Identifying Grading and Assessment Practices of Career and Technical Education Teachers: A Focus on Grading and Assessment Practices of Student Mastery of Employability Skills

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Abstract

Employers indicate their new employees lack the employability skills to be successful in the workplace. These skills are integral to the career and technical education (CTE) curriculum in Ohio. CTE teachers are responsible for grading and assessing student mastery of employability skills. This study examines Ohio CTE teachers' grading and assessment practices to determine student mastery of employability skills and provides an analysis to determine whether a relationship exists between their grading and assessment practices and demographic variables. The researcher sent a Google Survey to colleagues who completed the survey or forwarded the survey to eligible participants. Ninety-nine respondents completed the survey. Results indicate CTE teachers use behavior, work habits, and professionalism/employability often to determine students' grades for employability skills. Authentic assessments are used quite a bit or more by 93 percent of respondents. The cognitive level of assessments to measure employability skills focuses on having students apply what they learn quite a bit or more by 93 percent of respondents. The survey items were grouped into four factors for a multivariate analysis, revealing a significant interaction between a CTE teacher's career field and the multivariate factor, $p < .001$. Further research can examine why these interactions exist and how teaching and learning of outcomes related to employability skills are impacted. Many CTE teachers use grades as a measure of accountability, which can obscure a clear understanding of students' strengths and areas for improvement. Career and technical education teachers need professional development on research-based grading practices.

Keywords: assessment, career and technical education, CTE, employability skills, employee, employer, grading, practices, soft skills, teachers

Dedication

First, I thank God for granting me the strength, patience, and wisdom needed throughout the dissertation process. Thank you to my family and friends for their support and encouragement along the way. Everyone cheering me on and pushing me was exactly what I needed. To my twin brother, Brad, and my sister, Alyssa, you two are the best siblings a person could ask for. To my nieces, know that you can do anything you put your mind to. If you must, do it afraid.

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Chapter One

Introduction

The labor outlook for qualified, skilled laborers is bleak. The baby boomer generation is retiring at a rapid rate (Ito, 2023). Businesses lack the depth of qualified applicants that they were used to in the 1960s and 1970s to fill open positions (Ito, 2023). The construction industry alone faces a shortage of over half a million workers in 2023 (Associated Builders and Contractors, 2023). The number of applications being submitted for technical roles has been cut in half from 2020 to 2022 (Yang, 2023). Meanwhile, the unemployment rate for August 2023 is 3.8 percent, and the labor participation rate rose to 62.8 percent (BLS, 2023). This 3.8 percent unemployment rate is considered a healthy rate of unemployment in the United States (Kim, 2022). With a healthy unemployment rate and the baby boomer generation retiring, businesses that employ skilled laborers face difficulty in finding qualified workers to fill open positions. Often, employers look to career and technical education (CTE) centers to hire high school graduates for these available positions. When workers are found with the appropriate technical skills to fill positions, they must also possess the employability skills, or soft skills, required to thrive in their new position.

Employees bring employability skills to the workplace as a part of who they are (DiMattina & Ferris, 2013). Employability skills indicate necessary functional and enabling knowledge, capabilities, and attitudes necessary for the world of work in the 21st century. Some of these skills include teamwork, creativity, professionalism, punctuality, communication, problem-solving, and leadership skills (Chan et al., 2018; DiMattina & Ferris, 2013; Fajaryati et al., 2020; Holmber-Wright & Hirbar, 2016; Lerman, 2013;

Rasul et al., 2014; Wyman, 2015). Compounding the problem of a shortage of skilled laborers, employers state time and again that their new employees do not exhibit the employability skills to be successful in the workplace (Flanigan, 2019; Fletcher Jr. et al., 2018; Homan et al, 2019; Price & Magy, 2021). Employability skills are critical because they allow students to adjust to the frustrations and obstacles they encounter in their adult life, along with the demands of work (Gonzales & Vodicka, 2021). In their study, Beggin and Vaughn (2017) found that over 75% of employers, surveyed by the Seattle Jobs Initiative, emphasized the significance of soft skills, considering them equally or more crucial than technical abilities for securing entry-level positions. Lerman (2013) referenced a survey conducted in the mid-1990s involving 3,200 employers across four major cities. The survey revealed that characteristics such as responsibility, integrity, and self-management were deemed equally or more crucial than fundamental skills by employers.

