual potential may be challenged by such a concept (SREB, 2009).

**Teacher anxiety.**

Change may also be difficult for both CTE and academic teachers. Either group may want to protect their status, resources, and time. Academic teachers may fear that this improvement in Career and Technical Education may negatively affect a college preparatory program and may cause the value of a liberal arts education to be lessened. Some CTE teachers may feel that resources for their skills-specific program will be in jeopardy (SREB, 2009). As McLeod (2000) put it, "Turf wars may arise over concerns about maintaining the integrity of course content (p. 58)."

Taylor (2001) found that academic and occupational skills integration is one effective way to increase student knowledge. She also found that many CTE teachers believed the practice

to be complicated, time-consuming, and not their responsibility. Her findings conclude that many CTE educators believed that integration could be effective but would require more time and effort than they could afford.

Other problems have been recognized in the teacher collaboration process. Sometimes, academic teachers fail to perform as well when they perceive that the CTE administrator is committed to integration and the other administrators are not. Obviously, if the integration plan is to succeed, all administrators must be committed for the long haul. Also, measurable outcomes of the integration effort with attainable short-term goals must be clearly stated to teachers, students, parents, business and industry leaders, and community members (Schmidt, et al., 1992b).

Professional development agreements with third party groups can also cause problems if not properly directed. If teachers feel that they are being taught things that they already know, they will resent the efforts. Non-CTE administrators must also be careful to avoid directing instruction of basic academic skills toward CTE teachers during professional development sessions. Additionally, many CTE teachers perceive the guidance counselors are poorly informed about career technical offerings. Observations by administrators should be done cautiously to insure that actual changes in instruction are occurring. Another obstacle of teacher collaboration is that some teachers are not committed to the changes being implemented. Administrators must provide planning time for CTE and academic teachers (Schmidt, et al., 1992b).

An important question is yet to be answered: Does the principle of maximizing the academic opportunities in CTE diminish the value of CTE? At what point does the infusion of academic content into CTE courses begin to lessen the value of the CTE content? Researchers will continue to engage in this question as they study curriculum integration and present tested

models for implementation (Pearson, et al., 2010).

As Herbert (1995) has shown, students are able to learn more effectively through experiential learning than traditional techniques. The students are able to retain more information when they are engaged in hands-on activities.

Levels of academic performance have not been raised through the use of traditional teaching methods. Certain education experts want to do away with CTE instruction altogether, even though they are working hard to aid academic educators (Lozada, 1999). Lozada believed that the key to this problem lies in integrating science and mathematics into CTE.

Most students have difficulty learning through primary teaching methods. For the majority of high school students, traditional teaching methods, geared toward preparing students for "standardized tests of recall, facts, formulas, terms, definitions, sequences, dates, and short answers to objective questions – all of which have an absolute 'correct' answer are boring and ineffective in helping students to retain what is being taught" (Lynch, 2000, p. 35).

CTE teachers, in contrast, have engaged students for many years in active action oriented learning activities such as typing, automotive technology, agricultural education through supervised farm projects, and cooperative education. In addition, CTE must pay more attention to theory, concepts, and the "why," not just the "how," in planning instruction throughout the curriculum (Lynch, 2000).

**Traditional vs. Contextual**

According to Lynch (2000), the University of Georgia compared the "old fashioned," traditional approaches of teaching and learning to the contextual learning approach. The traditional way in which curriculum is delivered is described as "passive, dependent learning"

while the newer contextual approach focuses on "highly active, engage learning." The following table compares the traditional and the contextual approaches.

**Table 1**

Traditional Teaching and Learning vs. Contextual Teaching and Learning

| Traditional Teaching and Learning | Contextual Teaching and Learning |
|---|---|
| Students are passive recipients. | Students are actively engaged. |
| Students regard content as having no relevant application. | Students view learning as relevant |
| Students work in isolation. Peer review and/or discussion is absent. | Students learn from one another through cooperation, discourse, teamwork, and self reflection. |
| Learning is abstract and theoretical. | Learning is related to "real world": and/or simulated issues and meaningful problems. |
| The teaching is considered the sole arbiter of student learning. | Students are encouraged to take responsibility to develop and monitor their own learning. |
| Little or no consideration is given to the experiences and backgrounds of the students. | Appreciating students' diverse life contexts and prior experiences is fundamental to learning. |
| Students expected to wait and become involved in social improvement. | Students are encouraged to become active participants in the improvement of society. |
| Learning is assessed in a singular, standardized format. | Student learning is assessed in multiple ways. |
| Students' perspectives are not solicited or are undervalued. | The perspectives and opinions of students are valued and respected. |
| Teacher controls and dictates all aspects of instructional environment. | Teacher acts as facilitator of learning. |
| Teacher displays a limited repertoire of teaching techniques: primarily lectures and recall questions. | Teacher employs a variety of appropriate teaching techniques. |

| | |
|---|---|
| The learning environment is routine and predictable. | The learning environment is dynamic and exciting. |
| There is overreliance on rote memorization in approaches to teaching and learning.<br>Little risk and experimentation in approaches to teaching and learning are evident. | High-order thinking and problem solving are emphasized.<br>Students and teachers are prepared to experiment with new approaches; creativity is encouraged. |
| Assimilation of content is considered singularly important. | The process of learning is as important as the content that is learned. |
| Learning occurs in one setting (i.e., the classroom). | Learning occurs in multiple settings and contexts. |
| Disciplinary content is taught in isolation. | Knowledge is interdisciplinary and extends beyond the boundaries of conventional classrooms. |
| Teacher is viewed as the primary source of knowledge. | Teacher accepts his or her role as a learner. |
| Students have limited opportunities to transfer understandings to new situations or contexts. | Learning in multiple contexts allows students to identify and solve problems in new contexts (transfer). |
| Teacher is the primary source of source of knowledge – the authority. | Teacher brokers knowledge and learning experiences. |

Lynch (2000, p. 63-64)

**TCTW Key Practices**

The TCTW has identified a set of key practices that contributes significantly to the improvement of student preparedness for college and future career success. According to TCTW, these key practices include

**High Expectations:** Motivate more students to meet high expectations by integrating high expectations into classroom practices and giving students frequent feedback.

**Program of Study:** Require each student to complete a plan of study leading them to complete a true concentration in an approved sequence of at least four career-technical

(CT) courses and an upgraded academic core leading to preparation for post-secondary studies and a career.

**Academic Studies:** Teach more students the essential concepts of the college-preparatory curriculum by encouraging them to apply academic content and skills to real-world problems and projects within their CT studies.

**CT Studies:** Provide more students access to intellectually challenging CT studies in high-demand fields that emphasize higher-level mathematics, science, literacy, and problem-solving skills needed in the workplace and in further education.

**Work-Based Learning:** Enable students and their parents to choose from programs that integrate challenging high school CT studies and work-based learning and are planned by educators, employers and students.

**Teacher Collaboration:** Provide cross-disciplinary teams of teachers the time and support to work together to help students succeed in challenging CT and academic studies. Integrate reading, writing and speaking as strategies for learning into all parts of the curriculum, and integrate mathematics and science into CT classrooms.

**Students Engagement:** Engage students in CT and academic classrooms in rigorous and challenging assignments using research-based strategies and technology.

**Guidance:** Involve students and their parents in a guidance and advisement system that develops positive relationships and ensures completion of a CT concentration with an approved sequence of at least four courses and an accelerated program of study. Provide each student with an adult mentor who works with them throughout high school to assist with setting goals, selecting courses, reviewing progress, and pursuing appropriate interventions as necessary.

**Extra Help:** Provide a structured system of extra help to assist students in completing accelerated programs of study with high-level academic and technical content.

**Culture of Continuous Improvement:** Use student assessment, program evaluation data, technology center performance reports, program enrollment, retention and placement reports, college remediation reports, student follow-up reports and advisory committee input to continuously improve school culture, organization, management, curriculum and instruction to advance student learning (SREB, 2014).

## TCTW Goals/Conditions for Continuous Improvement

According to the SREB (2014) website

> The mission of TCTW is to create a culture of high expectations that motivates students to make the effort to succeed in school. To achieve this mission, TCTW has set several goals for continuous improvement.

**Table 2**

**TCTW Goals for Improvement**

| |
|---|
| Increase the percentage of career-technical (CT) students who meet college and career-readiness goals to at least 85 percent. |
| Increase the percentages of technology center graduates who complete a career/technical concentration and enter post-secondary studies or employment within the field for which they were prepared. |
| Increase the percentage of high school students who enter the technology center and graduate on time to 95 percent. |
| Advance state and local policies and leadership initiatives that sustain a continuous school improvement effort. |
| Work with middle grades schools to guide students in creating programs of study that consist of courses that prepare students for high school and technology center courses. |
| Increase annually the percentage of students leaving the technology center with postsecondary credit or having met standards for post-secondary studies. |

| |
|---|
| Increase annually the percentage of technology center high school graduates that pass an approved industry certification examination. |

(SREB, 2014)

# CHAPTER 3 METHODS

The objective of this study was to determine best practices for the integration of academics in Career and Technical Education programs at Career and Technical Centers. The researcher obtained permission from the Institutional Review Board (IRB) at Auburn University to use responses of human subjects for this study. The protocol, an information form, and a copy of the survey instruments were forwarded to the IRB for approval prior to conducting this portion of the study. The board reviewed the protocol and granted permission to the researcher on February 28, 2014. In order to accomplish this objective, answers to the following questions were sought:

## Research Questions

The researched addressed the following research questions in this study:

1. What were the selective demographics for award-winning and non-award-winning TCTW schools?
2. Do administrators from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools?
3. Do teachers from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools?
4. What factors did the CTE administrators and teachers at award-winning agree schools contributed to their success?
5. Could a predictive model be established that can predict group membership (award-winning TCTW schools and NOT award-winning TCTW schools) using presage, process, context, and TCTW professional development.

## Purpose of Research

The purpose of this research study was to develop a consensus among leading secondary CTCs in the United States on the best practices of integrating academics into the CTE curriculum. By obtaining a consensus, a contemporary view of the best practices employed within CTE from the perspective of CTE administrators and CTE teachers has been established.

Furthermore, this research revealed how the best practices for integrating academic concepts into CTE compared with the concepts in the broader field of traditional academic and traditional CTE curriculum. In addition, the relationship between these selected CTE administrators' and CTE teachers' opinions regarding curriculum integration best practices were compared. The researcher used the award-winning group as expert participants to weigh the findings. The award-winning group consisted of the CTE administrators and teachers at each of the 18 award-winning TCTW schools. The comparison group was made up of the CTE administrators and CTE teachers at TCTW schools that did not obtain award-winning status.

## Research Design

In 2012, the TCTW consortium was comprised of 166 schools in 17 states in our country. The researcher sought to obtain participants from all of these schools. Since the research study is quasi-experimental in nature, the results are not generalizable to any other group or situation (Ross & Shannon, 2008).

In Round One, the researcher attempted to survey the entire population of schools, all 166 schools in the TCTW consortium that participated in the 2012 High Schools That Work Assessment. Administrators were invited to participate in the study and asked to forward the invitation to the Career and Technical faculty at their schools. A link to the round one survey was

provided in the email invitation. The surveys were handled through the Qualtrics operating system.

A quantitative survey design using a researcher-developed questionnaire was used to collect data for the first round of this study. The questionnaire was designed by examining the review of related literature in integrating academic concepts into the CTE curriculum. In this round of surveys, differences in practice were shown between award-winning TCTW schools and non-award-winning TCTW schools.

The data from this survey were then used to create a construct of best practices through review of CTE administrators' and CTE teachers' opinions of curriculum integration at their schools. The study then tested the best practices, through the use of a survey instrument in which the two group's responses were compared. The responses were then ranked based on the importance of the proposed best practices.

In Round Two, a modified Delphi technique was used to address the consensus of experts about best practices for the integration of academics into CTE at award-winning TCTW schools. Due to the extensive review of related literature in the proposal, a modified Delphi technique was used. This allowed the researcher to use the factors already identified in the literature review and move on to a second round Delphi. The expert participants consisted only of the CTE administrators and CTE teachers at the 18 TCTW award-winning CTCs.

Due to the exploratory nature of this study, a baseline was established for future research in this area. Central to the Delphi method is the notion that the "statistical aggregate of several individual judgments is more accurate than the judgment of random individuals" (Woundenberg, 1991, p. 131). The logic behind the method is that a consensus among a panel of experts is more likely to identify future needs than each expert individually.

Using a group of expert participants adds to the reliability and validity of the responses generated from the second round of the Delphi. In the second round of the Delphi, the questionnaire showed agreed-upon practices by the expert participants in order to show best practices for the integration of academics into the CTE curricula.

Utilization of the Delphi method seeks to develop a consensus within a group of people on a particular issue without bringing the subjects in personal contact with each other (Akers, 2000). According to Linstone and Turnoff (1975), "the Delphi technique may be characterized as a method for structuring a group so that the process is effective in allowing a group of individuals, as a whole, to deal with complex problems" (p. 13).

**Subject Selection**

For the award-winning group, the population for this study was award-winning schools (Platinum High Achievement Award, Gold Readiness Award, Gold Improvement Award, and the 15 most improved CTCs) that are a part of the TCTW consortium, a forum of the Southern Regional Education Board (SREB). CTCs that are a part of the HSTW initiative have a common purpose: to provide high-quality CTE studies to high school students. Students may attend these centers for only a portion of the school day, week, or year, or they may attend full time, receiving both academic and technical instruction at the center (SREB, 2012).

Student achievement data in this study was based on Technology Centers That Work schools' success on the HSTW Assessment in 2012 and responses from teacher surveys. Seniors at these schools are tested toward the end of the spring semester on even-numbered years (2008, 2010, 2012, etc.). The HSTW Assessment consists of three separately-timed sections which include a reading test, a mathematics test, and a science test.

Content on the reading test includes informational texts, literary nonfiction texts, and the cognitive targets include locating/recalling and integrating/interpreting questions. The content on the mathematics test includes number properties and operations, measurement/geometry, data analysis, statistics and probability, and algebra. In addition to assessing students' understanding of the math content, the questions assess what level (low, moderate, or high) math problems these students can solve. The science test content includes life sciences, physical sciences, and earth/space science. In addition to assessing students' abilities with this content, the science test determines how well students identify science principles, use science principles, use scientific inquiry, and use technological design (SREB, 2014).

**Instrumentation**

As previously mentioned, the research study was quantitative in nature. The independent variables (IV) are contributors to TCTW schools becoming either award-winning or non-award-winning schools. The dependent variables (DV) were award-winning and non-award-winning schools, which produced dichotomous results.

The extent to which a data collection instrument measures what it is supposed to measure is an indication of validity. The validity of the instrument was determined by asking a group of experts, CTE administrators in Northwest Alabama, to assess for content validity. This group indicated that the instrument was easy to understand and asked some very thoughtful questions. Necessary modifications were made to the instrument before the next step occurred.

In order to accurately describe best practices of curriculum integration, questions from the following categories were formulated:

1. Describe how to properly prepare CTE teachers to become affective curriculum integrators through pre-service and in-service experiences (presage variables)

2. Describe how to properly prepare learners to improve achievement through curriculum integration (context variables).
3. Describe how to properly integrate core academic concepts into CTE curriculum for maximum student achievement (process variables).
4. Describe which TCTW professional development opportunities each participant had been involved with.

From the reviewed related literature of curriculum integration, a questionnaire consisting of questions in each of the four categories (a total of 39 questions) previously mentioned were developed for the panel. In addition, questions concerning demographics and specific TCTW professional development that had been attained were asked. These questions were validated by a panel of faculty members from Auburn University. Frequencies, percentages, and rankings were used to produce levels of agreement which summarize the responses in this round.

The panel was then asked to rate these factors primarily on a four-point Likert-type scale with 1= strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree on most questions. This scale was be used to determine each panel member's level of agreement on each statement in the three primary categories. The Likert scale was developed to assess people's attitudes toward a certain subject (Leedy & Ormrod, 2005). A four-point Likert scale is an excellent way to help determine a subject's behavior, attitude, or interests. The four choices of strongly disagree, disagree, agree, and strongly agree made this instrument an appropriate choice for this type of research (Leedy & Ormrod, 2005).

The researcher determined a priori that only those factors which reached 80 percent consensus from the participants would be used as factors when developing instrumentation for the future studies. The researcher used concepts from Dillman's Tailored Design Method

(Dillman, 2007) to solicit responses. The prescribed steps in this model were followed by the researcher in order to achieve a high response rate in study participants. This method as presented by D.S. Dillman seeks for researchers to achieve an 80 percent return rate for internet surveys. The Tailored Design Method is based on sound research principles and confirms that when attention is paid to administrative detail, high response rates can be achieved from difficult subjects.

**Data Collection**

Each participant was contacted and informed about the purpose of the study. Each participant had the choice of whether or not they wanted to participate in the study. There were 13 CTE administrators and 63 teachers that participated in the award-winning group, along with 66 CTE administrators and 69 teachers that participated in the comparison group (non-award-winning). All surveys were delivered through an email link to the Qualtrics system.

The first round of survey questionnaires were sent to the participants in March 2014. First, a link to a questionnaire was sent by e-mail to each of the 166 selected administrator participants. The link contained specific instructions to the respondent: a means of not participating in the study if they wished not to, and a method of submitting the completed survey. Also contained in the initial e-mailing was an information letter which clearly described the purpose of the study and explained why the potential participant's opinion was being sought.

Fifty participants responded out of 166 in the first round for a 30 percent response rate. Frequencies, percentages, and rankings were used to produce levels of agreement which summarized the responses in this round.

**Non-Respondent Follow-Up**

The first contact to potential survey participants was a pre-notice email that was sent on Friday, March 7, 2014. The second contact was an email containing the information letter and the survey questionnaire link. This was sent out on Tuesday, March 11th. Next, a thank you/reminder was emailed to all original potential participants. In this notice, the researcher thanked those who had completed the survey and reminded the others to do the same. On April 8th, four weeks after the original email survey link was sent, the researcher sent another information letter and replacement link to the survey to those who still had yet to complete the surveys. On May 6, the researcher sent the last notice, along with a live survey link to all who had still not completed the survey. This last notice was done exactly eight weeks after the original survey link was sent to all potential participants.

Table 1 describes the independent variables and dependent variables for the five research questions. The data analysis for each research question is also given in the table.

**Data Analysis**

In round one of the survey, the data was compiled in order to address each of the research questions. Research question one. What were the selective demographics for award-winning and non-award-winning TCTW schools? Data from this question was analyzed to determine the characteristics of the participants which included current position, gender, age, college education, teaching experience, and experience as a high school student.

Research question number two asked, do administrators from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools? The data from this research question was examined to determine the mean scores of both the award-winning and the non-award-winning

administrators. By using a four-point Likert scale with 1 = strongly agree, 2 = agree, 3 = disagree, and 4 = strongly disagree, the researcher was able to rate each group's perceptions on how well integration variables are implemented at their schools. The smaller the mean scores originally showed a more positive response. The values on this scale were recalculated by reversing the scores when presenting this information in the research study, therefore the reader will need to take notice the higher the mean scores, the more positive the response. The data was also examined by a mixed ANOVA.

The data produced from the responses to the TCTW professional development sessions question was examined by a chi-square analysis. Each administrator, award-winning and non-award-winning, had their TCTW professional development experiences compared to determine if there was a significant difference.

Research question number three. Do teachers from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools? The data from this research question was examined to determine the mean scores of both the award-winning and the non-award-winning teachers. By using a four-point Likert scale with 1 = strongly agree, 2 = agree, 3 = disagree, and 4 = strongly disagree, the researcher was able to rate each group's perceptions on how well integration variables are implemented at their schools. The smaller the mean scores originally showed a more positive response. The values on this scale were recalculated by reversing the scores when presenting this information in the research study, therefore the reader will need to take notice the higher the mean scores, the more positive the response. The data was also examined by a mixed ANOVA.

The data produced from the responses to the TCTW professional development sessions question was examined by a chi-square analysis. Each teacher group, award-winning and non-award-winning, had their TCTW professional development experiences compared to determine if there was a significant difference.

Research question number four. What factors did the CTE administrators and teachers at award-winning schools agree contributed to their success? The data from the responses to this question were examined through the use of the modified Delphi. With this model, both groups of participants from award-winning schools were asked to rank integration variables in each of the following categories: presage, process, and context. The researcher then presented the top-ranked variables in each of these categories as the best practices for integration of academics in Career and Technical programs at Career and Technical Centers.

Research question number five. Could a predictive model be established that can predict group membership (award-winning TCTW schools and NOT award-winning TCTW schools) using presage, process, context, and TCTW professional development? This question was examined by analyzing the responses from participants to determine if there was a significant difference of the integration practices of presage, process, and context at award-winning and non-award-winning TCTW schools.