Employability skills are a component of the curriculum of CTE programming in the state of Ohio. Every CTE course is made up of strands, outcomes, and competencies. Strand 1 appears in every course, no matter the career field, and covers various employability skills. Students are tested on their knowledge of the topics covered in the course through a Webxam test. Teachers can identify the strengths and weaknesses of their students on any outcome. Students show proficiency on most employability skills assessment items on the Webxam tests. The question becomes *why are employers not seeing this knowledge put into practice on the job?* How CTE teachers grade student mastery of employability skills may assist in answering this question.

A grade indicates what a student knows and can do, as well as gives the teacher an idea of how close the student is to mastering the learning objective (Brookhart et al., 2016; Carifio & Carey, 2009; Chen & Bonner, 2017; Feldman & Reeves, 2020; Kunnath, 2017; Reeves, 2008). Many teachers include other data points (e.g., completing homework, turning in assignments on time, class participation, behavior, effort, and collaboration, in student grades) that make the grades less informative in relation to students' academic progress (Guskey, 2020; Kunnath, 2017). When this happens, grades no longer only represent what students know and can do, but they become a combination of other topics unrelated to academic achievement (Barton & Thomas, 2017). Teachers' grading practices in the United States are often characterized as a *hodgepodge* approach that intertwines content mastery and other factors related to effort, behavior, attitude, and progress (Chen & Bonner, 2017; Guskey, 2020; Hope, 2020). Teachers who use other factors as part of a student's grade are assessing the student's executive functioning skills. Students rely on executive functioning in their brains when they work on an assignment, interact with their peers, and manage their behavior (Cumming et al., 2023). Employability skills encompass some executive functioning skills which teachers may incorporate into a student's grade. Identifying the grading and assessment practices of CTE teachers regarding their students' mastery of employability skills can be the first step in determining why students lack these nontechnical skills employers desperately desire.

Problem Statement

Teachers grade and assess student work on a daily basis to measure understanding and achievement. The inconsistencies between teachers and these practices are vast and

can make grades a source of unreliable information (Feldman, 2019). Teachers craft grading protocols from tradition, perceived importance, and their own experiences (Kunnath, 2017).

Many teachers use nonachievement factors in determining students' grades (Brookhart et al., 2016). These factors distort what a grade should indicate (Barton & Thomas, 2017). Chen and Bonner (2017) pointed out that in a study of 169 current and preservice teachers, the majority determined "a number of grading practices to be ethical that are considered unethical by professional standards" and identified these factors as "consideration of student growth and effort, weighting according to class participation or attendance, and lowering scores for bad behavior or work habits" (p. 84).

McMillan (2001) found that many secondary teachers use effort, improvement, and ability to assist in determining student grades. By doing so, determining what a student knows and can do becomes difficult. McMillan also found some variation among subject areas and grading practices. Social studies teachers were more likely to emphasize effort and participation compared to math teachers. Little is known about CTE teachers and their characteristics, qualifications, and career paths (Anglum et al., 2023).

Career and technical education allows students to explore a career while also acquiring technical and employability skills (Congressional Research Service, 2022). Employers note that their employees lack employability skills (Flanigan, 2019; Fletcher Jr. et al., 2018; Homan et al, 2019; Price & Magy, 2021); however, there is a dearth of career and technical education research in the United States (Anglum et al., 2023; Congressional Research Service, 2022; Jacob, 2017). The lack of research may contribute to one facet of why employers experience having employees who do not possess the

employability skills necessary to be successful. CTE teachers' grading and assessment practices, which may not yield reliable information regarding student mastery of employability skills, cannot address students' deficiencies with these skills, as their data may be unreliable. There is a gap in the literature regarding the grading and assessment practices CTE teachers regarding employability skills. The researcher in this study addresses this gap in the research by identifying the grading and assessment practices of CTE teachers regarding their students' mastery of employability skills. Identifying these practices of CTE teachers in relationship to their gender, age, career technical planning district, time spent working in their career field before teaching, time spent teaching, their career field, educational attainment level, and ethnicity provides a baseline for future research in the field of the grading and assessment practices of CTE teachers.