**Table 3**

**Data Analysis**

| Research Questions | IV(s) | DV | Analysis |
|---|---|---|---|
| RQ1. What were the selective demographics for award-winning and non-award-winning TCTW schools? | Type of School<br>Educator role<br>Type of Best Practice | Perceptions of best practice | Characteristics of the demographics |
| RQ2. Do administrators from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools? | Type of School (award or non-award winning) | Professional development participation | Comparison of Means<br>Mixed ANOVA<br>Chi-Square analysis |
| RQ3. Do teachers from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools? | Type of Best Practice (presage, process, context) | TCTW Award recognition | Comparison of Means<br>Mixed ANOVA<br>Chi-Square analysis |
| RQ4. What factors did the CTE administrators and teachers at award-winning agree schools contributed to their success? | Type of Best Practice (presage, process, context) | TCTW Award recognition | Delphi |
| RQ5. Could a predictive model be established that can predict group membership (award-winning TCTW schools and NOT award-winning TCTW schools) using presage, process, context, and TCTW professional development? | Type of Best Practice (presage, process, context) | TCTW Award recognition | Logistic regression |

TCTW recognizes bi-annually its member schools that achieve award-winning status with several distinctions which include TCTW Platinum High Achievement status, TCTW Gold Readiness status, the TCTW Gold Improvement Award, and the 15 Most Improved TCTW Centers. This study will identify integration practices that will help member TCTW schools as they seek to earn award-winning status. Table 4 describes these award categories and the criteria for each.

**Table 4**

2012 TCTW Award Winning Sites and the 15 Most Improved Centers

| **TCTW Platinum High Achievement Centers Criteria** |
|---|
| TCTW site |
| At least 85 percent of students met one or more readiness goal |
| At least 85 percent of students completed one or more parts of the recommended curriculum |
| School is classified as a high implementation site |
| At least 50 percent of students indicated that they experienced an intensive emphasis on quality CTE studies |
| At least 45 percent of students indicated that they experienced an intensive emphasis on guidance and advisement |
| At least fifty students completed the 2012 HSTW Assessment (or at least 75 percent of the senior class if it is fewer than 60 seniors) |
| Member of the TCTW network in 2010 or prior. |

## TCTW Gold Readiness Award Criteria

TCTW site

At least 75 percent of students met one or more readiness goal

At least 75 percent of students completed one or more parts of the recommended curriculum

At least 45 percent of students experienced an intensive emphasis on quality CTE studies

At least 45 percent of students experienced an intensive emphasis on guidance

At least 40 percent of career/technical students experienced a rigorous CTE (comprised of indicators from the emphasis on integrating academic content and skills into CTE courses index and emphasis on quality CTE studies index)

At least fifty students completed the 2012 HSTW Assessment (or at least 75 percent of the senior class if it is fewer than 60 seniors)

Did not earn TCTW Platinum High Achievement Award in 2012

## TCTW Gold Improvement Award Criteria

TCTW site

Increased mean score in reading, mathematics and science by at least ten points from 2010 to 2012

At least thirty percent of career/technical students experienced a rigorous CTE (comprised of indicators from the emphasis on integrating academic content and skills into CTE courses index and emphasis on quality career/technical studies index)

Participated in both the 2010 and 2012 HSTW Assessments

Over 50 students completed 2012 assessment (or at least 75 percent of class if class is fewer than fifty)

Did not earn TCTW Platinum High Achievement or Gold Readiness Award in 2012

Increased mean score in reading, mathematics, and science from 2010 to 2012 on the HSTW Assessment

## TCTW Gold Improvement Award Criteria

Participated in both the 2010 and 2012 HSTW Assessments

Population assessed both years is comparable

# Chapter 4

## RESULTS

The major purposes of this quantitative study were to (1) determine perceptions of Career and Technical administrators and teachers at Technology Centers That Works (TCTW) schools concerning the best practices of integrating academic concepts into the context of Career and Technical Education (CTE); (2) compare differences in integrating practices at award-winning TCTW schools and non-award-winning TCTW schools; (3) use a Delphi study to determine a best practices model for integrating academics into CTE using award-winning TCTW faculty as the expert panel and; determine if a predictive model could be established that can predict group membership (award-winning TCTW schools and NOT award-winning TCTW schools) using presage, process, context, and TCTW professional development.

This study sought to answer the following questions:

1. What were the selective demographics for award-winning and non-award-winning TCTW schools?
2. Do administrators from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools?
3. Do teachers from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools?
4. What factors did the CTE administrators and teachers at award-winning agree schools contributed to their success?

5. Could a predictive model be established that can predict group membership (award-winning TCTW schools and NOT award-winning TCTW schools) using presage, process, context, and TCTW professional development.

Collected data were entered into SPSS for analysis. Chronbach's alpha values were calculated for each construct to determine reliability. Frequency data (number of responses and percentages) were calculated and demographic information such as age ranges, gender, teaching experience, and education information was gathered from each participant. Then, the data was sorted into categories created by the researcher in order to condense for reporting purposes. The theoretical number of responses, mean, standard deviation, etc. were used for analyzing each individual construct.

**Findings**

Research Question 1. What were the selective demographics for award-winning and non-award-winning TCTW schools?

**Characteristics of the participants.**

The population for this study included 166 Technology Centers That Work (TCTW) schools from 17 states that had senior students participate in the 2012 High Schools That Works Assessment. A total sample of 211 Career and Technical educators (132 teachers and seventy-nine administrators) participated in this study. The participants in the study were categorized into two groups: educators (teachers and administrators) at non-award-winning Technology Centers That Work (TCTW) schools and educators at award-winning TCTW schools. The participating educators at the award-winning TCTW schools made a group and the participating educators at the non-award-winning TCTW schools comprised the comparison group.

According to Babbie (1990), a return rate of at least 50 percent is considered adequate. Of the 166 TCTW schools that received emailed survey links in round one of the quantitative study, 211 surveys were completed. A total of 135 surveys were received from the schools that were classified as non-award-winning and 76 surveys were received from award-winning schools. Thirteen out of 18 award-winning schools participated in the study for a 72 percent response rate. Sixty-six out of 148 comparison schools participated in the study for a response rate of 45 percent. Seventeen out of 18 total award winning schools participated in the Delphi study for a 94 percent rate. These response rates resulted by applying the response formula according to Dillman (2007, p. 149-193) (see Chapter 4).

The majority of the 211 participants were male (124; 59.6 percent). The award-winning group (n=135) included seventy-eight males (58 percent) and fifty-six females (42 percent). The comparison group (n=76) included forty-six males (61 percent) and thirty females (39 percent). The demographic characteristics for all participants are presented in table five. The demographics for the sample population are similar to what would be expected from the entire population of teachers and administrators of TCTW schools.

**Table 5**

Respondent Demographics

| Individual Variables | | | |
|---|---|---|---|
| | | Non-Award-Winning | Award-Winning |
| Current Position | Teacher | 69 (51%) | 63 (83%) |
| | Administrator | 66 (49%) | 13 (17%) |
| Gender | Male | 78 (58%) | 46 (61%) |
| | Female | 56 (42%) | 30 (39%) |
| Age | Under 25 | 0 (0%) | 0 (0%) |
| | 25-30 | 3 (2%) | 7 (9%) |
| | 31-35 | 6 (4%) | 5 (7%) |
| | 36-40 | 15 (11%) | 9 (12%) |
| | 41-45 | 26 (19%) | 16 (21%) |
| | 46-50 | 24 (18%) | 7 (9%) |
| | 51-55 | 24 (18%) | 14 (18%) |
| | 56-60 | 22 (16%) | 4 (5%) |
| | 61-65 | 10 (7%) | 12 (16%) |
| | Over 65 | 4 (3%) | 2 (3%) |
| College Education | None | 1 (1%) | 1 (1%) |
| | <2 years | 10 (8%) | 7 (9%) |
| | Associates | 12 (9%) | 10 (13%) |
| | Bachelors | 22 (17%) | 23 (30%) |
| | Masters | 68 (52%) | 30 (39%) |
| | Ed.S/A.A. | 14 (11%) | 3 (4%) |
| | Ph.D./Ed.D. | 5 (4%) | 2 (3%) |
| Teaching Experience prior to becoming an administrator (Administrators) | <5 years | 7 (11%) | 3 (23%) |
| | 5-10 years | 23 (37%) | 4 (31%) |
| | 11-15 years | 13 (21%) | 4 (31%) |
| | 16-20 years | 13 (21%) | 0 (0%) |
| | 21-25 years | 6 (10%) | 1 (8%) |
| | 26-30 | 1 (2%) | 0 (0%) |
| | >30 years | 0 (0%) | 1 (8%) |
| Participated in a quality CTE program while in high school | Yes | 50 (38%) | 22 (29%) |
| | No | 83 (62%) | 54 (71%) |

**Response to descriptive questions – administrators and teachers**

An open-ended survey question was asked to those who participated in this study concerning which specific subjects they taught prior to becoming an administrator in Career and Technical Education. Responses were grouped together according to similar subject titles. Responses were tallied and described in the following paragraph. The open-ended question produced 61 responses from the non-award-winning panel.

Fourteen indicated that they had been Business/Marketing teachers and 10 indicated that they had been math teachers prior to becoming administrators. Seven former Special Education and six former Agriscience and science teachers completed the survey. Five that had taught elementary grades, five former language arts teachers, and four that had taught social science were among those surveyed. There were two former teachers in each of the following categories: Carpentry, Cosmetology, Drafting, Electricity/Electronics, and Machine Shop. Each of the remaining administrators indicated that they had formerly taught Driver's Education, Graphic Arts, Photography, Physical Education, Health, Health Science, Engineering, or Aviation Mechanics.

The same open-ended survey question was asked to those from the award-winning Career and Technical Centers concerning which specific subjects they taught prior to becoming an administrator. Responses were grouped together the same as the comparison schools. Five of the administrators had been Business/Marketing teachers and two had been Agriscience teachers. The remaining administrators indicated that they had been Special Education, Math, Physical Education, Social Science, or Health Science teachers in the past.

**Round One Questions**

Questions in Round One were categorized into three categories: teachers at my school (presage variables), teaching and learning (process variables), and students in my school (context variables). The framework for this research study was based on Dunkin and Biddle's (1974) model for classroom teaching (see illustration 1). In their model of teaching and learning, Dunkin and Biddle focused on four major variable components: presage, context, process, and product.

Research Question 2. Do administrators from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools?

Table six describes the summary of scales for the administrators' categories construct. Each of the scales (presage, process, and context) reached sig. and each of the mean scores were considerably higher for the award-winning administrators compared to the non-award-winning administrators. Since each of the categories showed a sig. of less than .05, it can be said that the integration practices of award-winning and non-award-winning TCTW schools differ significantly according to the data submitted by the administrator groups on the survey. Award-winning administrators showed a mean score in the presage category of 3.27 and the non-award-winning administrators had a mean score of 2.98, a difference of .28. Award winners expressed a mean in the process category of 3.35 while the non-award-winners had a mean of 3.13, a higher than their counterparts, a difference of .22. Finally, the award-winning administrators group had a .35 higher mean than the non-award-winning administrators in the context category. The award-winners had a mean of 3.48 and the non-award-winners had a mean of 3.14.

**Table 6**

Summary of scales – Administrators

| | Award-Winning Administrators | Non-Award-Winning Administrators | F | Sig. | Eta. Squared |
|---|---|---|---|---|---|
| Presage Mean (SD) | 3.27 (.30) | 2.98 (.44) | 4.22 | .044 | .055 |
| Process Mean (SD) | 3.35 (.33) | 3.13 (.33) | 4.34 | .041 | .058 |
| Context Mean (SD) | 3.48 (.27) | 3.14 (.31) | 12.28 | .001 | .149 |

**Administrators' Perceptions of Presage, Process, and Context Variables**

The data in table seven, eight, and nine indicates that administrators at award-winning schools perceive their school's integration practices to be much more successful than administrators at comparison schools in presage, process, and context variables.

**Presage Variables – Administrators**

Table seven shows the perceptions of administrators and reports the mean differences of award-winning and non-award-winning groups. These are arranged with the differences between the means from greatest to least. The table shows that administrators at award-winning TCTW schools felt that the teachers at their CTE schools are continually learning and seeking new ideas on how to improve instruction at a mean of .65 higher than the administrators at non-award-winning schools. Administrators at award-winning TCTW schools also believe that there is an intensive emphasis on continuous improvement at their CTC and the teachers at their CTE

school use data continuously to evaluate their program's curriculum, instruction, and student success. Each of these questions had a mean of .43 higher than the comparison administrators' collective response. Administrators at award-winning TCTW schools rated felt that Teachers and the CTE Administrator at their schools work as a team to improve student achievement at a .41 higher mean that administrators at non-award-winning schools. Administrators at award-winning schools also expressed that the teachers at their CTC have had sufficient professional development to integrate academics into their CTE program at a rate of 2.27 compared to the 1.95 rate of their counterparts. This is a .32 difference.

**Table 7**

Teachers at My School Characteristics, Presage Variables – Administrators

| | **Award Winning** | | **Non-Award Winning** | | **Difference Between Groups** | **Difference Between Groups** |
|---|---|---|---|---|---|---|
| **Individual Variables** | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **Z** |
| Teachers at my CTE school are continually learning and seeking new ideas on how to improve instruction | 2.73 | .47 | 2.08 | .55 | .65 | 1.18 |
| There is an intensive emphasis on continuous improvement at my CTE school | 2.82 | .40 | 2.39 | .56 | .43 | .77 |
| Teachers at my CTE school use data continuously to evaluate their program's curriculum, instruction, and student success | 2.27 | .65 | 1.84 | .79 | .43 | .54 |

| | Award Winning | | Non-Award Winning | | Difference Between Groups | Difference Between Groups |
|---|---|---|---|---|---|---|
| **Individual Variables** | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **Z** |
| Teachers at my CTE school have had sufficient professional development to integrate academics into their CTE program | 2.27 | .65 | 1.95 | .74 | .32 | .43 |
| Teachers at my CTE school often spend evenings and/or weekends working with their students | 1.73 | .90 | 1.42 | .79 | .31 | .39 |
| Teachers at my CTE school maintain a demanding yet supportive environment that pushes students to do their best | 2.55 | .52 | 2.26 | .57 | .26 | .51 |
| CTE teachers and academic teachers are given mutual planning time for collaboration throughout the school year | .65 | 1.61 | .90 | 1.35 | .25 | -.19 |
| Teachers at my CTE school often attend students extracurricular activities | 1.64 | .81 | 1.46 | .79 | .18 | .23 |
| Teachers at my CTE school are active listeners to their students' concerns | 2.27 | .47 | 2.15 | .62 | .12 | .19 |
| I provide periodic feedback to my teachers to help instruction at my CTE school | 2.55 | .52 | 2.45 | .53 | .10 | .19 |
| CTE teachers and academic teachers work well together | 2.25 | 1.73 | .69 | 2.15 | .10 | .73 |

**Process Variables – Administrators**

Table eight shows the results of the perceptions of administrators and reports the mean differences of award-winning and non-award-winning groups from greatest to least. Table eight indicates that administrators at award-winning TCTW schools estimate the percentage of their students earning post-secondary college credit (dual enrollment) is far above what administrators at non-award-winning schools estimate in their schools. In fact, there is a 2.32 difference in the means of these estimates. This difference is by far the largest difference in this entire data set. Comparison group administrators indicate that the teachers at their schools give homework at a higher mean rate of 1.66 than award-winning schools, which had a 1.00 mean. Administrators at award-winning schools also estimate that there is a much higher number of their students earning employability credentials, a mean difference of .53, when compared to the estimates at the non-award-winning schools. Table eight also expresses a difference in the perceptions of administrators at award-winning schools on their students being given the multiple opportunities to learn content at a mean rate of .39 higher than the what those at the non-award-winning schools said. Award winning schools provide their students with intellectually demanding studies that emphasizes science at a mean rate .33 higher than non-award-winning schools, according to the administrators.

A strong emphasis is placed on certain teaching and learning methods at each of these school groups. The comparison administrators indicated that teacher demonstrations, group projects, teacher presentations, and discussions are the top four methods in their schools. In contrast, the principals at award-winning TCTW schools pointed out that student presentations was their schools' most popular method with teacher demonstrations, group projects, and discussions rounding out the top four.

**Table 8**

Teaching and Learning Characteristics, Process Variables –Administrators

| | Award-Winning | | Non-Award-Winning | | Difference Between Groups | Difference Between Groups |
|---|---|---|---|---|---|---|
| **Individual Variables** | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **Z** |
| An estimation of the percentage of students at my CTE school that earn post-secondary college credit (dual enrollment) | 4.45 | 1.81 | 2.13 | 1.67 | 2.32 | 1.39 |
| Number of times per class per week (0-5) teachers at my CTE school assign homework | 1.00 | 1.04 | 1.66 | 1.06 | .66 | -.62 |
| An estimation of the percentage of employability credentials earned by the students at my CTE school each year | 4.55 | 1.92 | 4.02 | 1.69 | .53 | .31 |
| Students at my CTE school are given multiple opportunities to learn content | 2.73 | .47 | 2.34 | .54 | .39 | .72 |
| Students at my CTE school are provided with intellectually demanding studies that emphasize science | 2.18 | .40 | 1.85 | .66 | .33 | .50 |
| Students at my CTE school are commonly allowed to develop their own assignments | 2.27 | .47 | 2.00 | .52 | .27 | .52 |
| Teachers at my CTE school place great emphasis on the use of technology | 2.55 | .52 | 2.30 | .59 | .25 | .42 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Students at my CTE school are provided with intellectually demanding studies that emphasizes math | 2.27 | .47 | 2.03 | .56 | .24 | .43 |
| Number of times teachers at my CTE school give extra help to students outside of class time | 1.55 | 1.21 | 1.77 | 1.70 | .22 | -.13 |
| CTE Student Organizations (FBLA, FFA, HOSA, SkillsUSA, TSA, etc.) activities are strongly emphasized at my CTE school | 2.73 | .65 | 2.60 | .59 | .13 | .22 |
| Students at my CTE school are provided with intellectually demanding studies that emphasizes literacy | 2.27 | .65 | 2.15 | .54 | .12 | .22 |

| **A strong emphasis is placed on these teaching and learning methods at my CTE school.** | **Mean** | **SD** | **Mean** | **SD** | **Difference Between Groups** | **Difference Between Groups Z Scores** |
|---|---|---|---|---|---|---|
| Student Presentations | 2.55 | .52 | 2.02 | .62 | .53 | .85 |
| Student Research | 2.18 | .60 | 1.78 | | .40 | .62 |
| Discussions | 2.45 | .69 | 2.25 | .60 | .20 | .33 |
| Lecture | 1.64 | .67 | 1.85 | .75 | .21 | -.28 |
| Students Sharing in Small Groups | 2.36 | .50 | 2.18 | .65 | .18 | .28 |
| Group Projects | 2.45 | .52 | 2.31 | .62 | .14 | .23 |
| Students Viewing Videos | 1.80 | .79 | 1.72 | .55 | .08 | .15 |
| Teacher Demonstrations | 2.45 | .69 | 2.51 | .50 | .06 | -.12 |
| Teacher Presentations | 2.27 | .65 | 2.26 | .51 | .01 | .02 |

**Context Variables – Administrators**

Table nine describes administrators' perceptions on context variables. The mean differences of award-winning and non-award-winning groups are arranged from greatest to least in table nine. Administrators at award-winning TCTW schools say that there is a much higher percentage of their students completing a career exploration course before they enroll in the Career and Technical Center (CTC). In fact, the mean rate at award-winning schools is 1.00 higher than the other principal group indicated. This figure is second greatest difference in all of the variables on the administrator questionnaire. Administrators at award-winning TCTW schools also estimate that the percentage of their students on a free or reduced lunch rate is much different than the mean estimation of the non-award-winning schools, a .72 difference. The goals and priorities are clearly communicated at award-winning schools at a mean rate of .46 higher and students are perceived to have the math skills they need to succeed at the Career and Technical Center at a mean rate of .40 higher at the award-winning-schools when compared to the other group.

**Table 9**

Students in My School Characteristics, Context Variables –Administrators

| | Award Winning | | Non-Award Winning | | Difference Between Groups | Difference Between Groups |
|---|---|---|---|---|---|---|
| **Individual Variables** | **Mean** | **SD** | **Mean** | **SD** | **Means** | **Z** |
| An estimation of the percentage of student enrolled at my CTE school that completed a career exploration course in the past. | 4.05 | 1.55 | 3.05 | 1.70 | 1.00 | .59 |
| An estimation of percentage of students at my CTE school that receive a free or reduced lunch \ | 2.45 | .93 | 3.17 | 1.08 | .72 | -.67 |
| The goals and priorities at my CTE school are clearly communicated | 2.82 | .40 | 2.36 | .55 | .46 | .84 |
| Students have the math skills to succeed at my school | 2.00 | .45 | 1.60 | .49 | .40 | .82 |
| The feeder school(s) for my CTE school set high expectations for their students | 2.18 | .75 | 1.81 | .63 | .37 | .59 |
| Students have the technological skills to succeed at my school | 2.40 | .52 | 2.05 | .39 | .35 | .90 |
| The administration at my CTE school has high expectations for students to achieve college and career readiness | 3.00 | 0 | 2.65 | .48 | .35 | .73 |
| A majority of the students at my CTE school have a genuine interest in the subject matter being taught | 2.73 | .47 | 2.39 | .56 | .34 | .61 |

| | Award Winning | | Non-Award Winning | | Difference Between Groups | Difference Between Groups |
|---|---|---|---|---|---|---|
| **Individual Variables** | **Mean** | **SD** | **Mean** | **SD** | **Means** | **Z** |
| Students are required to work in teams at my CTE school develop their own assignments | 2.28 | .30 | 2.00 | .52 | .28 | .54 |
| Students have the science skills to succeed at my school | 1.91 | .54 | 1.67 | .47 | .24 | .51 |
| Students get the guidance counseling they need to transition to college and career while at my CTE school | 2.18 | 1.17 | 1.97 | .78 | .21 | .27 |
| Students have the literacy skills to succeed at my school | 2.00 | .45 | 1.80 | .45 | .20 | .44 |

A 2x2 chi-square analysis was conducted to assess any relationship that may exist between specific professional development sessions and success in becoming an award-winning Technology Centers That Work school.

**Professional Development Results - Administrators**

The data cited in table 10 reveals that there were no significant differences in the distribution of responses among the administrator groups for any of the 27 Technology Centers That Work professional development sessions.

**Table 10**

Chi-squares Results for Specific TCTW Professional Development – Administrators

| | Administrators | | |
|---|---|---|---|
| **Professional Development** | **Non-Award Winning Schools (n=44)** | **Award Winning Schools n=10)** | **Chi-square (p)** |
| Site Development Workshop Two Day Strategic Planning | 61.36% | 80.00% | .44 (.51) |
| Technical Visit (TAV) – Three Days | 72.73% | 90.00% | .32 (.57) |
| Literacy Workshop – Big Six Literacy Skills | 31.82% | 40.00% | .16 (.69) |
| Literacy Workshop – Literacy Design Collaborative in Career and Technical Education | 56.82% | 80.00% | .72 (.40) |
| Data Workshop - Leveraging the Technology Centers That Work Assessment: The Role of Data in School Improvement | 50.00% | 30.00% | .70 (.40) |
| Data Workshop – Using Data to Create a High Performance Learning Culture | 38.64% | 30.00% | .16 (.69) |
| Career Technical Education Preparation Project Professional Development | 18.18% | 20.00% | .02 (.90) |
| Career Technical Education Preparation Project Two Week Summer Institute | 4.55% | 0% | .46 (.50) |

| | Administrators | | |
|---|---|---|---|
| **Professional Development** | **Non-Award Winning Schools (n=44)** | **Award Winning Schools (n=10)** | **Chi-square (p)** |
| Career Technical Education Preparation Project – Three Week, Two Day workshops throughout the school year | 6.82% | 0% | .68 (.41) |
| Career Technical Education Preparation Project Two Week Summer Institute after 1st Year of Teaching | 4.55% | 0% | .46 (.50) |
| Career Technical Education Preparation Project Monthly Webinars | 13.64% | 0% | 1.36 (.24) |
| Four Professional Development Modules – Instructional Planning | 9.09% | 0% | .91 (.34) |
| Four Professional Development Modules – Research-Based Instructional Planning | 4.55% | 0% | .46 (.50) |
| Four Professional Development Modules – Classroom Assessment | 6.82% | 0% | .68 (.41) |
| Four Professional Development Modules – Classroom Management | 2.27% | 0% | .23 (.63) |

| | Administrators | | |
|---|---|---|---|
| **Professional Development** | **Non-Award Winning Schools (n=44)** | **Award Winning Schools (n=10)** | **Chi-square (p)** |
| Career and Technical Teacher Tech Prep (Option 1) SREB provides all the professional development training sessions and classroom observations and conducts the webinars | 11.36% | 30.00% | 1.91 (.17) |
| Career and Technical Teacher Tech Prep (Option 2) SREB supports a state education agency or local education agency in implementing the Career and Technical Education Teacher Preparation Project (Train the Trainer) | 11.36% | 20.00% | .47 (.49) |
| Career and Technical Teacher Tech Prep (Option 3) SREB provides professional development for veteran teachers in a school | 6.82% | 0% | .68 (.41) |
| Enhanced Career Technical Education (4 Days Professional Development (+ 2 Days Follow Up + 3 Days Coaching) | 18.18% | 10.00% | .33 (.57) |
| Guidance and Advisement (2 Days Professional Development - 1 +1) | 18.18% | 20.00% | .02 (.90) |

| | Administrators | | |
|---|---|---|---|
| **Professional Development** | **Non-Award Winning Schools (n=44)** | **Award Winning Schools (n=10)** | **Chi-square (p)** |
| Seven Essential Teaching (2 Days Professional Development +2 Days Coaching) | 15.91% | 10.00% | .19 (.66) |
| Project–Based Learning (PBL) | 22.73% | 50.00% | 2.18 (.14) |
| School Leaders of Instructional Coaches (1 Day Professional Development + 1 Day Professional Development) | 20.45% | 0% | 2.05 (.15) |
| Programs of Study (2 Days Professional Development) | 13.64% | 0% | 1.36 (.24) |
| Numeracy Workshops – Building Academic Skills in Context (6 Days Professional Development – 2 + 2 + 2) | 18.18% | 20.00% | .02 (.90) |
| Numeracy Workshops – Developing Classroom Instruction to Enhance Thinking (2 Days + On Site Coaching) | 25.00% | 10.00% | .83 (.36) |
| Numeracy Workshops – Mathematics Design Collaborative (MDC) in CTE (2 Days + 2 Days + 2 Days) | 25.00% | 10.00% | .83 (.36) |

Research Question 3. Do teachers from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools?

In table 11 a summary of scales for the teachers' categories is given. The data in this table shows that presage (.023) and context (<.001) reached sig. and process did not (.289). Much like the data in the administrators' summary of scales, the context category showed the greatest sig. Since the Process category had a sig. of .289, it can be said that the integration practices of award-winning and non-award-winning TCTW schools do not differ significantly according to the data submitted by the teacher groups on the survey. Like the mean from the award-winning administrators, the award-winning teachers' means were higher in each category when compared to the non-award-winning teachers. In the presage category, the award-winning teachers had a mean of 3.21 and the non-award-winning teachers had a mean of 3.06. This is a .15 difference. The award-winners had a mean of 3.31 while the non-award-winners had a mean of 3.26 in the process category, a .05 difference. Lastly, the context category was compared. Award-winning teachers had a mean of 3.11 and non-award-winning teachers had a mean of 2.78. This is a difference of .33.

**Table 11**

Summary of scales – Teachers

| | Award-Winning Teachers | Non-Award-Winning Teachers | F | Sig. | Eta. Squared |
|---|---|---|---|---|---|
| Presage Mean (SD) | 3.21 (.34) | 3.07 (.37) | 5.32 | .023 | .040 |
| Process Mean (SD) | 3.31 (.27) | 3.26 (.29) | 1.13 | .289 | .009 |
| Context Mean (SD) | 3.11 (.41) | 2.78 (.41) | 19.67 | <.001 | .138 |

**Teachers' Perceptions of Presage, Process, and Context Variables**

The data in table 12, 13, and 14 also indicates that teachers at award-winning schools generally perceive their school's integration practices to be more successful than teachers at non-award-winning schools in Presage, Process, and Context variables. The results of the perceptions of teachers and reports the mean differences of award-winning and non-award-winning groups from greatest to least.

**Presage Variables – Teachers**

Table 10 shows that the perceptions of teachers at award-winning TCTW schools are that the administration at their school provides feedback to them to help them improve instruction at a .27 mean rate higher than the administrators at comparison schools. Teachers at award-winning TCTW schools also believe that the teachers and the CTE Administrator work as a team to improve student achievement at a mean rate of .25 higher than the non-award-winning administrators' responses. Teachers at non-award winning schools actually indicated that their schools give their CTE teachers and academic teachers mutual planning time for collaboration throughout the school year at a mean rate of .25 higher than the responses of the award-winning teachers. Teachers at award-winning schools indicated that in their schools there is an intensive emphasis on continuous improvement at mean difference of .21, when compared to the non-award-winning teachers.

**Table 12**

Teachers at My School Characteristics, Presage Variables –Teachers

| Individual Variables | Award-Winning Mean | Award-Winning SD | Non-Award Winning Mean | Non-Award Winning SD | Difference Between Groups Means | Difference Between Groups Z |
|---|---|---|---|---|---|---|
| The administration at my CTE school provides feedback to help me improve instruction | 2.35 | .60 | 2.08 | .71 | .27 | .38 |
| Teachers and the CTE Administrator at my CTE school work as a team to improve student achievement | 2.49 | .54 | 2.24 | .65 | .25 | .38 |
| CTE teachers and academic teachers are given mutual planning time for collaboration throughout the school year | .65 | 1.61 | .90 | 1.35 | .25 | -.19 |
| There is an intensive emphasis on continuous improvement at my CTE school | 2.68 | .50 | 2.47 | .61 | .21 | .34 |
| I have had sufficient professional development to integrate academics into our CTE program | 2.37 | .63 | 2.22 | .57 | .15 | .26 |
| Teachers at my CTE school often spend evenings and/or weekends working with their students | 1.40 | .83 | 1.55 | .71 | .15 | -.21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| I use data continuously to evaluate our program's curriculum, instruction, and student success | 2.24 | .53 | 2.10 | .74 | .14 | .19 |
| Teachers at my CTE school are continually learning and seeking new ideas on how to improve instruction | 2.52 | .53 | 2.39 | .52 | .13 | .25 |
| Teachers at my CTE school maintain a demanding yet supportive environment that pushes students to do their best | 2.49 | .54 | 2.39 | .58 | .10 | .17 |
| I am an active listener to my students' concerns | 2.63 | .49 | 2.72 | .45 | .09 | -.20 |
| I often attend students' extracurricular activities | 1.60 | .75 | 1.55 | .76 | .05 | .07 |
| CTE teachers and academic teachers in my school work well together | .73 | 1.73 | .69 | 1.54 | .04 | .03 |

**Process Variables – Teachers**

Much like the perception of the award-winning administrator group, table 11 indicates that teachers at award-winning TCTW schools estimate the percentage of their students earning post-secondary college credit (dual enrollment) is much higher than what teachers at non-award-winning schools estimate in their schools. There is a .61 higher mean in these of these estimates. This mean difference is the second largest for all of the teacher variables. According to the following table, teachers at non-award-winning schools actually assign homework at a mean rate of .31 higher than their award-winning teacher counterparts. Award-winning teachers believe that their schools place a greater emphasis on the use of technology in their programs at a mean

rate of 1.30 when compared to the non-award-winning teacher rate of 1.60, a .30 difference. Teachers at award-winning schools also believe that their schools provide their students with intellectually demanding studies that emphasize math at a mean of 2.37 compared to the comparison groups mean of 2.12.

According to the surveyed teachers, there was agreement in the indicated emphasis placed on certain teaching and learning methods at the award-winning and non-award-winning schools. Each group indicated that teacher demonstrations, discussions, group projects, and students sharing in small groups are the top four methods in their schools.

**Table 13**

Teaching and Learning Characteristics, Process Variables –Teachers

| | **Award Winning** | | **Non-Award Winning** | | **Difference Between Groups** | **Difference Between Groups** |
|---|---|---|---|---|---|---|
| **Individual Variables** | **Mean** | **SD** | **Mean** | **SD** | **Means** | **Z** |
| An estimation of the percentage of students at my CTE school that earn post-secondary college credit (dual enrollment) | 2.87 | 2.32 | 2.26 | 2.18 | .61 | .28 |
| Number of times per class per week teachers at my CTE school assign homework | 1.25 | 1.19 | 1.56 | 1.61 | .31 | -.19 |
| I place great emphasis on the use of technology in my program | 2.70 | .50 | 2.40 | 71 | .30 | .00 |
| Students at my CTE school are provided with intellectually demanding studies that emphasize math | 2.37 | .61 | 2.12 | .60 | .25 | .42 |

| | Award Winning | | Non-Award Winning | | Difference Between Groups | Difference Between Groups |
|---|---|---|---|---|---|---|
| **Individual Variables** | **Mean** | **SD** | **Mean** | **SD** | **Means** | **Z** |
| Students at my CTE school are given multiple opportunities to learn content | 2.83 | .42 | 2.59 | .53 | .24 | .45 |
| Students at my CTE school are provided with intellectually demanding studies that emphasize science | 2.25 | .62 | 2.08 | .78 | .17 | .22 |
| An estimation of the percentage of employability credentials earned by the students at my CTE school each year | 3.59 | 2.34 | 3.73 | 2.15 | .14 | -.07 |
| Number of times teachers at my CTE school give extra help to students outside of class time | 1.79 | 1.45 | 1.65 | 1.79 | .14 | .08 |
| Students at my CTE school are provided with intellectually demanding studies that emphasize literacy | 2.45 | .59 | 2.37 | .55 | .08 | .15 |
| CTE Student Organizations (FBLA, FFA, HOSA, SkillsUSA, TSA, etc.) activities are strongly emphasized at my CTE school | 2.49 | .79 | 2.43 | .78 | .06 | 08 |
| Students at my CTE school are commonly allowed to develop their own assignments | 1.87 | .49 | 1.92 | .57 | .05 | -.09 |

| A strong emphasis is placed on these teaching and learning methods at my CTE school | Mean | SD | Mean | SD | Means | Z |
|---|---|---|---|---|---|---|
| Students Viewing Videos | 1.75 | .72 | 1.89 | .63 | .14 | .22 |
| Student Presentations | 2.25 | .70 | 2.17 | .68 | .08 | .12 |
| Student Research | 2.35 | .63 | 2.28 | .60 | .07 | .12 |
| Group Projects | 2.46 | .70 | 2.41 | .64 | .05 | .08 |
| Teacher Demonstrations | 2.70 | .46 | 2.66 | .51 | .04 | .08 |
| Discussions | 2.63 | .52 | 2.59 | .56 | .04 | .07 |
| Students Sharing in Small Groups | 2.37 | .71 | 2.41 | .64 | .04 | -.06 |
| Teacher Presentations | 2.32 | .51 | 2.35 | .57 | .03 | -.05 |
| Lecture | 2.05 | .76 | 2.06 | .71 | .01 | -.01 |

**Context Variables – Teachers**

Teacher context variables are displayed in the following table. Teachers at non-award-winning TCTW schools estimate that the percentage of their students on a free or reduced lunch rate is much higher than the mean estimation of the comparison schools, a 1.15 difference. This was the greatest mean difference in this particular teacher survey set.

Teachers from award-winning schools indicated that their students have the math skills needed to succeed at their schools at a mean rate of 2.17, while the comparison group's mean was 1.59. Award-winning teachers also indicate that the feeder school(s) for their CTC sets high standards for their students at a mean rate of .44 higher than what is indicated by the non-award-winning teachers. Teachers at award-winning TCTW schools, much like their administrators, say that there is a higher percentage of their students completing a career exploration course before

they enroll at their CTC. The mean rate at award-winning schools is .42 higher than the other teacher group indicated. A majority of the students in the schools of award-winning programs are genuinely interested in the subject matter being taught according to the teacher group. This mean rate is .40 higher in the award-winning schools compared to the indications of the teachers at comparison schools.

**Table 14**

Students in My School Characteristics, Context Variables –Teachers

| | Award Winning | | Non-Award Winning | | Difference Between Groups | Difference Between Groups |
|---|---|---|---|---|---|---|
| **Individual Variables** | **Mean** | **SD** | **Mean** | **SD** | **Means** | **Z Scores** |
| An estimation of the percentage of student enrolled at my CTE school that receive a free or reduced lunch rate | 2.00 | .79 | 3.15 | 1.25 | 1.15 | -.92 |
| Students have the math skills to succeed at my school | 2.17 | .72 | 1.59 | .66 | .58 | .88 |
| The feeder school(s) for my CTE school set high expectations for their students | 2.03 | .74 | 1.59 | .74 | .44 | .59 |
| An estimation of the percentage of student enrolled at my CTE school that completed a career exploration course in the past | 2.47 | 1.81 | 2.05 | 2.11 | .42 | .20 |
| A majority of the students in my program have a genuine interest in the subject matter being taught | 2.20 | .57 | 1.80 | .89 | .40 | .45 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Students get the guidance counseling they need to transition to college and career while at my CTE school | 2.18 | .62 | 1.82 | .76 | .36 | .47 |
| The goals and priorities at my CTE school are clearly communicated | 2.59 | .53 | 2.30 | .68 | .29 | .43 |
| Students have the literacy skills to succeed at my school | 1.95 | .69 | 1.66 | .60 | .29 | .48 |
| The administration at my CTE school has high expectations for students to achieve college and career readiness | 2.72 | .45 | 2.52 | .50 | .20 | .40 |
| Students have the technological skills to succeed at my school | 2.26 | .54 | 2.09 | .46 | .17 | .37 |
| Students have the science skills to succeed at my school | 1.90 | .66 | 1.78 | .52 | .12 | .23 |
| Students are required to work in teams at my CTE school to develop their own assignments | 2.67 | .51 | 2.67 | .56 | 0 | .00 |

A 2x2 chi-square analysis was conducted to assess any relationship that may exist between specific professional development sessions and success in becoming an award-winning Technology Centers That Work school.

The data cited in table 15 reveals that there was a significant difference in the distribution of responses among the teachers groups for the Literacy Workshop – Big Six Literacy Skill producing a chi-square of 4.77 with a sig. of .029. Teachers at non-award-winning schools

indicated that they have participated in this workshop at a rate of 27.91% compared to the award-winning teachers' rate of 7.50%.

**Professional Development Results - Teachers**

The data in table 15 also reveals that there was a significant difference in the distribution of responses among the teachers group for Four Professional Development Modules – Instructional Planning producing a chi-square coefficient 4.30 and a sig. of .038. Teachers from award-winning schools reported attending this professional development at a 25.00% rate and the non-award-winning teachers participated at a 6.98% rate.

The data cited in table 15 also shows that there was a chi-square of 4.082 and a significant difference of .042 in the distribution of responses among the teachers groups Project-Based Learning. Teachers at non-award-winning schools indicated that they have participated in this workshop at a rate of 39.53% compared to their award-winning counterparts' rate of 15%.