Purpose Statement

This survey research study aimed to identify the grading and assessment practices that CTE teachers use to determine student mastery of employability skills. In addition to identifying the grading and assessment practices of CTE teachers, the discussion also describes how grading practices differed by gender, age, career technical planning district, time spent working in their career field before teaching, time spent teaching, their career field, educational attainment level, and ethnicity. The need to document the grading and assessment practices of CTE teachers exists because employers state that their employees still lack these skills (Flanigan, 2019; Fletcher Jr. et al., 2018; Homan et al, 2019; Price & Magy, 2021). These skills enhance an individual's value to the company, making the skills a critical component of the employee's human capital (Kyllonen, 2013). As teachers include other data points into a student's grade, the grade

becomes less informative in relation to the student's academic progress (Guskey, 2020; Kunnath, 2017). Career and technical education teachers who do not clearly understand their students' mastery of employability skills cannot identify areas of improvement to help bridge the gap that employers see in prospective employees. Due to the high variability of teachers' grading practices, it is critical to document how CTE teachers grade and assess student mastery of employability skills.

The amount of research regarding CTE pales in comparison to that of the K-12 education arena. Research on teachers' grading practices has increased over the years. These studies identify teachers' beliefs on grading (Cox, 2011; Kunnath, 2017; McMillan, 2001) and the grading practices they use (Duncan & Noonan, 2007; McMillan, 2001; McMillan et al., 2002; Ohlsen, 2007). Boss and McKendree (2022) completed a qualitative study that focused on CTE teachers in Michigan and their perceptions of assessment, student growth, and utilization of an evidence-based grading system. This study sought to add to the dearth of existing literature examining CTE and CTE teacher grading and assessment practices.

Research Questions

The study examined the grading and assessment practices of employability skills that CTE teachers utilize through the following research questions:

- Are there grading practices that CTE teachers use more than others with respect to employability skills?
- Are there assessment practices that CTE teachers use more than others with respect to employability skills?

- Is there a relationship between teachers' employability skills grading and assessment practices and their related career field, educational attainment level, gender, number of years spent in education, number of years spent in industry before starting their career in education, related career field, or age?

Methodology

Non-experimental research holds significance in the field of education due to the presence of numerous variables that cannot be manipulated and require further investigation (Johnson, 2001). This survey research study employed a quantitative non-experimental approach to identify the assessment and grading practices that CTE teachers use to determine student mastery of employability skills and to describe how those practices differ among the variables of a teacher's related career field, educational attainment level, gender number of years spent in education, number of years spent in the industry before starting their career in education, related career field, or age. One of the main purposes of survey research is to understand and measure people's behaviors (Trochim et al., 2016).

The population for the study was CTE teachers in Ohio, and the target population was drawn from the researcher's colleagues in various career and technical planning districts (CTPD) in Ohio. The snowball sampling method was utilized to gather participants. A voluntary online survey was emailed to the researcher's colleagues throughout Ohio, and they were asked to forward the survey to CTE teachers in their CTPD. The survey was adapted, with permission, from The Survey of Assessment and Grading Practices—Secondary Form, which was created by James H. McMillan of the Virginia Commonwealth University (McMillan, 2001). General demographic questions

were included at the beginning of the survey to identify each teacher's related career field, educational attainment level, gender, number of years spent in education, number of years spent in industry before starting their career in education, related career field, age, and ethnicity. The survey was created using Google Forms which is a secure, confidential online platform. The survey identified the grading and assessment practices CTE teachers use to evaluate study mastery of employability skills.

Significance of Study

This research provides new insights into CTE teachers' grading and assessment practices. More specifically, the research identifies how CTE teachers grade and assess student mastery of employability skills. Through this study, the educational community can gain insight into CTE teachers' decisions concerning grades and assessment. An objective look at these practices aids educators in determining if there is an over-reliance on certain grading and assessment practices. This over-reliance of certain practices may not give an accurate picture of students' understanding of employability skills and their ability to utilize them in real-world situations.