**Table 15**

Chi-squares Results for Specific TCTW Professional Development – Teachers

| Professional Development | Non-Award Winning Schools (n=43) | Award Winning Schools (n=40) | Chi-square (p) |
|---|---|---|---|
| Site Development Workshop Two Day Strategic Planning | 30.23% | 15.00% | 2.10 (.15) |
| Technical Visit (TAV) – Three Days | 20.93% | 30.00% | .67 (.41) |
| Literacy Workshop – Big Six Literacy Skills | 27.91% | 7.50% | **4.77 (.03)** |

| Professional Development | Non-Award Winning Schools (n=43) | Award Winning Schools (n=40) | Chi-square (p) |
|---|---|---|---|
| Literacy Workshop – Literacy Design Collaborative in Career and Technical Education | 41.86% | 42.50% | .00 (.96) |
| Data Workshop – Leveraging the Technology Centers That Work Assessment: The Role of Data in School Improvement | 9.30% | 17.50% | 1.05 (.31) |
| Data Workshop – Using Data to Create a High Performance Learning Culture | 9.30% | 12.50% | .20 (.66) |
| Career Technical Education Preparation Project Professional Development | 39.53% | 40.00% | .00 (.97) |
| Career Technical Education Preparation Project Two Week Summer Institute | 4.65% | 5.00% | .01 (.94) |
| Career Technical Education Preparation Project – Three Week, Two Day workshops throughout the school year | 9.30% | 2.50% | 1.59 (.22) |
| Career Technical Education Preparation Project Two Week Summer Institute after 1st Year of Teaching | 2.33% | 7.50% | 1.51 (.28) |
| Career Technical Education Preparation Project Monthly Webinars | 9.30% | 5.00% | .53 (.47) |
| Four Professional Development Modules – Instructional Planning | 6.98% | 25.00% | **4.30 (.038)** |
| Four Professional Development Modules – Research-Based Instructional Planning | 4.65% | 17.50% | 3.15 (.08) |
| Four Professional Development Modules – Classroom Assessment | 9.30% | 20.00% | 1.64 (.20) |
| Four Professional Development Modules – Classroom Management | 11.63% | 17.50% | .49 (.48) |

| Professional Development | Non-Award Winning Schools (n=43) | Award Winning Schools (n=40) | Chi-square (p) |
|---|---|---|---|
| Career and Technical Teacher Tech Prep (Option 2) SREB supports a state education agency or local education agency in implementing the Career and Technical Education Teacher Preparation Project (Train the Trainer | 0% | 5.00% | 2.15 (.14) |
| Career and Technical Teacher Tech Prep (Option 3) SREB provides professional development for veteran teachers in a school | 6.98% | 0% | 2.79 (.10) |
| Enhanced Career Technical Education (4 Days Professional Development (+ 2 Days Follow Up + 3 Days Coaching) | 2.33% | 2.50% | .00 (.96) |
| Guidance and Advisement (2 Days Professional Development - 1 +1) | 9.30% | 7.50% | .08 (.78) |
| Seven Essential Teaching (2 Days Professional Development +2 Days Coaching) | 0% | 0% | 0 (0) |
| Project–Based Learning (PBL) | 39.53% | 15% | **4.50 (.03)** |
| School Leaders of Instructional Coaches (1 Day Professional Development + 1 Day Professional Development) | 6.98% | 2.50% | .86 (.35) |
| Programs of Study (2 Days Professional Development) | 9.30% | 17.50% | 1.05 (.31) |
| Numeracy Workshops – Building Academic Skills in Context (6 Days Professional Development – 2 + 2 + 2) | 23.26% | 17.50% | .34 (.56) |
| Numeracy Workshops – Developing Classroom Instruction to Enhance Thinking (2 Days + On Site Coaching) | 18.60% | 12.50% | .49 (.48) |

| Professional Development | Non-Award Winning Schools (n=43) | Award Winning Schools (n=40) | Chi-square (p) |
|---|---|---|---|
| Numeracy Workshops – Mathematics Design Collaborative (MDC) in CTE (2 Days + 2 Days + 2 Days) | 16.28% | 2.50% | **4.08 (.04)** |

Research Question 4. What factors did the CTE administrators and teachers at award-winning agree schools contributed to their success?

Table 16 provides a summary of mixed ANOVA results. In the table, a p value of .05 or lower was needed for statistical significance in all of the variables. The educator group is not statistically significant showing p = .936. The differences among the three scales were not statistically significant. The scale is not significant either with a p = .570. However, the interaction between group and scale is statistically significant with a p = .001.

**Table 16**

Summary of Mixed ANOVA results

| | df | MS | F | p | Effect size |
|---|---|---|---|---|---|
| **Between Subject Effects** | | | | | |
| Educator Group (A) | 1 | .002 | .007 | .936 | .001 |
| Error | 194 | .246 | | | |
| **Within Subjects Effects** | | | | | |
| Scale (B) | 1 | .029 | .325 | .570 | .002 |
| Group X Scale (AB) | 1 | 3.207 | 36.138 | .001 | .157 |
| Error | 194 | .089 | | | |

Table 17 and illustration two give the summary of descriptive statistics for administrators and teachers. The data shows that the combined teacher groups rated their schools much higher in the process variables with a mean score of 3.29 than the low mean of 2.94 for context variables. Presage variables mean scores were in the mid-range, with a 3.15.

The administrators ranked process and context with about the same level of practice with means on 3.17 and 3.19 respectively. Administrators rated presage variables much lower with a mean of 3.02. Teachers view context as least important with a 2.94 mean. Teachers see presage (3.15) and process (3.29) variables as more important when compared to administrators. Administrators had a mean of 3.02 for presage and 3.18 for process variables.

**Table 17**

Summary of Descriptive Statistics for Teachers and Administrators

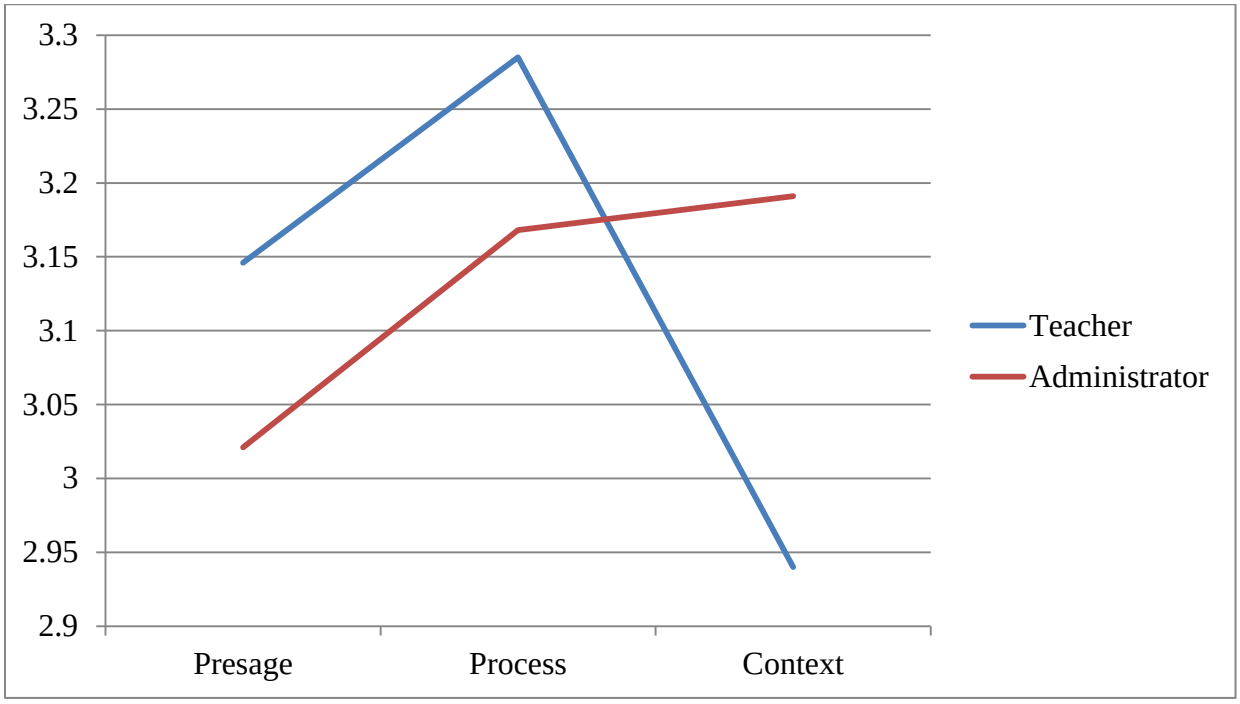
| | Variable | | |
|---|---|---|---|
| Educator Group | Presage Mean | Process Mean | Context Mean |
| Teacher | 3.15 | 3.29 | 2.94 |
| Administrator | 3.02 | 3.17 | 3.19 |

**Interaction Graph Results**

The information shown in illustration two shows that the group combined teachers rate process as the most important variable, presage as the second most important, and context as the least important variable. The graph also shows that the combined administrators group rated context as the most important variable, process as the second most important, and presage as the least important.

**Illustration Two**

Interaction Graph




**Round Two**

In Round Two, the panel of experts, educators from Award-Winning Technology Centers That Work schools, was presented with an instrument which asked them to rank "TEACHERS AT MY SCHOOL" characteristics (presage variables), "TEACHING AND LEARNING" characteristics (process variables) and "STUDENTS IN MY SCHOOL" characteristics (context variables) for contributing to the success for integrating academics into Career and Technical Education at Career and Technical Centers. The instrument was developed from the quantitative survey given in round one.

Round two of the survey was the final round and reserved for the award winning group only. In round two, the items that reached 80 percent consensus in the previous round were not included. Only the items that failed to reach 80 percent consensus were included in round two.

Nine practices describing how to properly prepare teachers through pre-service and in-service training (presage variables) become affective curriculum integrators were included in this round with three of these failing to reach consensus in round two. Six practices describing how to properly integrate core academic concepts (process variables) into CTE curriculum for maximum student achievement were included with six of these failing to reach consensus in round two. Ten practices describing how to properly prepare learners to improve achievement through curriculum integration (context variables) were included in this round with four of these failing to reach consensus in round two. Participants from 18 schools responded in round two for a 100 percent response rate. Frequencies, percentages, and ranks were used to evaluate the second round responses.

With the results from the survey, a predictive model, using logistic regression, was constructed to predict the success of a TCTW school based on its behaviors and integration practices. With this construct, independent variables were placed into the predictive model in an effort to predict if a school will be an award-winning or a non-award-winning TCTW school (dependent variables). According to Ross and Shannon (2008)

> Logistic regression is used to examine relationships with and make predictions of a categorical outcome (DV). So if you wanted to predict if you will pass this class, logistic regression is the approach you would take. The outcome of passing (or failing) the class is a dichotomous variable. There are just two choices (pass or fail), and what you will find by using logistic regression are the variables that contribute toward the probability of passing the class. (p. 221)

With this study, the researcher determined several predictors (independent variables) that are effective in helping TCTW schools to become award-winners (dependent variables). The

researcher's null hypothesis stated that there were no differences between the practices of award-winning TCTW schools and non-award-winning TCTW schools, specifically the presage variables (teacher variables), context variables (student variables), and process variables (classroom variables). Due to the evidence from this study presented throughout this chapter, the null hypothesis was rejected. There are significant differences between the practices of award-winning TCTW schools and non-award-winning TCTW schools, specifically the presage variables (teacher variables), context variables (student variables), and process variables (classroom variables).

The researcher determined that the participants should consist of CTE administrators and CTE teachers at leading CTCs in the United States as indicated by the SREB 2012 TCTW award-winning sites and most improved centers. This group made up the award-winning group. The participants from this group consisted of schools that achieved TCTW Platinum High Achievement status, TCTW Gold Readiness status, the TCTW Gold Improvement Award, and/or the 15 Most Improved TCTW Centers. Each of these categories required CTCs to have outstanding mean achievement scores in reading, math, and science on the HSTW Assessment.

**Agreement level for characteristics.**

In round one, each panel, both award-winning and non-award-winning Technology Centers That Work schools were asked to rate each characteristic using primarily a four-point Likert scale with 1 = strongly agree, 2 = agree, 3 = disagree, and 4 = strongly disagree. Several survey questions required panel members to rate using a 1 = frequently, 2 = occasionally, and 3 = not at all. These various scales were used to determine each panel member's level of agreement as to the characteristic's contribution to the success of integrating academics into the Career and Technical curriculum.

The percentage of the award-winning Technology Centers That Work schools' expert panel who agreed or strongly agreed on the Likert scale questions or indicated frequently or occasionally with each characteristic was used to measure the overall level of agreement. The researcher determined that only those characteristics that received an 80% level of agreement or higher would be used for inclusion in the round two for best practices ranking. Results of the panel's level of agreement for each characteristic are illustrated in tables 18, 19, and 20.

**Table 18**

Teachers at My School Characteristics, Presage Variables – Award-Winning Administrators and Teachers Individual Variables

| | % of Agreement | |
|---|---|---|
| Characteristic | Administrators | Teachers |
| Teachers have had sufficient professional development to integrate academics into the CTE curriculum | 90% | 95% |
| Teachers at my CTE school are active listeners to students' concerns | 91% | 100% |
| Data is continuously used to evaluate the CTE school's curriculum, instruction, and student success | 91% | 97% |
| Teachers at my CTE school often spend evenings and/or weekends working with students | 63% | 33% |
| Teacher at my CTE school often attend my students extracurricular activities | 45% | 58% |
| Teachers at my CTE school maintain a demanding yet supportive environment that pushes students to do their best | 100% | 98% |
| Teachers at my CTE school are continually learning and seeking new ideas on how to improve instruction | 100% | 98% |
| Teachers and the CTE administrator at my CTE school work as a team to improve student achievement | 100% | 92% |

| | | |
|---|---|---|
| CTE teachers and academic teachers are given mutual planning time for collaboration throughout the school year. | 45% | 46% |
| CTE teachers and academic teachers in my school work well together. | 27% | 50% |
| The administration at my CTE school provides feedback to help teachers improve my instruction. | 100% | 94% |
| There is an intensive emphasis on continuous improvement at my CTE school. | 100% | 99% |

**Table 19**

Teaching and Learning Characteristics, Process Variables – Award-Winning Administrators and Teachers Individual Variables

| | % of Agreement | |
|---|---|---|
| Characteristic | Administrators | Teachers |
| Great emphasis on the use of technology in my CTE school | 100% | 98% |
| Students at my CTE school are given multiple opportunities to learn content | 100% | 98% |
| Students in my CTE school are commonly allowed to develop their own assignments | 100% | 79% |
| Students at my CTE school are provided with intellectually demanding studies that emphasizes math | 100% | 94% |
| Students at my CTE school are provided with intellectually demanding studies that emphasizes science | 100% | 90% |
| Students at my CTE school are provided with intellectually demanding studies that emphasizes literacy | 91% | 98% |
| CTE Student Organizations (FBLA, FFA, HOSA, SkillsUSA, TSA, etc.) activities are strongly emphasized at my CTE school | 91% | 92% |

**Table 20**

Students in My School Characteristics, Context Variables – Award-Winning Administrators and Teachers Individual Variables

| | Non-Award-Winning | Award-Winning |
|---|---|---|
| Students have the math skills to succeed at my school | 91% | 80% |
| Students have the literacy skills to succeed at my school | 91% | 80% |
| Students have the science skills to succeed at my school | 82% | 80% |
| Students have the technological skills to succeed at my school | 100% | 95% |
| A majority of the students in my program have a genuine interest in the subject matter being taught | 100% | 97% |
| The goals and priorities at my CTE school are clearly communicated | 100% | 98% |
| The administration at my CTE school has high expectations for students to achieve college and career readiness | 100% | 100% |
| The feeder school(s) for my CTE school set high expectations for their students | 82% | 81% |
| Students get the guidance counseling they need to transition to college and career while at my CTE school | 90% | 91% |
| Students are required to work in teams at my CTE school develop their own assignments | 100% | 98% |

The format in Round Two required the expert panel (Educators at Award Winning Technology Centers That Work schools) to rank integration characteristics that received an 80% level of agreement or higher in Round One.

In Round Two, the expert panel was first asked to rank the TEACHER IN MY SCHOOL (presage variables) characteristics 1-9 (1 being the most important and 9 the least important) for contributing to the success of integrating academics into Career and Technical Education at Career and Technical Centers.

Next, the panel was asked to rank the TEACHING AND LEARNING (process variables) characteristics 1-6 (1 being the most important and 6 the least important) for contributing to the success of integrating academics into Career and Technical Education at Career and Technical Centers.

Finally, the panel was asked to rank the STUDENT IN MY SCHOOL characteristics 1-10 (1 being the most important and 10 the least important) for contributing to the success of integrating academics into Career and Technical Education at Career and Technical Centers.

According to the Delphi portion of the research study, educators at award winning TCTW schools indicated that certain presage integration characteristics increase the likelihood of a school becoming an award-winning school. Table 18 indicates that these integration characteristics include

1. Career and Technical teachers maintaining a demanding yet supportive environment that pushes students to do their best. Mean of 3.21.
2. Career and Technical teachers are continually learning and seeking new ideas on how to improve student achievement. Mean of 3.48.
3. Providing professional development to teachers at the Career and Technical school concerning how to integrate academics into their Career and Technical program is crucial. Mean of 4.18.

**Table 21**

Ranking of Teachers at My School Characteristics, Presage Variables (1 being the most important and 9 being the least important) – Award-Winning Administrators and Teachers

| Integration Characteristic | Ranking Frequency | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Providing professional development to teachers at the Career and Technical school concerning how to integrate academics into their Career and Technical program | 8 | 3 | 3 | 5 | 4 | 2 | 4 | 1 | 3 |
| | | | | Mean = 4.18 | | | | | |
| Career and Technical teachers actively listening to their students' concerns | 3 | 8 | 5 | 3 | 3 | 3 | 2 | 1 | 5 |
| | | | | Mean = 4.42 | | | | | |
| Career and Technical teachers using data continuously to evaluate their program's curriculum, instruction, and student success | 2 | 2 | 9 | 2 | 4 | 3 | 3 | 7 | 1 |
| | | | | Mean = 5.00 | | | | | |
| Career and Technical teachers maintaining a demanding yet supportive environment that pushes students to do their best | 11 | 2 | 4 | 6 | 7 | 2 | 0 | 1 | 0 |
| | | | | Mean = 3.21 | | | | | |
| Career and Technical teachers continually learning and seeking new ideas on how to improve student achievement | 5 | 6 | 7 | 5 | 6 | 3 | 0 | 0 | 1 |
| | | | | Mean = 3.48 | | | | | |
| Career and Technical teachers and administrators working as a team to improve student achievement | 3 | 3 | 1 | 4 | 5 | 10 | 5 | 2 | 0 |
| | | | | Mean = 4.97 | | | | | |
| Career and Technical teachers and academic teachers working well together | 0 | 0 | 1 | 2 | 0 | 0 | 11 | 8 | 11 |
| | | | | Mean = 7.61 | | | | | |
| Administrators providing periodic feedback to Career and Technical teachers to help improve instruction | 0 | 1 | 1 | 6 | 1 | 4 | 6 | 7 | 7 |
| | | | | Mean = 6.64 | | | | | |

| Integration Characteristic | Ranking Frequency | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Teachers placing an intensive emphasis on continuous improvement in Career and Technical programs | 1 | 8 | 2 | 0 | 3 | 6 | 2 | 6 | 5 |
| | | | | Mean = 5.48 | | | | | |

Table 22 indicates that according to the Delphi portion of the research study, educators at award-winning TCTW schools indicated that certain process integration characteristics increase the likelihood of a school becoming an award-winning school. These integration characteristics include

1. Career and Technical teachers giving students multiple opportunities to learn content. Mean of 2.23.
2. Career and Technical teachers placing great emphasis on the use of technology. Mean of 2.58.

**Table 22**

Ranking of Teaching and Learning Characteristics, Process Variables (1 being the most important and 6 being the least important) – Award-Winning Administrators and Teachers

| Integration Characteristic | Ranking Frequency | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Career and Technical teachers placing great emphasis on the use of technology | 9 | 12 | 1 | 3 | 4 | 2 |
| | | | Mean = 2.58 | | | |
| Career and Technical teachers giving students multiple opportunities to learn content | 15 | 7 | 4 | 0 | 2 | 3 |
| | | | Mean = 2.23 | | | |
| Career and Technical teachers giving students intellectually demanding assignments emphasizing math | 2 | 4 | 9 | 13 | 3 | 0 |
| | | | Mean = 3.35 | | | |

| Integration Characteristic | Ranking Frequency | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Career and Technical teachers giving students intellectually demanding assignments emphasizing science | 0 | 2 | 3 | 10 | 9 | 7 |
| | | | Mean = 4.52 | | | |
| Career and Technical teachers giving intellectually demanding assignments emphasizing literacy | 1 | 2 | 12 | 4 | 9 | 3 |
| | | | Mean = 3.87 | | | |
| Career and Technical teachers emphasizing Career and Technical Student Organizations (FBLA, FCCLA, FFA, HOSA, SkillsUSA, TSA, etc.) activities at the Career and Technical Center | 4 | 4 | 2 | 1 | 4 | 16 |
| | | | Mean = 4.45 | | | |

According to the Delphi portion of the research study, educators at award winning TCTW schools indicated that certain Context integration characteristics increase the likelihood of a school becoming an award winning school as table 20 shows. These integration characteristics include

1. Students having a genuine interest in the subject matter being taught in the Career and Technical Center. This single characteristic was selected at a higher frequency as the top choice of all other indicators in this study with a mean of 2.13.
2. The Career and Technical Center's administration having high expectations for students to achieve college and career readiness. Mean 4.67.
3. Students having the math skills necessary to succeed at the Career and Technical Center. Mean of 4.87.

**Table 23**

Ranking of Students in My School Characteristics, Context Variables (1 being the most important and 10 being the least important) – Award Winning Administrators and Teachers

| Integration Characteristic | Ranking Frequency | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Students having the math skills necessary to succeed at the Career and Technical Center | 1 | 5 | 4 | 4 | 3 | 5 | 3 | 4 | 1 | 0 |
| | | | | | Mean = 4.87 | | | | | |
| Students having the science skills necessary to succeed at the Career and Technical Center | 1 | 0 | 1 | 2 | 4 | 2 | 6 | 8 | 1 | 5 |
| | | | | | Mean = 6.97 | | | | | |
| Students having the literacy skills necessary to succeed at the Career and Technical Center | 0 | 2 | 3 | 2 | 4 | 7 | 5 | 1 | 6 | 0 |
| | | | | | Mean = 6.0 | | | | | |
| Students having the technological skills necessary to succeed at the Career and Technical Center | 3 | 0 | 2 | 7 | 2 | 5 | 4 | 5 | 1 | 1 |
| | | | | | Mean = 5.47 | | | | | |
| Students having a genuine interest in the subject matter being taught in the Career and Technical program | 18 | 3 | 3 | 1 | 4 | 0 | 1 | 0 | 0 | 0 |
| | | | | | Mean = 2.13 | | | | | |
| The Career and Technical Center clearly communicating the goals and priorities of the school | 2 | 6 | 4 | 2 | 4 | 2 | 3 | 2 | 3 | 2 |
| | | | | | Mean = 5.0 | | | | | |
| The Career and Technical Center's administration having high expectations for students to achieve college and career readiness | 3 | 7 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 1 |
| | | | | | Mean = 4.67 | | | | | |
| Feeder schools having high expectations for their students to achieve college and career readiness | 1 | 3 | 4 | 4 | 1 | 2 | 2 | 6 | 4 | 3 |
| | | | | | Mean = 6.0 | | | | | |

| Integration Characteristic | Ranking Frequency | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Career and Technical students getting the guidance counseling they need to transition to college and career | 0 | 3 | 0 | 3 | 3 | 3 | 0 | 0 | 9 | 9 |
| | | | | | Mean = 7.4 | | | | | |
| Students being required to work in teams at the Career Technical Center | 1 | 1 | 6 | 2 | 2 | 2 | 4 | 1 | 2 | 9 |
| | | | | | Mean = 6.5 | | | | | |

Research Question 5. Could a predictive model be established that can predict group membership (award-winning TCTW schools and non-award-winning TCTW schools) using presage, process, context, and TCTW professional development?

The achievement level was identified for the TCTW member schools as either award-winning or non-award-winning. The hypothesis of this study attempted to predict this behavior by applying a logistic regression model; that is, does the predicted behavior match that of the observed behavior through the application of the logistic regression? According to Field (2005), the choice of logistic regression is an appropriate method designed to "model the relationship between one or more predictor variables and an outcome" (Field, 2005, p. 218). This method is especially designed to facilitate the use of and predict outcome variables which are categorically dichotomous through the analysis of predictor variables that are continuous or categorical. Due to these specific limiting criteria, the application of linear regression/multiple regression modeling would be ineffective due to the lack of a linear relationship between the predictor(s) and the outcome variables.

This study examined the achievement level data from the TCTW schools and split this data into two groups, award winning and non-award-winning. The samples of the two groups

were analyzed with the inclusion of specific variables which include presage variables, context variables, context variables, and TCTW professional development variables. These data were derived from a survey developed by the researcher. Data for this study were also derived from the 2012 HSTW Assessment, which measures the academic content knowledge of students and teachers' responses through a survey in the spring of even-numbered years. The academic assessment is given to a sample or to the entire population of senior students at participating TCTW schools. This assessment evaluates students' competencies in mathematics, reading, and science. Students' ability levels are grouped as either below basic, basic, proficient, or advanced with the basic level being the minimum goal for all students to reach. Students who reach this level are considered ready for college level coursework without the need for remediation. Teachers at these schools are also surveyed bi-annually to determine benchmarks (SREB, 2014).

**Logistic Regression Model Results**

The choice of variables for this model was considered for specific factors. The study was designed to determine how presage variables, process variables, and process variables affect group membership as either a TCTW award-winning or non-award-winning school. The scales of presage and context were important predictors of whether a school was award winning or non-award-winning. The context scale was not important in predicting award-winning or non-award-winning status. When the logistic model was set up to remove the least contributing factor, process was removed. The full model had a 66.3% chance of determining if a school would be classified as an award-winning or non-award-winning TCTW school. The restricted model had a 64.3% chance of predicting award-winning or non-award-winning TCTW schools. In this predictive model, the Backward Wald method was utilized to remove the variable of least

significance. As a result, process was removed and all other variables were found to be significant.

**Table 24**

Logistic Regression Model

| | FULL MODEL | | | RESTRICTED MODEL | | |
|---|---|---|---|---|---|---|
| | Model 1 $\chi^2$ | % Classified Correctly | Nagelkerke's $R^2$ | Model 2 $\chi^2$ | % Classified Correctly | Nagelkerke's $R^2$ |
| **Overall Model** | 24.686 | 66.3 | .162 | 23.470 | 64.3 | .154 |
| | B | Odds ratio | | B | Odds ratio | |
| Presage | 1.010* | 2.744 | | 1.291* | 3.635 | |
| Process | .697 | 2.007 | | REMOVED | REMOVED | |
| Context | 1.038* | 2.823 | | 1.040* | 2.830 | |
| **Constant** | -8.822 | .000 | | -7.445 | .001 | |

*p<.05

# Chapter 5

## Summary, Conclusions, Implications, and Recommendations

### Summary

This chapter presents the following information: background, purpose of the study, conclusions, implications, and recommendations for practice and further research. The problem was students are not prepared for the demands associated with the required skills in the workplace. Business and industry leaders are very concerned with this growing challenge. Many feel that integrating academic skills in literacy, math, and science into the context of real world learning experiences will dramatically improve students' abilities to succeed in post-secondary studies and the workplace (The Conference Board, 2006).

### Background

Integrating academics and career and technical education is viewed in many American public high schools as a way to solve the problems of preparing students for the rigors of college and the demands in the modern workplace. In 1987, the Southern Regional Education Board (SREB) created an initiative aimed at improving both the academic and career and technical curriculum of students. This initiative, titled High Schools That Work (HSTW), set out to focus on retooling traditional education into one that is both integrated and collaborative with the participation and cooperation of academic and career and technical education teachers. In 2007, the SREB launched another initiative, titled Technology Centers That Work (TCTW). This initiative focused on improving the quality of Career and Technical Centers (CTCs) in the United States through integration practices.

Studies have identified certain conditions and strategies to implement the integration of academics and career and technical education. The strategies take on many variations depending

on geographic location, school type and size, and availability of resources (Bottoms & Han, 2004; Grubb, et al., 1991; Schmidt, et al., 1992 a&b).

**Purpose of the Study**

The purpose of this study was to create a consensus among award-winning CTCs that are members of the TCTW consortium regarding what constitutes best practices in the integration of core academic concepts into the CTE curriculum. These were also compared to non-award winning schools in order to determine what those schools did differently. These factors were used to determine if they are predictors for group membership at an award-winning TCTW school or comparison TCTW school. The end result may now be used as a formula for schools to employ as they strive to achieve an award-winning status. The information acquired from this research may be used by CTCs across the country to improve existing CTE curriculum and instruction for the boosting of student achievement.

In order to better prepare our youth for future success in a variety of careers, this study explored how the best practices of the integration of core academics into the CTE curriculum has improved students' achievement.

Existing within the TCTW network of schools are many curriculum integration practices that will benefit other CTCs in our nation. This network, developed as a division of the SREB) High Schools That Work (HSTW) initiative, included 166 sites in 17 states in 2012. Founded in 1987, HSTW is a comprehensive school reform initiative that combines modern CTE studies and challenging academic courses to improve the achievement of high school students (Frome, 2001). According to SREB (2012), HSTW is the largest school improvement initiative in the country involving over 1,200 schools in 30 states and the District of Columbia.

The TCTW school improvement initiative, developed by SREB, has existed since 2007 and was designed to help schools review and implement the actions needed to produce high-demand, high-wage graduates who will be leaders in their selected careers. The SREB administers the HSTW academic student assessment and teacher surveys in the spring of even-numbered years. The academic assessment is given to a sample or the entire population of senior students at participating TCTW schools. This assessment evaluates students' competencies in mathematics, reading, and science. Students' ability levels are grouped as either below basic, basic, proficient, or advanced with the basic level being the minimum goal for all students to reach. Students who reach this level are considered ready for college level coursework without the need for remediation. Teachers at these schools are also surveyed bi-annually to determine benchmark areas (SREB, 2014).

## Research Questions

1. What were the selective demographics for award winning and non-award-winning TCTW schools?
2. Do administrators from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools?
3. Do teachers from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools?
4. What factors did the CTE administrators and teachers at award-winning agree contributed to their success?

5. Could a predictive model be established that can predict group membership (award-winning TCTW schools and non-award-winning TCTW schools) using presage, process, context, and TCTW professional development.

**Null Hypothesis**

The following null hypothesis guided the study's statistical analysis:

$H_o1$ There is no difference between the perceptions of teachers at award-winning TCTW schools and teachers at non-award-winning TCTW schools as measured by responses on the perception survey.

$H_o2$ There is no difference between the perceptions of administrators at award-winning TCTW schools and administrators at non-award-winning TCTW schools as measured by responses on the perception survey.

$H_o3$ There is no difference between the perceptions of teachers at award-winning TCTW schools and administrators at award-winning TCTW schools as measured by responses on the perception survey.

$H_o4$ There is no difference between the perceptions of teachers at non-award-winning TCTW schools and administrators at non-award-winning TCTW schools as measured by responses on the perception survey.

## Population

**Teachers**

Two groups of Career and Technical teachers who taught at participating TCTW schools provided information for this study and data concerning school characteristics and perceptions. Teachers were assigned to either the award-winning group (n = 63) or to the comparison group (n = 69) for the purpose of this study:

Award-Winning Teachers. Teachers from TCTW schools identified as award-winning upon the completion of the 2012 High Schools That Work Assessment given to senior students at participating schools (i.e., award-winning teachers).

Non-Award-Winning Teachers. Teachers from TCTW schools identified as non-award-winning upon the completion of the 2012 High Schools That Work Assessment given to senior students at participating schools (i.e., comparison group teachers).

**Administrators**

Two groups of administrators from participating TCTW schools provided information for this study and data concerning school characteristics and perceptions. Administrators were assigned to either the award-winning group (n = 13) or to the comparison group (n = 66) for the purpose of this study:

Award-Winning Administrators. Administrators from TCTW schools identified as award-winning upon the completion of the 2012 High Schools That Work Assessment given to senior students at participating schools (i.e., award-winning administrators).

Non-Award-Winning Administrators. Administrators from TCTW schools identified as non-award-winning upon the completion of the 2012 High Schools That Work Assessment given to senior students at participating schools (i.e., comparison group administrators).

## Design of the Study

This study created a construct of best practices through review of CTE administrators' and CTE teachers' perceptions of curriculum integration at the 18 TCTW award-winning CTCs (award-winning group) and 148 TCTW non-award-winning CTCs (comparison group) in the United States. The study then tested the best practices, through the use of a survey instrument in which the two groups of participants' (award-winning and comparison groups) responses were

compared. The responses were then ranked based on the importance of the proposed best practices. The researcher attempted to survey the entire population of schools in the TCTW consortium. This included administrators and all CTE teachers at these schools. The surveys were sent through email and the operating system handling these surveys was Qualtrics. Survey results were made available to all participants in the study.

Due to the extensive review of related literature in the proposal, a modified Delphi technique was used. This allowed the researcher to use the factors already identified in the literature review and then move on to a Delphi round. The expert participants consisted only of the CTE administrators and CTE teachers at the eighteen TCTW award-winning CTCs.

## Data Collection

Data collection occurred in the spring of 2014 for both of the groups. Teacher and administrator questionnaires concerning the integration of academics into the CTE curriculum were administered along with several reminders and follow ups. Measures are described in the following paragraphs.

## Measures

Each participant was contacted and informed about the purpose of the study. Each participant had the choice of whether or not they wanted to participate in the study. There were 13 CTE administrators and 63 teachers that participated in the award-winning group, along with 66 CTE administrators and 69 teachers that participated in the comparison group (non-award-winning). All were delivered through an email link to the Qualtrics system.

The first round of survey questionnaires were sent to the participants in March 2014. In order to accurately describe best practices of curriculum integration, questions from the following categories were formulated:

1. Describe how to properly prepare CTE teachers to become affective curriculum integrators through pre-service and in-service experiences (presage variables)
2. Describe how to properly prepare learners to improve achievement through curriculum integration (context variables).
3. Describe how to properly integrate core academic concepts into CTE curriculum for maximum student achievement (process variables).
4. Describe which TCTW professional development opportunities each participant had been involved with.

From the reviewed related literature of curriculum integration, a questionnaire consisting of questions in each of the above four categories (a total of 39 questions) were developed for the panel. In addition, questions concerning demographics and specific TCTW professional development attained were asked.

## Data Analysis

Frequencies and percentages were calculated for selected demographic data. The target population for the perception surveys conducted in the spring of 2014 were teachers and administrators at schools that were a member of the TCTW consortium in 2012. Within the award winning group, 76 total educators completed the survey. Sixty-three teachers, along with 13 administrators completed the survey. Within the non-award winning group, 135 total educators completed the survey, with 69 being from teachers and 66 being from administrators. All quantitative analysis was completed using the Statistical Package for the Social Sciences version 11.01.

## Results

Of the 166 TCTW schools that received emailed survey links in round one of the quantitative study, 211 surveys were completed. A total of 135 surveys were received from the schools that were classified as non-award-winning and 76 surveys were received from award-winning schools. Thirteen out of 18 award-winning schools participated in the study for a 72 percent response rate. Sixty-six out of 148 comparison schools participated in the study for a response rate of 45 percent.

All four of the null hypotheses were rejected based on the analysis. The quantitative analyses determined that significant differences existed between the groups regarding the perceptions of teachers at award-winning TCTW schools and teachers at non-award-winning TCTW schools as measured by responses on the perception survey and differences between the perceptions of administrators at award-winning TCTW schools and administrators at non-award-winning TCTW schools as measured by responses on the perception survey. In addition, there was a significant difference between the perceptions of teachers at award-winning TCTW schools and administrators at award-winning TCTW schools and there is a significant difference between the perceptions of teachers at non-award-winning TCTW schools and administrators at comparison TCTW schools as measured by responses on the perception survey.

## Conclusions

Conclusions were based on analysis of data as related to research questions.

Research question 1. What were the selective demographics for award winning and non-award-winning TCTW schools? The conclusion drawn from this study concerning research question number one was that the majority of the 211 participants were male (124; 59.6 percent). The award-winning group (n=135) included 78 males (58 percent) and fifty-six females (42

percent). The comparison group (n=76) included 46 males (61 percent) and 30 females (39 percent). Another interesting fact about the groups is that neither a majority of award-winning or non-award-winning participants indicated that they participated in a quality CTE program while in high school. Only 50 out of 133 (38%) non-award-winning participants indicated that they participated in a quality CTE program in high school. Only 22 of 76 participants (29%) award-winning participants indicated that they participated in a quality CTE program in high school. It therefore, does not seem to matter if teachers and administrators participated in quality CTE programs when they were in high school.

Research question 2. Do administrators from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools? The presage variables data indicates that administrators at award-winning schools perceive their school's integration practices to be much more successful than administrators at non-award-winning schools in presage, process, and context variables. The data shows that award-winning administrators perceive that nearly all of their schools' presage integration practices are better when compared to non-award-winning administrators' perceptions.

The perceptions of administrators at award-winning TCTW schools are that the teachers at their CTC are continually learning and seeking new ideas on how to improve instruction at a mean of .65 higher than the administrators at non-award-winning schools. Administrators at award-winning TCTW schools also believe that there is an intensive emphasis on continuous improvement at their CTC and the teachers at their CTE school use data continuously to evaluate their program's curriculum, instruction, and student success. Each of these questions had a mean of .43 higher than the non-award-winning administrators' collective response. Administrators at

award-winning TCTW schools rated felt that Teachers and the CTE Administrator at their schools work as a team to improve student achievement at a .41 higher mean that administrators at comparison schools. Administrators at award-winning schools also expressed that the teachers at their CTC have had sufficient professional development to integrate academics into their CTE program at a rate of 1.36 compared to the 1.77 rate of their counterparts. This is a .41 difference.

Administrators at non-award-winning TCTW schools responded with a mean of 1.55 while award-winning administrators' collective mean was 1.45 on the question that stated, I provide periodic feedback to my teachers to help instruction at my CTC. This shows that administrators at award-winning schools perceive that their schools are .10 better on the mean than non-administrators' perceptions. The next statement on the survey was, teachers at my CTC maintain a demanding yet supportive environment that pushes students to do their best. Again, administrators at award-winning TCTW schools had better a better mean score which was 1.45, than the other administrators' group which was 1.74. This shows a .29 better score for the award-winning schools. A 1.36 mean was recorded for the award-winning administrators' perception and a 1.77 for the non-award-winning group for the statement, teachers and the CTE Administrator at my CTE school work as a team to improve student achievement. Award-winning schools were .41 better in regards to the mean. Principals at award-winning TCTW schools had an average of 1.73 on the statement, teachers at my CTE school are active listeners to their students' concerns, while the non-award winning group had a mean of 1.85. This showed a .12 difference in favor of the award-winning schools.

Administrators at non-award-winning TCTW schools responded with a mean of 2.54 while award-winning administrators' collective mean was 2.36 on the question that stated, teachers at my CTC often attend students' extracurricular activities, a difference of .18.

According to administrators, teachers at award-winning TCTW schools often spend evenings and/or weekends working with their students at a mean of 2.27 compared to a non-award-winning mean of 2.58, a difference if .31 in favor of the award-winners. The next statement on the survey was CTE teachers and academic teachers are given mutual planning time for collaboration throughout the school year. The non-award-winning mean was actually better than the other group in this case. A 3.10 mean compared to a 3.35 mean from the award-winners. This is a slight difference of .25. Lastly, the statement CTE teachers and academic teachers in my school work well together was asked. The award-winning administrators responded with a mean of 3.27 and the non-award-winners showed a 3.31. This was very similar, showing only a difference of .04.

When teaching and learning variables, or process variables were analyzed, it was determined that administrators at award-winning TCTW schools estimate the percentage of their students earning post-secondary college credit (dual enrollment) is far above what administrators at non-award-winning schools estimate in their schools. In fact, there is a 2.32 difference in the means of these estimates. This difference is by far the largest difference in this entire data set. Administrators at award-winning schools also estimate that there are a much higher number of their students earning employability credentials, a mean difference of .53, when compared to the estimates at the non-award-winning schools. Table six also expresses a difference in the perceptions of administrators at award-winning schools on their students being given the multiple opportunities to learn content at a mean rate of .39 higher than the what those at the non-award-winning schools said. Award winning schools provide their students with intellectually demanding studies that emphasizes science at a mean rate .33 higher than non-award-winning schools, according to the administrators.

A strong emphasis is placed on certain teaching and learning methods at each of these school groups. The non-award winning administrators indicated that teacher demonstrations, group projects, teacher presentations, and discussion are the top four methods in their schools. In contrast, the principals at award-winning TCTW schools pointed out that students sharing in small groups was their school's most popular method with teacher demonstrations, group projects, and discussions rounding out the top four.

The data from the context variables for administrators at award-winning TCTW schools indicate that there is a much higher percentage of their students completing a career exploration course before they enroll in the Career and Technical Center (CTC). In fact, the mean rate at award-winning schools is 1.00 higher than the other principal group indicated. This figure is second greatest difference in all of the variables on the administrator questionnaire. Administrators at award-winning TCTW schools also estimate that the percentage of their students on a free or reduced lunch rate is much different than the mean estimation of the non-award-winning schools, a .72 difference. The goals and priorities are clearly communicated at award-winning schools at a mean rate of .46 higher and students are perceived to have the math skills they need to succeed at the CTC at a mean rate of .40 higher at the award-winning-schools when compared to the other group.

Research question 3. Do teachers from award-winning and non-award-winning schools report different levels of presage, process, context, and professional development activity at their schools? Teachers at award-winning schools generally perceive their school's integration practices to be more successful than teachers at non-award-winning schools in presage, process, and context variables.

As far as presage variables are concerned, the perceptions of teachers at award-winning TCTW schools are that the administration at their school provides feedback to them to help them improve instruction at a .27 mean rate higher than the administrators at non-award-winning schools. Teachers at award-winning TCTW schools also believe that the teachers and the CTE Administrator work as a team to improve student achievement at a mean rate of .25 higher than the non-award-winning administrators' responses. Teachers at non-award winning schools actually indicated that their schools give their CTE and academic teachers mutual planning time for collaboration throughout the school year at a mean rate of .25 higher than the responses of the award-winning teachers.