Further research can identify best practices to grade and assess employability skills that CTE teachers should use. The implementation of appropriate grading and assessment practices will increase student mastery of employability skills. Students who exhibit mastery of employability skills increase their human capital, adding value to the skills they bring into the workplace. In turn, employers will experience an increase in employees who possess the soft skills they currently see lacking and can spend less time cultivating these skills in their employees. A boost in the initial productivity of new employees who possess the required employability skills should also be noticed. As they

start their employment, these new employees will be more efficient because of the skills they learned. A detailed identification and comparison of the assessment and grading practices involved in this research can serve as a tool to determine if there is an increased reliance on certain grading and assessment practices that fail to produce an accurate picture of what students know and can do.

Role of the Researcher

With 15 years of experience in the field of education, the researcher holds a Bachelor of Science in Education degree and a Master of Education in Educational Administration degree. Several educator licenses in the state of Ohio are held by the researcher, including a current teaching license in Grades 7-12 integrated mathematics, a Grades 4-12 principal license, a school treasurer license, and a superintendent's license. The researcher's professional background includes teaching eighth grade math in an urban school for seven years and spending eight years as a CTE high school administrator. Throughout the past years of working in the CTE high school, it has become apparent that the grading of CTE students and the assessment of their mastery of employability skills needs to be identified in order to more accurately capture how well the students are being prepared for the workforce. Proficient in the skills essential for conducting the proposed study, the researcher was well-prepared for its execution.

Assumptions

This quantitative survey research study assumed that respondents completed the survey honestly. The survey provided anonymity which allowed respondents to answer without the fear of their responses. The survey participants were only able to take the survey once and could only respond to each item one time. The assumption of

homogenous variations was present. By adapting the inventory for the current investigation from The Survey of Assessment and Grading Practices—Secondary Form (McMillan, 2001), the survey was assumed to have no leading or poorly constructed questions. The survey communicated what the researcher wanted to communicate and ask. Another assumption was that a representative sample was collected.

Limitations

Validity in research refers to how well the interpretations and applications of a measurement instrument accurately align with the research questions (Frisbie, 2005; Sullivan, 2011). Validity plays a crucial role in assessing the strength of the conclusions drawn from the analysis of measurement tool results, much like presenting evidence in a courtroom to substantiate claims derived from data interpretation. Sullivan (2011) identified various sources of evidence that contribute to validity, including content, the process of collecting responses, relationships between variables, and consequences.

Validity threats can manifest as either internal or external. External validity pertains to the degree to which the study's findings can be generalized to other groups, locations, and time periods beyond the study's immediate scope (Trochim et al., 2016). In this study, concerns regarding external validity may arise due to convenience-based sampling methods. The sample exclusively comprises career and technical planning districts listed on the Ohio Department of Education's website, omitting charter or private schools offering CTE courses. However, the intentional use of purposive sampling should mitigate potential biases associated with convenience sampling. The sample encompasses a diverse range of schools aiming to alleviate concerns regarding external validity.

Moreover, the inclusion of demographic data about CTE teachers enhances the potential for generalization to other Ohio CTE educators.

A social threat to construct validity arises from the possibility of CTE teachers making educated guesses about the study's hypotheses, potentially leading to biased responses aimed at presenting their grading and assessment practices in a favorable light. Trochim et al. (2016) highlighted that survey respondents often seek to project themselves positively. To address this limitation, respondents received assurances of anonymity and confidentiality to encourage honest responses. Additionally, the survey's name clearly states its purpose, helping to mitigate any hypothesis guessing tendencies among CTE teachers.

Delimitations

This study exclusively delved into the grading and assessment methods employed by secondary CTE teachers in Ohio, with a specific focus on their practices related to Strand 1 (i.e., encompassing outcome 1.01 employability skills and 1.02 leadership and communication). The study also examined the competencies associated with each of these outcomes. An important note is that this research did not encompass an investigation into grading practices utilized by middle school CTE teachers or the broader grading and assessment practices of secondary CTE educators in general.