When it comes to process variables, much like the perception of the award-winning administrator group, teachers at award-winning TCTW schools estimate the percentage of their students earning post-secondary college credit (dual enrollment) is much higher than what teachers at non-award-winning schools estimate in their schools. There is a .61 higher mean in these of these estimates. This mean difference is the second largest for all of the teacher variables. According to the table, teachers at non-award-winning schools actually assign homework at a mean rate of .31 higher than their award-winning teacher counterparts. Teachers at non-award-winning schools also believe that their students earn a mean difference of .29 more employability credentials than teachers at award-winning schools. Award-winning teachers believe that they place a greater emphasis on the use of technology in their programs at a mean rate of 1.30 when compared to the non-award-winning teacher rate of 1.60., a .30 difference.

According to the surveyed teachers, there is no difference in the indicated emphasis placed on certain teaching and learning methods at the award-winning and non-award-winning

schools. Each group indicated that teacher demonstrations, discussions, group projects, and students sharing in small groups are the top four methods in their schools.

When it comes to context variables, teachers at non-award-winning TCTW schools estimate that the percentage of their students on a free or reduced lunch rate is much higher than the mean estimation of the non-award-winning schools, a 1.15 difference. This was the greatest mean difference in this particular teacher survey set.

Teachers at award-winning TCTW schools, much like their administrators, say that there is a much higher percentage of their students completing a career exploration course before they enroll at their CTC. The mean rate at award-winning schools is .62 higher than the other teacher group indicated. This figure is second greatest difference in all of the variables on the teacher questionnaire. Award-winning teachers also indicate that the feeder school(s) for their CTE school sets high standards for their students at a mean rate of .44 higher than what is indicated by the non-award-winning teachers. A majority of the students in the schools of award-winning programs are genuinely interested in the subject matter being taught according to the teacher group. This mean rate is .40 higher in the award-winning schools compared to the indications of the teachers at non-award winning schools.

A 2x2 chi-square analysis was conducted to assess any relationship that may exist between specific professional development sessions and success in becoming an award-winning Technology Centers That Work school.

Chi-square tests were conducted for all 27 TCTW professional development sessions. The data revealed that there were no significant differences in the distribution of responses for the award-winning and non-award-winning administrators in all of these professional development offerings.

The results from the teachers' responses revealed that there was a significant difference in the distribution of responses among the teachers group the Literacy Workshop – Big Six Literacy Skill producing a chi-square coefficient of .029. Teachers at non-award-winning schools indicated that they have participated in this workshop at a rate of 27.91% compared to the award-winning teachers' rate of 7.50%.

The data cited in table 15 also shows that there was significant difference in the distribution of responses among the teachers group for Four Professional Development Modules – Instructional Planning producing a chi-square coefficient of .038. Teachers from award-winning schools reported attending this professional development at a 25.00% rate and the non-award-winning teachers participated at a 6.98% rate.

The data cited in table 15 also shows that there was a significant difference in the distribution of responses among the teachers groups Project-Based Learning. Teachers at non-award-winning schools indicated that they have participated in this workshop at a rate of 39.53% compared to their award-winning counterparts' rate of 15%. The data produced on TCTW professional development workshops is very limited. With the 27 workshops being offered, the data shows that award-winning and non-award schools participate in these sessions at a similar rate with the exception of only a few.

Research question 4. What factors did the CTE administrators and teachers at award-winning agree contributed to their success? According to the Delphi portion of the research study, educators at award winning TCTW schools indicated that certain presage integration characteristics increase the likelihood of a school becoming an award-winning school. These integration characteristics include

1. CTE teachers maintaining a demanding yet supportive environment that pushes students to do their best. Mean of 3.21. This may be driven by the leadership, guidance counselor, or program specific teachers at the CTC.
2. CTE teachers are continually learning and seeking new ideas on how to improve student achievement. Mean of 3.48. This may mean that Career and Technical teachers and academic teachers need to work well together to do what's best for student achievement at the CTC.
3. Providing professional development to teachers at the Career and Technical school concerning how to integrate academics into their Career and Technical program is crucial. Mean of 4.18. This may mean that progressive Career and Technical schools offer their faculty members opportunities to participate in professional development workshops from TCTW, Math-In-CTE, or another type of curriculum integration model.

According to the Delphi portion of the research study, educators at award-winning TCTW schools indicated that certain process integration characteristics increase the likelihood of a school becoming an award-winning school. These integration characteristics include

1. CTE teachers giving students multiple opportunities to learn content. Mean of 2.23. Examples of giving students multiple opportunities to learn content may be allowing students to turn in a project or test multiple times before the final grade is taken, giving students timely feedback on completed assignments, or using a variety of teaching and learning methods as an attempt to reach all types of learners.
2. CTE teachers placing great emphasis on the use of technology. Mean of 2.58. The world is becoming more technological driven and our CTCs must continue to adapt

our programs to simulate this occurrence while students are training.

CTCs must teach technology skills that reflect the demands of the 21st century workforce.

According to the Delphi portion of the research study, educators at award-winning TCTW schools indicated that certain context integration characteristics increase the likelihood of a school becoming an award winning school as table 16 shows. These integration characteristics include

1. Students having a genuine interest in the subject matter being taught in the CTC. This single characteristic was selected at a higher frequency as the top choice of all other indicators in this study with a mean of 2.13. When students are placed in CTE programs that they are genuinely interested in, they will obviously pay attention more, enjoy what they are learning, make better grades, develop a stronger skill set, see a potential career pathway, and be less of a potential discipline problem for their teacher.
2. The CTCs administration having high expectations for students to achieve college and career readiness. Mean 4.67.
3. Students having the math skills necessary to succeed at the CTC. Mean of 4.87. Middle schools that do a good job teaching math will better prepare their students for success at the CTC and college and career after graduation.

Research question 5. Could a predictive model be established that can predict group membership (award-winning TCTW schools and non-award-winning TCTW schools) using presage, process, context, and TCTW professional development.

Logistic regression, chi square, and ANOVA analyses were performed on existing survey data to provide a statistical perspective on the perceptions of educators at TCTW schools concerning the best practices of integrating academics into the context of Career and Technical Education. The researcher performed analysis on the various survey items which included presage, process, context, and TCTW professional development workshops. This was done in order to determine if there was a significant difference in the distribution of responses between award-winning and non-award winning schools and between teachers and administrators.

The theoretical framework for this study was based on the Dunkin and Biddle's (1974) model for classroom instruction. This model focuses on the properties of teachers and learners and includes the variables of presage, context, process, and product variables. The Dunkin and Biddle model proposes that product variables are the outcome of presage variables, process variables, and context variables. Presage variables (how teachers are prepared prior to a particular classroom experience) and context variables (learners experiences prior to the particular classroom experience) both contribute to the process variables (teacher and learner behaviors in a specific classroom learning experience). These three variables in turn, contribute collaboratively to determine the product variables or outcomes of a particular classroom experience (Dunkin & Biddle, 1974).

In this study, the presage and context variables at both the award-winning TCTW schools and the non-award-winning TCTW schools showed significant difference. Therefore the presage practices and the context practices of integrating academics into CTE were different at the award-winning TCTW schools when compared to the non-award-winning TCTW schools. Also, it was shown that the process variables of award-winning and non-award-winning TCTW

schools had no significant difference. This means that the practices of integrating academics into the CTE curriculum with these two groups were very similar.

**Implications**

This study proved to be consistent with much of the previously published body of literature concerning the integration of academics in to the context of CTE. The results do imply that previous researchers and practitioners (Bottoms et. al, 2004; Stone et. al, 2006; Hyslop, 2007) were correct in their assumptions that an integrated CTE curriculum leads to higher student achievement. Findings in this study were consistent with the stance taken by Hyslop (2007), "Integration of academic competencies into career and technical education curricula and of real-world content and applied methods and examples into traditional classes can raise achievement levels and increasing understanding of rigorous content (p. 40)." Responses from award-winning administrators and teachers indicate that schools that are doing a better job of integrating academics into the CTE curriculum are producing students that are outperforming others on the HSTW Assessment.

This study supported claims made by SREB (2014) that TCTW key practices contribute significantly to the improvement of student preparedness for college and future career success. The TCTW key practices of setting high expectations for students, integrating rigorous academic competencies into the context of CTE, focusing on teacher collaboration in cross-disciplinary teams, involving students in a comprehensive guidance, providing students with extra system of getting extra help in completing accelerated assignments, and creating a culture of continuous improvement did prove to provide a significant increase in student performance on the HSTW Assessment.

CTCs in the United States must continue to seek better ways of integrating academics into the context of real-world learning experiences in CTE. The SREB continues to make a positive impact on preparing students for college and career readiness through the recommended practices of the TCTW Initiative. Local education agencies must embrace the powerful role of CTE to help students become prepared for life after high school.

This study has shown that certain integration practices seem to increase the likelihood of students in TCTW schools achieving award winning status while others do not. The data seems to indicate that award-winning and non-award-winning TCTW schools are basically doing the same things in the process of classroom and laboratory learning experiences. However, the presage practices (teacher behaviors, learner variables, and changes in behavior) and the context practices of the learners (formative experiences, learner characteristics, personality traits, school and community characteristics, and classroom characteristics) show a significant difference at award-winning TCTW schools when compared to the non-award winning schools.

Due to the research findings, the researcher would like to have had the entire population of teachers and administrators at TCTW schools instead of the considerably smaller sample size that participated in the study. This would have eliminated the chance of error due to a larger and complete data set.

In a perfect world, the researcher would have gotten data from the SREB indicating which schools, teachers, and administrators actually participated in specific TCTW professional development workshops. This information would have removed the margin for error in determining this information from the memory of each participant in the study. With 27 different professional development workshops, many having similar titles, this question was simply asking too much of them. A study on the effectiveness of TCTW professional development as

related to student performance and schools obtaining award-winning or non-award-winning status would be very compelling, but it seems that waiting a few years into the future for this study makes more sense. At this time, the TCTW Initiative is still in its infancy and more participation in these professional development sessions in necessary in order to gain a clearer view of which session offers schools the greater potential impact on increasing student achievement.

**Recommendations**

Like other research studies, findings from this study could raise questions for further research study. Schools that are members of the TCTW consortium that desire to become an award-winning school should consider placing a stronger emphasis on presage and context variables as indicated in this study and not as much emphasis on the context variables. The logistic regression model findings support this concept.

**Response to Descriptive Questions**

The researcher gave participants an opportunity to respond to open-ended questions regarding specific integration factors and challenges to integration. These responses could serve as a guide for directing future research studies. The open-ended question regarding specific teacher factors that help teachers effectively integrate literacy, science, and math concepts in the CTE curriculum produced 39 responses from award-winning teachers and 41 responses from the non-award-winning teacher panel.

Thirty-nine responses from the award winning teacher panel were produced. Analysis of the responses produced the following 24 topic areas for the comparison teacher panel:

1. Fostering strong administrative support of the instructional coaches and integration initiatives
2. Developing trusting relationships between CTE and academic teachers

3. Discussing and developing integration frequently

4. Collaborating with academic teachers and peer-defined activities

5. Integrating activities on a daily basis

6. Increasing writing assignments

7. Using literacy and math strategies as a formative assessment

8. Using NCCER curriculum

9. Using process sheets, self-grade sheets, writing, and English teacher help in literacy

10. Using tools and equipment in science

11. Continuing math weekly exercises from classroom to "hands-on" shop activities

12 Mixing ratios with materials already using

13. Disguising facts that students are learning math, literacy, and science skills

14. Changing methods of teaching

15. Answering need for academic teachers on the Career and Technical school campus

16. Having co-op students that identify with working in the real world

17. Embedding academic concepts

18. Writing assignments daily

19. Using strategic Teaching Approach: TWIRL – Talk, Write, Investigate, Read, Listen

20. Realizing some CTE programs are better fits to integrate academics

21. Using student workbooks

21. Establishing more time to plan

22. Using project-based learning

23. Having CTE teachers with a strong real-world background

24. Implementing introductory assignments into lessons each day

The open-ended question regarding specific teacher factors that help teachers effectively integrate literacy, science, and math concepts in the CTE curriculum produced 41 responses from the non-award-winning teacher panel. Analysis of the responses produced the following 24 topic areas for the non-award-winning teacher panel:

1. School sponsored staff development to help with integration
2. Teaching budgeting, planning, and research
3. Teaching subject matter that continually deals with unit conversion, physics, algebra, geometry, and reports.
4. Teacher accountability by the CTC
5. Longer instruction time with students
6. Embedding academic programs
7. Practical activities with real world application through projects
8. Writing lab reports, costing recipes, and converting recipes
9. Teacher backgrounds in real world work experiences
10. Using Project Lead the Way curriculum which already has integrated academics
11. Embedded academic sections in the textbooks and information systems
12. Motivating teachers
13. Having the freedom to try new concepts
14. Having a strong, supportive administration staff
15. Having programs that foster math enrichment
16. Having a district-wide literacy and numeracy initiative
17. Constantly changing lessons to improve integration
18. Funding for our specific knowledge

19. Having cross-curriculum knowledge

20. Instilling teacher knowledge of the CTE subject matter

21. Writing across the curriculum

22. Implementing practical math applications in the context of the subject matter

23. Establishing a clear vision of Career Center and leadership

24. Difficulties in applying integration concepts into certain subject matter areas

Eight responses from the award-winning administrator panel were produced. Analysis of the responses produced the following seven topic areas for the non-award-winning administrator panel:

1. Teacher understanding need/value of integrating literacy, math, and science

2. Project-based learning

3. Requiring reading and writing assignments

4. Willingness of teachers to increase academic rigor

5. CTE teachers and academic teachers working well together

6. Professional Development

7. Employment of academic teachers on CTE campus

Forty-seven responses from the non-award-winning administrators were produced. An analysis of the responses produced the following 16 topic areas for the non-award-winning administrators' panel:

1. CTE teacher buy-in/understanding the need to integrate

2. Teamwork/dedication/mutual collegiality

3. Willingness to support students through integration

4. Having academic specialists support/instructional (math and reading) coaches on staff

5. Support/mentoring/collaboration from academic teachers

6. Accountability measures

7. Lack of confidence by CTE teachers to teach integrated academics

8. Assistance linking teaching strategies and specific academic standards

9. School-wide initiatives

10. Showing real-world applications and need

11. Poor teachers refusing to change

12. Monetary incentives to teachers

13. Project-based learning professional development

14. Literacy professional development

15. Individual personality characteristics of teachers

16. The implementation of TCTW teaching tools and strategies

The researcher asked the participants an open-ended question regarding specific issues or challenges faced when attempting to effectively integrate literacy, science, and math concepts into the CTE curriculum. Thirty-nine responses were produced from the award-winning teacher panel. Analysis of the responses produced the following sixteen topic areas for the non-award-winning teacher panel:

1. Having a variety of applications to the real-world

2. Getting students to become critical thinkers

3. Overcoming student math deficiencies

4. Finding ways to integrate academics into certain more difficult CTE programs

5. Getting students up to level on fundamental academic skills in math and literacy

6. Encouraging teamwork between all CTE teachers and academic teachers on lesson plans

7. Catching students up on prior knowledge needed for integrating the programs

8. Varying degrees of student abilities

9. Overcoming student apathy

10. Replacing find the answer concept with understanding and applying concept

11. Solving lack of student respect for CTE program's curriculum

12. Learning to work in concepts other than their expertise or passion

13. Adding support in technology areas and maintaining current curriculum

14. Attaining higher levels of computer accessibility in student homes

15. Finding more time for implementing change

16. Implementing approaches for a variety of ages

The open-ended question regarding specific issues or challenges faced when attempting to effectively integrate literacy, science, and math concepts into the CTE curriculum produced 41 responses from the comparison winning teacher panel. Analysis of the responses produced the following 19 topic areas for the non-award-winning teacher panel:

1. Instituting more time for program

2. Instilling confidence for program in instructional coaches and academic teachers

3. Gaining more student expectation from academic teacher

4. Matching curriculum with assessments that students must pass to graduate

5. Learning how to explain why we are learning this and explaining how they will use it

6. Varying student ability levels

7. Solving difficulties with technology capabilities

8. Establishing offsite locations for collaboration with academic teachers

9. Finding ways to convince student buy-in

10. Refusing to allow students to lag behind in academic credits
11. Creating ways to keep student from thinking program is not real school, thus avoiding math, science, and literacy skills
12. Finding CTE activities for special needs children
13. Solving very poor study habits
14. Stressing basic math and literacy skills
15. Forming administrative support
16. Finding ways of explaining how to apply academic concepts in a real- world application
17. Launching programs for student motivation
18. Keeping students on task while using computers/tablets
19. Finding innovative ways to assist with having little or no background on the information being introduced

The open-ended question regarding specific issues or challenges faced when attempting to effectively integrate literacy, science, and math concepts into the CTE curriculum produced eight responses from the award-winning administrator panel and 48 responses from the non-award-winning administrator panel.

Eight responses from the award-winning administrators' panel were produced. Analysis of the responses produced the following five topic areas of stress for the award winning-teacher panel:

1. Overcoming the stereotype that CTE teachers are not proficient enough to integrate academics
2. Lack of mutual planning period
3. Diversity in student abilities

4. Lack of time

5. Students not wanting to lose “shop time”

Analysis of the responses produced the following 21 topic areas for the comparison administrator panel:

1. CTE teachers lack of academic competency

2. The need for better professional development opportunities

3. Developing a culture of trust between CTE and academics

4. Need of mutual planning time between CTE teachers and academic teachers

5. Lack of time

6. Lack of understanding of integration and buy-in by CTE teachers

7. Lack of academic teachers on CTE campus

8. Academic teachers having no understanding of real world applications

9. Scheduling problems

10. Student resistance/lack of buy-in

11. CTE teachers not comfortable with integrating academics

12. Teachers feeling overwhelmed

13. Relation between dislike of reading and writing and implementing same for CTE teachers.

14. Common core standards Algebra skills too rigorous

15. Budget restraints

16. Lack of accountability measures

17. The lack of academic coaches

18. Cooperating schools refusing to accept CTE credits for high school graduation

19. Mismatch in state assessments in math and literacy

20. Common Core Standards and the emphasis on standardized testing forcing academic teachers away from a more integrated curriculum
21. The need for more data on integrating disciplines

Preparation of students in the middle school grades seems to significantly increase the likelihood that a school will become an award-winning TCTW school. Middle school is the key. Students must be properly prepared in literacy, math, and technology at this level. Students' attitudes toward subject matter need to be closely analyzed. We need to identify students' interests earlier in order to steer them properly as they progress through school. Every student needs to take a career exploration course in middle school, and they need to take career and college interest assessments to determine their aptitudes and what career pathway is best suited for their individual needs. Getting each student in the most suitable program at the CTC is paramount. Teachers should be encouraged to present subject matter in a way that captures the interest of the student. Teachers that are passionate about what they teach will capture the interests of their students and encourage greater achievement.

Perhaps another researcher will show an interest in the findings of this study and choose to compare the results of CTCs that adapted the TCTW integration model to schools that adapted the Math-in-CTE model (Pearson, et al., 2006). A standardized assessment could be given to students from schools that represent each group. Determinations could be made on how successful each model is by each group's performance on the assessment.

A future study could be done to determine if there is a significant difference in the outcomes of CTCs that adhere to traditional teaching and learning as compared to those schools that have adapted the contextual teaching and learning approach (Lynch, 2000). This study could place determine if each of these traditional and contextual practices should be classified as

presage, context, or process variables. These variables could then be compared statistically to a certain standardized test, just as the researcher did when attempting to determine what award-winning TCTW schools and non-award-winning schools do differently.

Educators from across America are encouraged to read this study and determine how they can use the results to make improvements at their schools by adopting these best practices for the integration of academics into the Career and Technical curriculum. Accordingly, by adopting these practices within our own schools, we can improve student achievement.

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# Appendices

# Appendix A

## Online Invitation Notice

To:

Cc:
Subject: Notice of Upcoming Online Survey Request

Dear Esteemed Career and Technical Education Administrator,

Congratulations on being the chief administrator of a *2012 Award Winning Technology Centers That Work* school. You and your school are to be commended. Because of this prestigious status, educators throughout the country would like to learn from you and your faculty about your school's successes.

I am the director of Muscle Shoals City Schools' Career and Technical Education in Alabama. As a graduate student from the Department of Curriculum and Teaching at Auburn University, I would like to invite you and your faculty to participate in my research study, *Determining Best Practices for the Integration of Academics in Career and Technical Education at Career and Technical Centers*.

A few days from now you will receive an email invitation asking you and your faculty to complete a brief survey related to this important research project.
I am writing to you in advance because I have found many people like to know ahead of time that they will be asked to participate in a survey. The research study that I am conducting is an important one that will assist educators across the country by determining best practices for the integration of academics in Career and Technical Education Programs at Career and Technical Centers.

I appreciate your time and participation in my survey. It is only with the generous help of people like you that important research like this can be conducted. Your help will be a tremendous benefit to students and educators nationwide.