Operational Definitions

Various constructs were examined throughout this study. The key constructs of assessment practices, employability skills, and grading practices are defined below. Relevant terms mentioned throughout the study are provided with well-documented definitions found in the existing literature.

Academic Enabler: An entity of nonachievement factors that is more positive in nature (Chen & Bonner, 2017; McMillan, 2001). They can include effort, potential, work habits, attentiveness, and classroom participation (Brookhart et al., 2016).

Cognitive Level of Assessments: The depth of mental process an evaluation tool requires regarding student mastery of a topic or skill (recall knowledge, understanding, application, and reasoning) (Government of British Columbia, n.d.).

Competency: A specific statement of foundational and critical knowledge or skill that will be learned in a CTE pathway program (ODE, 2022a).

Employability Skills: The set of "skills, understandings, and personal attributes that make graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community, and the economy" (Yorke & Knight, 2006, p. 3). They denote essential functional and enabling knowledge, capabilities, and mindset necessary for the world of work in the 21st century. These are skills employees bring to the workplace as a part of who they are (DiMattina & Ferris, 2013). Other phrases or terms for employability skills are 21st-century skills, soft skills, or workforce readiness skills (Beggin & Vaughn, 2017; DiMattina & Ferris, 2013; Slyter & Wickam, 2021; Wilson, 2022; Wyman, 2015).

Factors used in determining grades: Items teachers take into account when assigning grades such as nonachievement factors and academic performance (McMillan, 2001).

Grades: Symbols allocated to individual components of student work or combined evaluations of student performance featured on student report cards (Brookhart et al., 2016).

Grading Practices: The approach that teachers utilize to determine a student's grades and typically include measures of content mastery and other factors related to attitude, conduct, effort, and improvement (Chen & Bonner, 2017; Guskey, 2020; Hope, 2020).

Human Capital: The employee's skill sets that bring value to company productivity (Holmberg-Wright & Hribar, 2016). The knowledge and skills gained through education, on-site job training, and other types of experience (Krieger et al., 2021).

Human Capital Theory: The notion that individuals' learning capacities are comparable commodities and other components involved in the production of goods and services (Nafukho et al., 2004).

Nonachievement Factors: Entities that influence a grade that does not measure the knowledge or skill a student possesses (Brookhart et al., 2016).

Outcome: A comprehensive statement summarizing the knowledge and skills delineated within a collection of individual competencies to be acquired by the conclusion of 12th grade (ODE, 2022a).

Strand: A broad subject domain within which numerous outcomes are categorized, irrespective of the specific pathway (ODE, 2022a).

Types of Assessments Used: The tools and instruments teachers use to measure student learning (Ohlsen, 2007).

Organization of the Dissertation

The introduction serves to provide background information detailing the current problem employers note about the lack of employability skills their employees currently possess. This necessitates the current investigation to identify the grading and assessment practices CTE teachers use in their classrooms to measure students' mastery of these employability skills that are embedded into their curriculum. The study documents these practices. CTE teachers throughout the state of Ohio completed a survey that asked them to indicate the factors they use in determining student' grades, the types of assessments they use, and the cognitive level of assessments they use in measuring student mastery of employability skills.

The literature review provides an examination of current research. This review details the national history of CTE education and the structure of CTE education in Ohio. The CTE teacher and their path to teacher licensure is provided. The importance of issuing grades in determining student mastery and teacher beliefs about the purpose of grades and student motivation are discussed. An in-depth analysis of employability skills previews the following section regarding current employer trends. The trends shine light on the current issue employers see with a lack of employability skills in their employees. By identifying these grading and assessment practices, further research can be conducted to determine the best practices that will lead to an increase in employers seeing their employees exhibit these skills in the workplace.

The methods section outlines how the study was conducted. The participants are identified. The survey instrument, The Secondary Career and Technical Educators Grading and Assessment of Employability Skills Survey which was adapted with

permission from The Survey of Assessment and Grading Practices—Secondary Form created by James H. McMillan of the Virginia Commonwealth University (McMillan, 2001) is presented. Reliability and validity of the instrument are reviewed, and the data analysis procedure is explained.

In the analysis and results section, demographic data is detailed, and raw survey data is also presented. The CTE teachers' grading and assessment practices responses are shared. Applicable statistical analysis is explained, and the results are detailed with the accompanying appropriate statistical assumptions.

The discussion section provides an interpretation of the results. The grading and assessment practices and the frequency of use are framed to making meaning of the results in reference to the research questions. Existing literature is used to compare the research findings. The research questions are also answered, and further implications of the findings and future research studies are suggested, along with possible improvements for the study.

Chapter Two

Review of Literature

Theoretical Framework

Humans start learning from the moment they are born. They observe the world around them, and after many days of observations and increasing their fine motor strength and skills, they begin walking and talking and become more independent as they progress with age. Elementary-age students construct knowledge they will need as they move through school. American high school sets students up to pursue a pathway to college or the workforce. High school students are funneled through courses to prepare them for their next steps after graduation. Some high school students are enrolled in career and technical education courses to prepare them for the workforce after high school. The value of career and technical education courses lies in the ability to give students the skills necessary to succeed in the world of work. The necessary skills are a mix of technical and *soft*, or employability, skills. To increase the human capital within an organization, employers often choose to send their employees for training to further their skills.

Human Capital Theory

The main components of production in the 1950s were tangible assets, labor, land, and management (Becker, 1993; Mincer 1962). In the early 1960s, difficulty arose in explaining the growth of the U.S. economy through the four components of production (Denison, 1962; Krueger, 1968; Schultz, 1961). “Human capital” became known as the other factor to fill the gap among the other four components (Schultz, 1961). Becker published his book *Human Capital* in 1964 which became the typical reference for

numerous years (Holmber-Wright & Hribar, 2016). He saw human capital in the same way as tangible items like buildings and machines or the physical means of business productivity (Holmberg-Wright & Hribar, 2016). The foundation of human capital theory is the notion that individuals' learning abilities are comparable commodities to other factors involved in producing goods and services (Nafukho et al., 2004). Human capital theory suggests enhancing human resources (e.g., skills, knowledge, values, or health) to provide benefits to society and individuals (Brown & Washburn, 2019; Nafukho et al., 2004; Rinker et al., 2020; Tan, 2014). Increasing knowledge and skills with education enhances the individual's productivity in the workplace (Tan, 2014), as well as the stock of educated adults within the organization (Rinker et al., 2020). Human capital is broadly defined today as the employee's skill sets that bring value to company productivity (Holmberg-Wright & Hribar, 2016). Coupled with the habits and values that individuals possess, human capital encompasses the skills and knowledge accrued through education and training as critical exemplifications of human capital development (Michaels & Barone, 2020). The education and well-being of individuals, and the stock of educated adults, are other components of human capital (Rinker et al., 2020).

The human capital theory is now a broadly accepted notion that emphasizing that investments in education, training, and diverse learning methods yield significant returns (Deming, 2022). The investment in education is crucial to the individual and the economic growth of the business, industry, and country (Michaels & Barone, 2020; Tan, 2014). Human capital development strives to bring cost savings and improvement of performance to the industry (Rasul et al., 2014). An important component of increasing company performance and improving employee productivity, as well as making the

company more sustainable and competitive, is human capital (Rasul et al., 2014). Additional education and training strengthen an individual's capital, which is essential for economic growth and mitigating unemployment and poverty (Michaels & Barone, 2020). Within and across countries, human capital explains a large amount of variability in labor wages (Deming, 2022). Human capital investments also yield substantial economic gains throughout childhood and the early stages of adulthood (Deming, 2022).