Sincerely,

Gary Dan Williams
(256) 443-1730

# Appendix B

## Online Information Letter to Educators at Award-Winning TCTW Schools

AUBURN
UNIVERSITY

COLLEGE OF EDUCATION
CURRICULUM AND TEACHING

**(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS AN IRB APPROVAL STAMP WITH CURRENT DATES HAS BEEN APPLIED TO THIS DOCUMENT.)**

**INFORMATION LETTER**
**for a Research Study entitled**
**"Determining Best Practices for the Integration of Academics in Career and Technical Education Programs at Career and Technical Centers"**

**You are invited to participate in a research study** to determine best practices for the integration of academics in Career and Technical Education at Career and Technical Centers. This information will be used in a dissertation and journal article. The study is being conducted by Gary Dan Williams, under the direction of Dr. Brian Parr, Career and Technical Professor in the Auburn University Department of Curriculum and Teaching. You were selected as a possible participant because you are an educator at one of the Career and Technical Centers in the Technology Centers That Works consortium and are age 19 or older.

**What will be involved if you participate?** This modified Delphi research study will require participants to complete 2 surveys. If you decide to participate in this study, you will first be asked to complete the survey by clicking on the link below. Your total time commitment to this survey will be approximately 10 minutes. By not choosing to complete the survey, you will be choosing not to participate in this study.

Next, the responses from the first survey will be compiled. The top responses will then be sent back to the participants to rank in the round two survey. A survey link will be sent to the participants at that time. Your total time commitment to this survey will also be approximately 10 minutes. By not choosing to complete the survey, you will be choosing to discontinue your participation in this study.

**Are there any risks or discomforts?** There are no risks associated in this study.

**Are there any benefits to yourself or others?** If you participate in this study, you can expect to receive the results from this study.

**There will be no compensation for your time.** Thank you for your time.

**There are no costs for participating in this survey.**



5040 HALEY CENTER
AUBURN, AL 36849-5212

TELEPHONE:
334-844-4434

FAX:
334-844-6789

www.auburn.edu

**If you change your mind about participating,** you can withdraw at any time during the study. Your participation is completely voluntary. If you choose to withdraw, your data can be withdrawn as long as it is identifiable. Your decision about whether or not to participate or to stop participating will not jeopardize your future relations with Auburn University, the Department of Curriculum and Teaching.

**Any data obtained in connection with this study will remain confidential.** We will protect your privacy and the data you provide by not collecting any identifiable information. All information collected will be kept locked in a filing cabinet. Information collected through your participation may be used to fulfill an educational requirement, published in a professional journal, and/or presented at a professional meeting.

**If you have questions about this study,** please ask them now or contact Gary Dan Williams 256-443-1730 or Dr. Brian Parr at 334-844-6995.

**If you have questions about your rights as a research participant,** you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, THE DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO. THIS LETTER IS YOURS TO KEEP.

Gary Dan Williams 2-11-14
Investigator's signature Date

Gary Dan Williams
Print Name

Brian Parr 2-10-14
Co-Investigator Date

Brian Parr
Printed Name

# Appendix C

## Online Information Letter to Educators at Non-Award-Winning TCTW Schools

AUBURN
UNIVERSITY

COLLEGE OF EDUCATION
CURRICULUM AND TEACHING

**(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS AN IRB APPROVAL STAMP WITH CURRENT DATES HAS BEEN APPLIED TO THIS DOCUMENT.)**

**INFORMATION LETTER**
**for a Research Study entitled**
**"Determining Best Practices for the Integration of Academics in Career and Technical Education Programs at Career and Technical Centers"**

**You are invited to participate in a research study** to determine best practices for the integration of academics in Career and Technical Education at Career and Technical Centers. This information will be used in a dissertation and journal article. The study is being conducted by Gary Dan Williams, under the direction of Dr. Brian Parr, Career and Technical Professor in the Auburn University Department of Curriculum and Teaching. You were selected as a possible participant because you are an educator at one of the Career and Technical Centers in the Technology Centers That Works consortium and are age 19 or older.

**What will be involved if you participate?** If you decide to participate in this research study, you will be asked to complete a survey. If you choose to participate in this study, click on the link below. Your total time commitment will be approximately 10 minutes. By not choosing to complete the survey, you will be choosing not to participate in this study.

**Are there any risks or discomforts?** There are no risks associated in this study.

**Are there any benefits to yourself or others?** If you participate in this study, you can expect to receive the results from this study.

**There will be no compensation for your time.** Thank you for your time.

**There are no costs for participating in this survey.**

**If you change your mind about participating,** you can withdraw at any time during the study. Your participation is completely voluntary. If you choose to withdraw, your data can be withdrawn as long as it is identifiable. Your decision about whether or not to participate or to stop participating will not jeopardize your future relations with Auburn University or the Department of Curriculum and Teaching.



5040 HALEY CENTER
AUBURN, AL 36849-5212

TELEPHONE:
334-844-4434

FAX:
334-844-6789

www.auburn.edu

**Any data obtained in connection with this study will remain confidential.** We will protect your privacy and the data you provide by not collecting any identifiable information. All information collected will be kept locked in a filing cabinet. Information collected through your participation may be used to fulfill an educational requirement, published in a professional journal, and/or presented at a professional meeting.

**If you have questions about this study,** please ask them now or contact Gary Dan Williams 256-443-1730 or Dr. Brian Parr at 334-844-6995.

**If you have questions about your rights as a research participant,** you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, THE DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO. THIS LETTER IS YOURS TO KEEP.

Gary Dan Williams 2-11-14
Investigator's signature Date

Gary Dan Williams
Print Name

Brian Parr 2-10-14
Co-Investigator Date

Brian Parr
Printed Name

# Appendix D

## Invitation to Online Survey – Award Winning TCTW Schools

To:
Cc:
Subject : Invitation to Online Survey

Dear Esteemed Career and Technical Educator,

I am a doctoral student in the Department of Curriculum and Teaching at Auburn University. I would like to invite you to participate in my research study entitled, "Determining Best Practices for the Integration of Academics in Career and Technical Education Programs at Career and Technical Centers." You have been chosen for this study because you are an administrator or teacher at a center that earned the prestigious status of a *2012 Award Winning Technology Centers That Work* school. As a result, educators throughout the country would like the opportunity to learn from you and your school's successes.

Please complete this survey and forward this email invitation and information letter to **any and all other administrators and all Career and Technical teachers** at your center and encourage them to participate in the survey. Your faculty's participation in this survey is valued and critical to the success of this research study. The results of this study will be shared with all participants. To those who have already completed the survey, thanks for your help.

This modified Delphi study will require a two-step process. The first step of the process will require participants to complete an opinion survey. Then, the top responses from the round one survey will be sent back for participants to rank in the round two survey.

Your total time commitment for each of the surveys will be approximately 10 minutes.

I will protect against breach of confidentiality by using my password protected home computer only to handle participant information and data. All responses will be identified as anonymous and no identifying information will be provided. Only a numbering system will be used to identify schools and individuals participating in the study. Any required hard copies of this information will be placed in a locked cabinet in my home office.

There will be no compensation for participants in this study.

If you would like to know more information about this study, an information letter can be obtained by clicking on the attachment below. If you decide to participate after reading the letter, you can access the survey from a link in the letter. By not completing the survey, you will choose not to participate in the study.

If you have any questions, please contact me at 256-443-1730 or my advisor, Dr. Brian Parr, at 334-844-6995.

Thank you for your consideration,

Gary Dan Williams

Irb email invitation letter award winning

**Take the Survey**
https://auburn.qualtrics.com/SE/?SID=SV_bsjoftkeiibKzBP

# Appendix E

## Invitation to Online Survey – Non-Winning TCTW Schools

To:
Cc:

Dear Esteemed Career and Technical Educator,

I am a doctoral student in the Department of Curriculum and Teaching at Auburn University. I would like to invite you to participate in my research study entitled, "Determining Best Practices for the Integration of Academics in Career and Technical Education Programs at Career and Technical Centers." You have been chosen for this study because of your participation as an *SREB, Technology Centers That Work* school administrator or teacher. This commitment proves that you and your school are serious about the education and future of your students.

Please complete this survey and forward this email invitation and information letter to **any and all other administrators and all Career and Technical teachers** at your center and encourage them to participate in the survey. Your faculty's participation in this survey is valued and critical to the success of this research study. The results of this study will be shared with all participants. If you have already completed this survey, thank you for your participation.

This study will require participants to complete an opinion survey. Your total time commitment for each of the surveys will be approximately 10 minutes.

I will protect against breach of confidentiality by using my password protected home computer only to handle participant information and data. All responses will be identified as anonymous and no identifying information will be provided. Only a numbering system will be used to identify schools and individuals participating in the study. Any required hard copies of this information will be placed in a locked cabinet in my home office.

There will be no compensation for participants in this study.

If you would like to know more information about this study, an information letter can be obtained by clicking on the attachment below. If you decide to participate after reading the letter, you can access the survey from a link in the letter. By not completing the survey, you will choose not to participate in the study.

If you have any questions, please contact me at 256-443-1730 or my advisor, Dr. Brian Parr, at 334-844-6995.

Thank you for your consideration,

Gary Dan Williams

**Follow this link to the Survey:**
https://auburn.qualtrics.com/SE/?SID=SV_9El2zCLfG2F4ZRX

## Appendix F

## Reminder #1 - Invitation to Online Survey – Award-Winning TCTW Schools

To:
Cc:
**Subject:** REMINDER - Invitation to Online Survey

Dear Esteemed Career and Technical Educator,

I am a doctoral student in the Department of Curriculum and Teaching at Auburn University. I would like to invite you to participate in my research study entitled, "Determining Best Practices for the Integration of Academics in Career and Technical Education Programs at Career and Technical Centers." You have been chosen for this study because you are an administrator or teacher at a center that earned the prestigious status of a *2012 Award Winning Technology Centers That Work* school. As a result, educators throughout the country would like the opportunity to learn from you and your school's successes.

Please complete this survey and forward this email invitation and information letter to **any and all other administrators and all Career and Technical teachers** at your center and encourage them to participate in the survey. Your faculty's participation in this survey is valued and critical to the success of this research study. The results of this study will be shared with all participants. To those who have already completed the survey, thanks for your help.

This modified Delphi study will require a two-step process. The first step of the process will require participants to complete an opinion survey. Then, the top responses from the round one survey will be sent back for participants to rank in the round two survey.

Your total time commitment for each of the surveys will be approximately 10 minutes.

I will protect against breach of confidentiality by using my password protected home computer only to handle participant information and data. All responses will be identified as anonymous and no identifying information will be provided. Only a numbering system will be used to identify schools and individuals participating in the study. Any required hard copies of this information will be placed in a locked cabinet in my home office.

There will be no compensation for participants in this study.

If you would like to know more information about this study, an information letter can be obtained by clicking on the attachment below. If you decide to participate after reading the letter, you can access the survey from a link in the letter. By not completing the survey, you will choose not to participate in the study.

If you have any questions, please contact me at 256-443-1730 or my advisor, Dr. Brian Parr, at 334-844-6995.

Thank you for your consideration,

Gary Dan Williams

Irb email invitation letter award winning

**Take the Survey**
https://auburn.qualtrics.com/SE/?SID=SV_bsjoftkeiibKzBP

## Appendix G

## Reminder #1 - Invitation to Online Survey – Non-Award-Winning TCTW Schools

To:
Cc:
**Subject:** REMINDER - Invitation to Online Survey

Dear Esteemed Career and Technical Educator,

I am a doctoral student in the Department of Curriculum and Teaching at Auburn University. I would like to invite you to participate in my research study entitled, "Determining Best Practices for the Integration of Academics in Career and Technical Education Programs at Career and Technical Centers." You have been chosen for this study because of your participation as an *SREB, Technology Centers That Work* school administrator or teacher. This commitment proves that you and your school are serious about the education and future of your students.

Please complete this survey and forward this email invitation and information letter to **any and all other administrators and all Career and Technical teachers** at your center and encourage them to participate in the survey. Your faculty's participation in this survey is valued and critical to the success of this research study. The results of this study will be shared with all participants. If you have already completed this survey, thank you for your participation.

This study will require participants to complete an opinion survey. Your total time commitment for each of the surveys will be approximately 10 minutes.

I will protect against breach of confidentiality by using my password protected home computer only to handle participant information and data. All responses will be identified as anonymous and no identifying information will be provided. Only a numbering system will be used to identify schools and individuals participating in the study. Any required hard copies of this information will be placed in a locked cabinet in my home office.

There will be no compensation for participants in this study.

If you would like to know more information about this study, an information letter can be obtained by clicking on the attachment below. If you decide to participate after reading the letter, you can access the survey from a link in the letter. By not completing the survey, you will choose not to participate in the study.

If you have any questions, please contact me at 256-443-1730 or my advisor, Dr. Brian Parr, at 334-844-6995.

Thank you for your consideration,

Gary Dan Williams

**Follow this link to the Survey:**
Take the Survey

## Appendix H

## Final Reminder - Invitation to Online Survey – Award-Winning TCTW Schools

To:
Cc:
Subject : FINAL REMINDER - Online Survey

Dear Esteemed Career and Technical Educator,

Again, thank you for your willingness to participate in this study. Please click on the link below and complete the final 5 minute survey if you have not already done so and forward to your faculty members for their completion.

By being an educator at an ***Award Winning Technology Centers That Works*** school in 2012, you are a member of the prestigious panel of experts we are using to conduct this study.

**This final questionnaire contains only 3 questions** should take **less than 5 minutes** to complete. Thank you for your willingness to participate in the study. Once we have compiled the data, I will be happy to send each of you a copy of the results.

If you have any questions do not hesitate to contact me at 256-443-1730 or my advisor, Dr. Brian Parr, at 334-844-6695.

Thanks again for your help,

Gary Dan Williams

**Follow this link to the Survey:**

**https://auburn.qualtrics.com/SE/?SID=SV_9Eo9weITRyzfbMN**

# Appendix I

## Final Reminder - Invitation to Online Survey – Non-Award-Winning TCTW Schools

To:
Cc:
Subject : FINAL REMINDER - Online Survey

Dear Esteemed Career and Technical Educator,

During the past two months I have sent you several emails about an important research study I am conducting concerning the integration of academics into Career and Technical Education.

The study is coming to a close and this is the last contact that will be made with you to request your participation and your faculty's participation in this project. Hearing from as many *Technology Centers That Works* participants as possible will ensure that the survey is as accurate as possible. If you have already participated in the survey, thank you for doing so.

I also want you to assure you that your response to this study is strictly voluntary. It is fine if you prefer not to participate.

Again, I appreciate your willingness to consider my request as I seek to better understand the best practices for the integration of math, science, and literacy into the context of Career and Technical Education. Thank you very much.

Sincerely,

Gary Dan Williams

**Follow this link to the Survey:**
https://auburn.qualtrics.com/SE/?SID=SV_9El2zCLfG2F4ZRX

## Appendix J

## Final Online Survey Invitation – Delphi Round – Award Winning TCTW Schools

To:
Cc:
Subject : Final Online Survey – Delphi Round

Dear Esteemed Career and Technical Educator,

First of all, let me thank you for your willingness to participate in this research project.

Let me remind you of what I am attempting to do in this research study. The study is called a modified Delphi study. The Delphi method makes use a panel of experts who have shown expertise in specific areas of interest. By being an educator at an ***Award Winning Technology Centers That Works*** school in 2012, you are a member of the panel of experts we are using to conduct this study. I have already received everyone's initial survey responses and I have summarized your responses.

I now you to rank these responses in order of importance by following the link posted below. Once you complete this ranking to reach consensus, the study will be over. **This final questionnaire contains only 3 questions** should take **less than 5 minutes** to complete.

Thank you for your willingness to participate in the study. Once we have compiled the data, I will be happy to send each of you a copy of the results.

If you have any questions do not hesitate to contact me at 256-443-1730 or my advisor, Dr. Brian Parr, at 334-844-6695.

Thanks again for your help,

Gary Dan Williams

**Follow this link to the Survey:**
**https://auburn.qualtrics.com/SE/?SID=SV_9Eo9weITRyzfbMN**

## Appendix K

## Educator Perception Survey

QA Which best describes your current position?

- ❍ Teacher (1)
- ❍ Administrator (2)

Q1 My gender is:

- ❍ Male (1)
- ❍ Female (2)

Q2 My age is:

- ❍ Under 25 (1)
- ❍ 25-30 (2)
- ❍ 31-35 (3)
- ❍ 36-40 (4)
- ❍ 41-45 (5)
- ❍ 46-50 (6)
- ❍ 51-55 (7)
- ❍ 56-60 (8)
- ❍ 61-65 (9)
- ❍ Over 65 (10)

Q3 My education background (college) is best described as:

- ❍ None (1)
- ❍ Less than 2 years (2)
- ❍ Associates Degree (3)
- ❍ Bachelors Degree (4)
- ❍ Masters Degree (5)
- ❍ Ed.S./A.A. (6)
- ❍ Ph.D./Ed.D. (7)

Q4 While you were a high school student, did you participate in a quality Career and Technical program?

- ❍ Yes (1)
- ❍ No (2)

Answer If Which best describes your current position? Administrator Is Selected

Q5 I taught school _____ years prior to becoming a Career and Technical Administrator.

- ❍ Less than 5 (1)
- ❍ 5-10 (2)
- ❍ 11-15 (3)
- ❍ 16-20 (4)
- ❍ 21-25 (5)
- ❍ 26-30 (6)
- ❍ Over 30 (7)

Answer If Which best describes your current position? Administrator Is Selected

Q6 Please describe specific courses that you taught prior to becoming a Career and Technical Administrator.

- ❍ Click to write (1) _____
- ❍ I was not a teacher prior to becoming a Career and Technical Administrator. (2)

Answer If Which best describes your current position? Administrator Is Selected

Q7 The career cluster(s) that best describe(s) my Career and Technical Education teaching background is:

- ❍ Agriculture, Food, and Natural Resources (1)
- ❍ Architecture and Construction (2)
- ❍ Arts, Audio-visual Technology, and Communication (3)
- ❍ Business Management and Administration (4)
- ❍ Education and Training (5)
- ❍ Finance (6)
- ❍ Government and Public Administration (7)
- ❍ Health Science (8)
- ❍ Hospitality and Tourism (9)
- ❍ Human Services (10)
- ❍ Information Technology (11)
- ❍ Law, Public Safety, Corrections, and Security (12)
- ❍ Manufacturing (13)
- ❍ Marketing (14)
- ❍ Science, Technology, Engineering, and Mathematics (15)
- ❍ Transportation, Distribution, and Logistics (16)
- ❍ I did not teach Career and Technical courses in the past (17)

Answer If Which best describes your current position? Administrator Is Selected

Q8 Teachers at my Career and Technical school have had sufficient professional development to integrate academics into their Career and Technical program.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q9 The teachers at my Career and Technical school are active listeners to their students' concerns.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q10 Teachers use data continuously to evaluate their Career and Technical program's curriculum, instruction, and student success.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q11 The teachers at my Career and Technical school often spend evenings and/or weekends working with their students.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q12 The teachers at my Career and Technical school often attend their students' extracurricular activities (fundraisers, ballgames, band events, etc.)

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q13 Teachers at this Career and Technical school maintain a demanding yet supportive environmental that pushes students to do their best.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q14 Teachers at this Career and Technical school are continually learning and seeking new ideas on how to improve student achievement.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q15 Teachers and the Career and Technical Administration at my Career and Technical school work as a team to improve student achievement.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q16 Career and Technical teachers and academic teachers (math, language arts, science, and social studies) are given mutual planning time for collaboration throughout the school year at my school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)
- ❍ There are no academic teachers at my school (5)

Answer If Which best describes your current position? Administrator Is Selected

Q17 Career and Technical teachers and academic teachers (math, language arts, science, and social studies) in my school work well together.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)
- ❍ There are no academic teachers at my school (5)

Answer If Which best describes your current position? Administrator Is Selected

Q18 I provide periodic feedback to my teachers to help improve instruction at my Career and Technical school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q19 There is an intensive emphasis on continuous improvement at my Career and Technical school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q20 On average, teachers at my Career and Technical school assign homework approximately ___ times per class per week.

- ❍ 0 (1)
- ❍ 1 (2)
- ❍ 2 (3)
- ❍ 3 (4)
- ❍ 4 (5)
- ❍ 5 (6)

Answer If Which best describes your current position? Administrator Is Selected

Q21 On average, teachers at my Career and Technical school give extra help to students outside of class time, approximately ___ days per week.