Human Capital Development

Human capital consists of knowledge and skills gained through education, on-site job training, and other types of experience (Krieger et al., 2021). Human capital is an employee's skill set that enhances productivity (Kyllonen, 2013). By applying their skills, knowledge, and expertise to provide a necessary means for solving business problems, human capital represents the value a person brings to their company (Holmberg-Wright & Hribar, 2016). Their value encompasses cognitive skills, attitudes, interests, abilities, knowledge, dispositions, etc. (Kyllonen, 2013). These attributes come from the training and education an individual experiences, their innate ability and/or parenting, medical care, as well as additional ways (Kyllonen, 2013). Education and schooling are viewed as purposeful investments to ready the workforce and increase the productivity of employees and organizations while fostering global-level growth and development (Nafukho et al., 2004). A heightened awareness exists regarding the value of non-cognitive skills (Kyllonen, 2013). Economists have shown that 20 percent of the impacts of educational achievement are attributable to cognitive skills for labor market outcomes (Kyllonen, 2013). The understanding is that schooling develops cognitive and non-cognitive abilities, with the later impacting workplace success to a higher degree

(Kyllonen, 2013). The expense of developing human capital is on the rise (Rasul et al., 2014). Employers expect educational institutions to teach and instill employability skills in their students before graduation (Rasul et al., 2014). These employability skills are the non-cognitive skills that are in high demand. Deming (2022) refers to some of them as higher-order skills like problem-solving and teamwork which continue to increase in economic value. Human capital theory is tightly associated to workforce education and assists in the explanation of why individuals invest money and time in career and technical education (CTE) programs (Michaels & Barone, 2020). The cognitive and non-cognitive skills are paired with human capital theory, implying that individuals who invest in themselves through further educational training will experience stable employment and larger salaries. This is because their skills give clues to employers about their abilities and productivity (Michaels & Barone, 2020).

Literature Review

The History of Career and Technical Education

Career and technical education is now a critical piece of the country's workforce need (Collom, 2021). Vocational education in the United States was initially utilized to prepare and train students for work in agriculture and industrial occupations during the middle and end of the 19th century (Michaels & Barone, 2020; Plasman et al., 2017). However, the beginning of significant legislation in CTE is traceable to the Smith-Hughes Vocational Act of 1917 (Gordon, 2014). The Smith-Hughes Vocational Education Act of 1917 was the initial piece of legislation that allocated funding for CTE at the secondary education level (Collom, 2021; Dougherty, 2016). Early CTE centralized on industries that were critical to the way of American life at the time, such as

homemaking, agriculture, and industrial training, to prepare students who were typically not going to attempt to obtain a college education. These CTE students were guided to careers on farms and in factories (Dougherty, 2016; Gordon, 2014). Under the Vocational Education Act of 1963, vocational education included occupational programs like business and commerce (Gordon, n.d.). This act sought to improve vocational education programs and made provisions for programs that serve disadvantaged and disabled students (Gordon, n.d.). Amendments were made to the 1963 act in 1968 which tied each goal to specific funding (Gordon, n.d.).