- ❍ 0 (1)
- ❍ 1 (2)
- ❍ 2 (3)
- ❍ 3 (4)
- ❍ 4 (5)
- ❍ 5 (6)
- ❍ 6 (7)
- ❍ 7 (8)

Answer If Which best describes your current position? Administrator Is Selected

Q22 My Career and Technical school places a strong emphasis on the following teaching and learning methods:

| | Strongly Agree (1) | Agree (2) | Disagree (3) | Strongly Disagree (4) |
|---|---|---|---|---|
| Lecture (1) | ❍ | ❍ | ❍ | ❍ |
| Teacher Demonstrations (2) | ❍ | ❍ | ❍ | ❍ |
| Group Projects (3) | ❍ | ❍ | ❍ | ❍ |
| Student Presentations (4) | ❍ | ❍ | ❍ | ❍ |
| Students viewing videos (5) | ❍ | ❍ | ❍ | ❍ |
| Teacher presentations (6) | ❍ | ❍ | ❍ | ❍ |
| Students sharing in small groups (7) | ❍ | ❍ | ❍ | ❍ |
| Discussions (8) | ❍ | ❍ | ❍ | ❍ |
| Student Research (9) | ❍ | ❍ | ❍ | ❍ |

Answer If Which best describes your current position? Administrator Is Selected

Q23 Teachers at my Career and Technical school place great emphasis on the use of technology.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q24 Students at my Career and Technical school are given multiple opportunities to learn content.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q25 Students at my Career and Technical school are commonly allowed to develop their own assignments.

- ❍ Frequently (1)
- ❍ Occasionally (2)
- ❍ Not At All (3)

Answer If Which best describes your current position? Administrator Is Selected

Q26 Students in my Career and Technical school are provided with intellectually demanding studies that emphasize math.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q27 Students in my Career and Technical school are provided with intellectually demanding studies that emphasize science.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q28 Students in my Career and Technical school are provided with intellectually demanding studies that emphasize literacy.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q29 I estimate that ____ of the students in my Career and Technical school earn employability credentials each year.

- ❍ My Career and Technical school does not offer employability credentials (1)
- ❍ less that 10% (2)
- ❍ 11-20% (3)
- ❍ 21-40% (4)
- ❍ 41-60% (5)
- ❍ 60-80% (6)
- ❍ 81-100% (7)

Answer If Which best describes your current position? Administrator Is Selected

Q30 I estimate that ____ of the students in my Career and Technical school earn post-secondary college credit (dual enrollment).

- ❍ My program does not offer dual enrollment (1)
- ❍ less than 10% (2)
- ❍ 11-20% (3)
- ❍ 21-40% (4)
- ❍ 41-60% (5)
- ❍ 61-80% (6)
- ❍ 81-100% (7)

Answer If Which best describes your current position? Administrator Is Selected

Q31 Career and Technical Student Organizations (FBLA, FCCLA, FFA, HOSA, SkillsUSA, TSA, etc.) activities are strongly emphasized at my Career and Technical school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q32 Students have the math skills necessary to succeed at my school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q33 Students have the literacy skills necessary to succeed at my school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q34 Students have the science skills necessary to succeed at my school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q35 Students have the technological skills necessary to succeed at my school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q36 A majority of the students entering in my Career and Technical school have a genuine interest in the subject matter being taught.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q37 The goals and priorities of my Career and Technical school are clearly communicated.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q38 The administration at my Career and Technical school has high expectations for students to achieve college and career readiness.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q39 I estimate that _____ of the students enrolled at my Career and Technical school completed a career exploration course in the past.

- ❍ The students were not offered any type of career exploration course in the past (1)
- ❍ 0-20% (2)
- ❍ 21-40% (3)
- ❍ 41-60% (4)
- ❍ 61-80% (5)
- ❍ 81-100% (6)

Answer If Which best describes your current position? Administrator Is Selected

Q40 The feeder school(s), for my Career and Technical school, set high expectations for their students.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Administrator Is Selected

Q41 I estimate that _____ of the students enrolled at my Career and Technical school receive a free or reduced lunch rate.

- ❍ 0-20% (1)
- ❍ 21-40% (2)
- ❍ 41-60% (3)
- ❍ 61-80% (4)
- ❍ 81-100% (5)

Answer If Which best describes your current position? Administrator Is Selected

Q42 Students get the guidance counseling they need to transition to college and career while at my Career and Technical school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)
- ❍ There is no guidance counselor at my Career and Technical school (5)

Answer If Which best describes your current position? Administrator Is Selected

Q43 Students are required to work in teams at my Career and Technical school.

- ❍ Frequently (1)
- ❍ Occasionally (2)
- ❍ Not At All (3)

Answer If Which best describes your current position? Administrator Is Selected

Q44 Please describe specific teacher factors that help you effectively integrate literacy, science, and math concepts in your Career and Technical curriculum.

Answer If Which best describes your current position? Administrator Is Selected

Q45 Please describe specific issues or challenges you face when attempting to effectively integrate literacy, science, and math concepts in your Career and Technical curriculum.

Answer If Which best describes your current position? Administrator Is Selected

Q46 In which of the following Technology Centers That Works professional development sessions has my Career and Technical school participated in the past five years? (You may select multiple answers)

- ❑ Site Development Workshop - Two Day Strategic Planning (1)
- ❑ Technical Visit (TAV) - Three Days (2)
- ❑ Literacy Workshop - Big Six Literacy Skills (3)
- ❑ Literacy Workshop - Literacy Design Collaborative in Career and Technical Education (4)
- ❑ Data Workshop - Leveraging the Technology Centers That Works Assessment: The Role of Data in School Improvement (5)
- ❑ Data Workshop - Using Data to Create a High Performance Learning Culture (6)
- ❑ Career Technical Education Preparation Project - Professional Development (7)
- ❑ Career Technical Education Preparation Project - Two Week Summer Institute (8)
- ❑ Career Technical Education Preparation Project - Three Week, Two Day workshops throughout the school year (9)
- ❑ Career Technical Education Preparation Project - Two Week Summer Institute after 1st Year of Teaching (10)
- ❑ Career Technical Education Preparation Project - Monthly Webinars (11)
- ❑ Four Professional Development Modules - Instructional Planning (12)
- ❑ Four Professional Development Modules - Research-based instructional planning strategies (13)
- ❑ Four Professional Development Modules - Classroom Assessment (14)
- ❑ Four Professional Development Modules - Classroom Management (15)
- ❑ Career and Technical Teacher Prep (Option 1) - Southern Region Education Board (SREB) provides all the professional development training sessions and classroom observations and conducts the webinars (16)
- ❑ Career and Technical Teacher Prep (Option 2) - Southern Region Education Board (SREB) supports a state education agency or local education agency in implementing the Career and Technical Education Teach Preparation Project (Train the Trainer) (17)
- ❑ Career and Technical Teacher Prep (Option 3) - Southern Region Education Board (SREB) provides professional development for veteran teachers in a school (18)
- ❑ Enhanced Career Technical Education (4 Days Professional Development + 2 Days Follow Up + 3 Days Coaching) (19)
- ❑ 7 Essential Teaching (2 Days Professional Development + 2 Days Coaching) (20)
- ❑ Guidance and Advisement (2 Days Professional Development - 1 + 1) (21)
- ❑ Project-based Learning (2 Days) (22)
- ❑ School Leaders of Instructional Coaches (1 Day Professional Development + 1 Day Professional Development) (23)
- ❑ Programs of Study (2 Days Professional Development) (24)

- ❑ Numeracy Workshops - Building Academic Skills in Context (6 Days Professional Development - 2 + 2 + 2) (25)
- ❑ Numeracy Workshops - Developing Classroom Instruction to Enhance Thinking (2 Days + On Site Coaching (26)
- ❑ Numeracy Workshops - Mathematics Design Collaborative (MDC) in CTE (2 Days + 2 Days + 2 Days) (27)

Answer If Which best describes your current position? Teacher Is Selected

Q52 The career cluster(s) that best describe(s) my Career and Technical program is:

- ❍ Agriculture, Food, and Natural Resources (1)
- ❍ Architecture and Construction (2)
- ❍ Arts, Audio-visual Technology, and Communication (3)
- ❍ Business Management and Administration (4)
- ❍ Education and Training (5)
- ❍ Finance (6)
- ❍ Government and Public Administration (7)
- ❍ Health Science (8)
- ❍ Hospitality and Tourism (9)
- ❍ Human Services (10)
- ❍ Information Technology (11)
- ❍ Law, Public Safety, Corrections, and Security (12)
- ❍ Manufacturing (13)
- ❍ Marketing (14)
- ❍ Science, Technology, Engineering, and Mathematics (15)
- ❍ Transportation, Distribution, and Logistics (16)

Answer If Which best describes your current position? Teacher Is Selected

Q53 I have had sufficient professional development to integrate academics into my Career and Technical program.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q54 I am an active listener to my students' concerns.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q55 I use data continuously to evaluate my Career and Technical program's curriculum, instruction, and student success.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q56 I often spend evenings and/or weekends working with my students.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q57 I often attend my students' extracurricular activities (fundraisers, ballgames, band events, etc.)

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q58 Teachers at this Career and Technical school maintain a demanding yet supportive environmental that pushes students to do their best.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q59 Teachers at this Career and Technical school are continually learning and seeking new ideas on how to improve student achievement.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q60 Teachers and the Career and Technical Administration at my Career and Technical school work as a team to improve student achievement.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q61 Career and Technical teachers and academic teachers (math, language arts, science, and social studies) are given mutual planning time for collaboration throughout the school year at my school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)
- ❍ There are no academic teachers at my school (5)

Answer If Which best describes your current position? Teacher Is Selected

Q62 Career and Technical teachers and academic teachers (math, language arts, science, and social studies) in my school work well together.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)
- ❍ There are no academic teachers at my school (5)

Answer If Which best describes your current position? Teacher Is Selected

Q63 The administration at my Career and Technical school provides periodic feedback to me to help improve my instruction.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q64 There is an intensive emphasis on continuous improvement at my Career and Technical school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q65 I assign homework approximately ___ times per class per week.

- ❍ 0 (1)
- ❍ 1 (2)
- ❍ 2 (3)
- ❍ 3 (4)
- ❍ 4 (5)
- ❍ 5 (6)

Answer If Which best describes your current position? Teacher Is Selected

Q66 I give extra help to students outside of class time, approximately ___ days per week.

- ❍ 0 (1)
- ❍ 1 (2)
- ❍ 2 (3)
- ❍ 3 (4)
- ❍ 4 (5)
- ❍ 5 (6)
- ❍ 6 (7)
- ❍ 7 (8)

Answer If Which best describes your current position? Teacher Is Selected

Q67 I place a strong emphasis on the following teaching and learning methods in my Career and Technical program:

| | Strongly Agree (1) | Agree (2) | Disagree (3) | Strongly Disagree (4) |
|---|---|---|---|---|
| Lecture (1) | ❍ | ❍ | ❍ | ❍ |
| Teacher Demonstrations (2) | ❍ | ❍ | ❍ | ❍ |
| Group Projects (3) | ❍ | ❍ | ❍ | ❍ |
| Student Presentations (4) | ❍ | ❍ | ❍ | ❍ |
| Students viewing videos (5) | ❍ | ❍ | ❍ | ❍ |
| Teacher presentations (6) | ❍ | ❍ | ❍ | ❍ |
| Students sharing in small groups (7) | ❍ | ❍ | ❍ | ❍ |
| Discussions (8) | ❍ | ❍ | ❍ | ❍ |
| Student Research (9) | ❍ | ❍ | ❍ | ❍ |

Answer If Which best describes your current position? Teacher Is Selected

Q68 I place great emphasis on the use of technology in my program.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q69 My students are given multiple opportunities to learn content in my program.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q70 In my program, students are commonly allowed to develop their own assignments.

- ❍ Frequently (1)
- ❍ Occasionally (2)
- ❍ Not At All (3)

Answer If Which best describes your current position? Teacher Is Selected

Q71 Students in my Career and Technical school are provided with intellectually demanding studies that emphasize math.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q72 Students in my Career and Technical school are provided with intellectually demanding studies that emphasize science.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q73 Students in my Career and Technical school are provided with intellectually demanding studies that emphasize literacy.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q74 I estimate that ____ of the students in my program earn employability credentials each year.

- ❍ My program does not offer employability credentials (1)
- ❍ Less that 10% (2)
- ❍ 11-20% (3)
- ❍ 21-40% (4)
- ❍ 41-60% (5)
- ❍ 60-80% (6)
- ❍ 81-100% (7)

Answer If Which best describes your current position? Teacher Is Selected

Q75 I estimate that ____ of the students in my program earn post-secondary college credit (dual enrollment) in my program.

- ❍ My program does not offer dual enrollment (1)
- ❍ Less than 10% (2)
- ❍ 11-20% (3)
- ❍ 21-40% (4)
- ❍ 41-60% (5)
- ❍ 61-80% (6)
- ❍ 81-100% (7)

Answer If Which best describes your current position? Teacher Is Selected

Q76 Career and Technical Student Organizations (FBLA, FCCLA, FFA, HOSA, SkillsUSA, TSA, etc.) activities are strongly emphasized in my program.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q77 Students have the math skills necessary to succeed at my school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q78 Students have the literacy skills necessary to succeed at my school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q79 Students have the science skills necessary to succeed at my school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q80 Students have the technological skills necessary to succeed at my school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q81 A majority of the students entering in my Career and Technical program have a genuine interest in the subject matter being taught.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q82 The goals and priorities of my Career and Technical school are clearly communicated.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q83 The administration at my Career and Technical school has high expectations for students to achieve college and career readiness.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q84 I estimate that _____ of the students enrolled at my Career and Technical school completed a career exploration course in the past.

- ❍ The students were not offered any type of career exploration course in the past (1)
- ❍ 0-20% (2)
- ❍ 21-40% (3)
- ❍ 41-60% (4)
- ❍ 61-80% (5)
- ❍ 81-100% (6)

Answer If Which best describes your current position? Teacher Is Selected

Q85 The feeder school(s), for my Career and Technical school, set high expectations for their students.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)

Answer If Which best describes your current position? Teacher Is Selected

Q86 I estimate that _____ of the students enrolled at my Career and Technical school receive a free or reduced lunch rate.

- ❍ 0-20% (1)
- ❍ 21-40% (2)
- ❍ 41-60% (3)
- ❍ 61-80% (4)
- ❍ 81-100% (5)

Answer If Which best describes your current position? Teacher Is Selected

Q87 Students get the guidance counseling they need to transition to college and career while at my Career and Technical school.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Disagree (3)
- ❍ Strongly Disagree (4)
- ❍ There is no guidance counselor at my Career and Technical school (5)

Answer If Which best describes your current position? Teacher Is Selected

Q88 Students are required to work in teams at my Career and Technical school.

- ❍ Frequently (1)
- ❍ Occasionally (2)
- ❍ Not At All (3)

Answer If Which best describes your current position? Teacher Is Selected

Q89 Please describe specific teacher factors that help you effectively integrate literacy, science, and math concepts in your Career and Technical curriculum.

Answer If Which best describes your current position? Teacher Is Selected

Q90 Please describe specific issues or challenges you face when attempting to effectively integrate literacy, science, and math concepts in your Career and Technical curriculum.

Answer If Which best describes your current position? Teacher Is Selected

Q91 In which of the following Technology Centers That Works professional development sessions have I participated in the past five years? (You may select multiple answers)

- ❑ Site Development Workshop - Two Day Strategic Planning (1)
- ❑ Technical Visit (TAV) - Three Days (2)
- ❑ Literacy Workshop - Big Six Literacy Skills (3)
- ❑ Literacy Workshop - Literacy Design Collaborative in Career and Technical Education (4)
- ❑ Data Workshop - Leveraging the Technology Centers That Works Assessment: The Role of Data in School Improvement (5)
- ❑ Data Workshop - Using Data to Create a High Performance Learning Culture (6)
- ❑ Career Technical Education Preparation Project - Professional Development (7)
- ❑ Career Technical Education Preparation Project - Two Week Summer Institute (8)
- ❑ Career Technical Education Preparation Project - Three Week, Two Day workshops throughout the school year (9)
- ❑ Career Technical Education Preparation Project - Two Week Summer Institute after 1st Year of Teaching (10)
- ❑ Career Technical Education Preparation Project - Monthly Webinars (11)
- ❑ Four Professional Development Modules - Instructional Planning (12)
- ❑ Four Professional Development Modules - Research-based instructional planning strategies (13)
- ❑ Four Professional Development Modules - Classroom Assessment (14)
- ❑ Four Professional Development Modules - Classroom Management (15)
- ❑ Career and Technical Teacher Prep (Option 1) - Southern Region Education Board (SREB) provides all the professional development training sessions and classroom observations and conducts the webinars (16)
- ❑ Career and Technical Teacher Prep (Option 2) - Southern Region Education Board (SREB) supports a state education agency or local education agency in implementing the Career and Technical Education Teach Preparation Project (Train the Trainer) (17)
- ❑ Career and Technical Teacher Prep (Option 3) - Southern Region Education Board (SREB) provides professional development for veteran teachers in a school (18)
- ❑ Enhanced Career Technical Education (4 Days Professional Development + 2 Days Follow Up + 3 Days Coaching) (19)
- ❑ 7 Essential Teaching (2 Days Professional Development + 2 Days Coaching) (20)
- ❑ Guidance and Advisement (2 Days Professional Development - 1 + 1) (21)
- ❑ Project-based Learning (2 Days) (22)
- ❑ School Leaders of Instructional Coaches (1 Day Professional Development + 1 Day Professional Development) (23)
- ❑ Programs of Study (2 Days Professional Development) (24)
- ❑ Numeracy Workshops - Building Academic Skills in Context (6 Days Professional Development - 2 + 2 + 2) (25)

- ❑ Numeracy Workshops - Developing Classroom Instruction to Enhance Thinking (2 Days + On Site Coaching (26)
- ❑ Numeracy Workshops - Mathematics Design Collaborative (MDC) in CTE (2 Days + 2 Days + 2 Days) (27)

## Appendix L

## Delphi Survey

Q1 Rank the following "TEACHERS AT MY SCHOOL" characteristics 1-9 (1 being the most important and 9 the least important) for contributing to the success of integrating academics into Career and Technical Education at Career and Technical Centers.

_____ Providing professional development to teachers at the Career and Technical school concerning how to integrate academics into their Career and Technical program. (1)

_____ Career and Technical teachers actively listening to their students' concerns. (2)

_____ Career and Technical teachers using data continuously to evaluate their program's curriculum, instruction, and student success. (3)

_____ Career and Technical teachers maintaining a demanding yet supportive environment that pushes students to do their best. (4)

_____ Career and Technical teachers continually learning and seeking new ideas on how to improve student achievement. (5)

_____ Career and Technical teachers and administrators working as a team to improve student achievement. (6)

_____ Career and Technical teachers and academic teachers working well together. (7)

_____ Administrators providing periodic feedback to Career and Technical teachers to help improve instruction (8)

_____ Teachers placing an intensive emphasis on continuous improvement in Career and Technical programs. (9)

Q2 Rank the following “TEACHING AND LEARNING” characteristics 1-6 (1 being the most important and 6 the least important) for contributing to the success of integrating academics into Career and Technical Education at Career and Technical Centers.

_____ Career and Technical teachers placing great emphasis on the use of technology. (1)

_____ Career and Technical teachers giving students multiple opportunities to learn content. (2)

_____ Career and Technical teachers giving students intellectually demanding assignments emphasizing math. (3)

_____ Career and Technical teachers giving students intellectually demanding assignments emphasizing science. (4)

_____ Career and Technical teachers giving students intellectually demanding assignments emphasizing literacy. (5)

_____ Career and Technical teachers emphasizing Career and Technical Student Organizations (FBLA, FCCLA, FFA, HOSA, SkillsUSA, TSA, etc.) activities at the Career and Technical Center. (6)

Q3 Rank the following "STUDENT IN MY SCHOOL" characteristics 1-10 (1 being the most important and 10 the least important) for contributing to the success of integrating academics into Career and Technical Education at Career and Technical Centers.

_____ Students having the math skills necessary to succeed at the Career and Technical Center. (1)

_____ Students having the science skills necessary to succeed at the Career and Technical Center. (2)

_____ Students having the literacy skills necessary to succeed at the Career and Technical Center. (3)

_____ Students having the technological skills necessary to succeed at the Career and Technical Center. (4)

_____ Students having a genuine interest in the subject matter being taught in the Career and Technical program. (5)

_____ The Career and Technical Center clearly communicating the goals and priorities of the school. (6)

_____ The Career and Technical Center's administration having high expectations for students to achieve college and career readiness. (7)

_____ Feeder schools having high expectations for their students to achieve college and career readiness. (8)

_____ Career and Technical students getting the guidance counseling they need to transition to college and career. (9)

_____ Students being required to work in teams at the Career and Technical Center. (10)