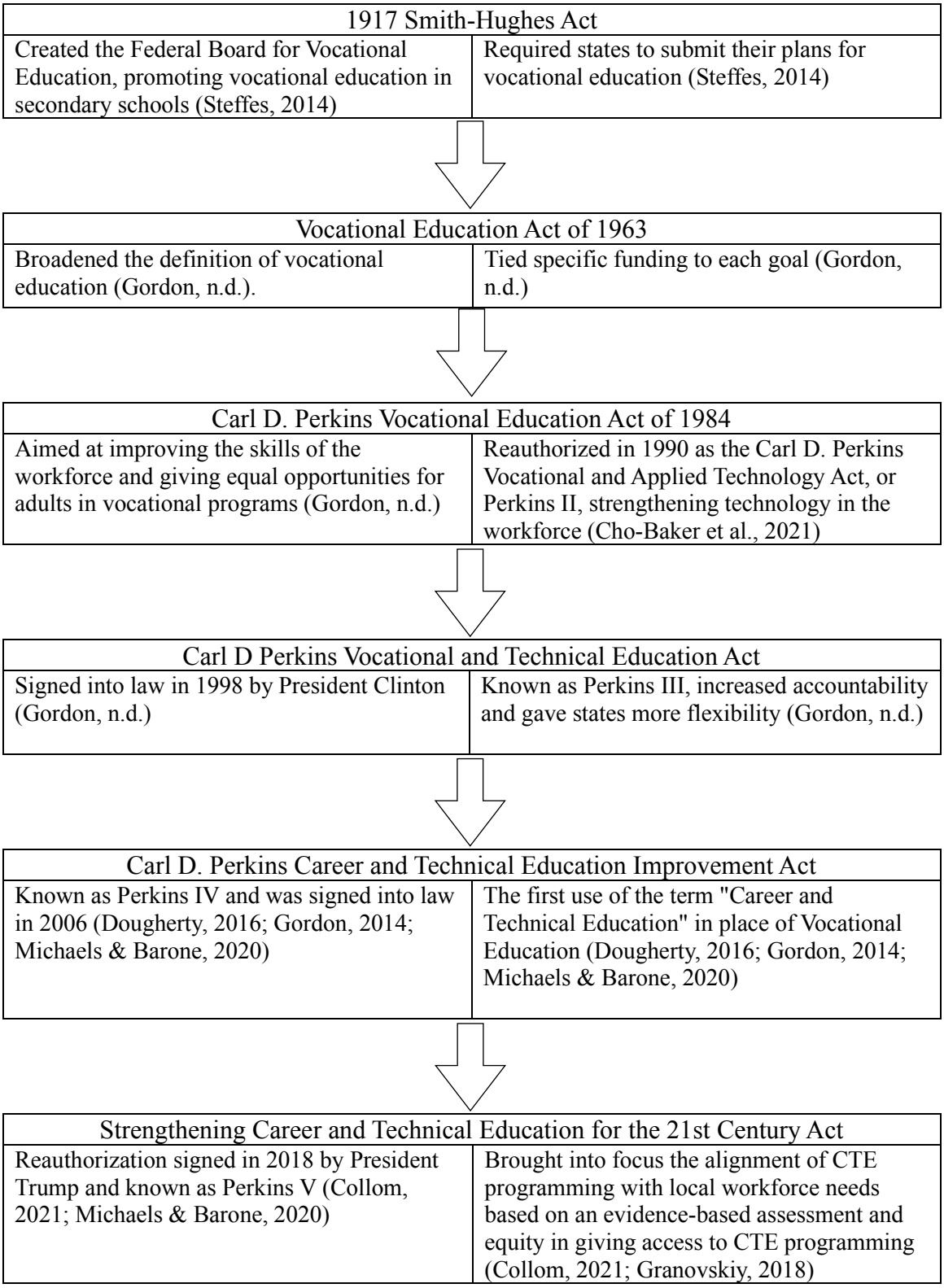
Over the years, several additional amendments were made to the Vocation Education Act. These amendments led to the federal government renaming the act to the Carl D. Perkins Vocational Education Act of 1984, referred to as the Perkins Act (Gordon, n.d.). In 1990, the Perkins Act underwent reauthorization as the Carl D. Perkins Vocational and Applied Technology Act, or Perkins II for short. Perkins II focused vocational education on the increasing use of technology in the workforce, as technology was rapidly increasing in its capabilities across the globe (Cho-Baker et al., 2021). In 1998, increased accountability and more flexibility for states resulted in President Bill Clinton signing the Carl D. Perkins Vocational and Technical Education Act, also known as Perkins III (Gordon, n.d.). The use of the term “Career and Technical Education” came on the scene when the act was revised in 2006 as the Carl D. Perkins Career and Technical Education Improvement Act, Perkins IV for short (Dougherty, 2016; Gordon 2014; Michaels & Barone, 2020). In 2018, Perkins IV was reauthorized again as Perkins V - Strengthening Career and Technical Education for the 21st Century Act (Collom, 2021; Michaels & Barone, 2020). This reauthorization brought into focus the alignment

of CTE programming with local workforce needs based on an evidence-based assessment and equity in giving access to CTE programming (Collom, 2021; Granovskiy, 2018). The passage of Perkins V came at a time when current and previous presidential administrations targeted CTE as an avenue to impact and strengthen workforce development. This increased the attention put on CTE (Plasman et al., 2017). Intertwining ESSA and CTE, the Every Student Succeeds Act (ESSA) of 2015 put greater emphasis on college and career readiness. The increasing cost of postsecondary education shines a spotlight on CTE (Plasman et al., 2017). Plasman (2019) states that 30% of high school graduates do not go on to obtain a postsecondary education.

Perkins V places heavy emphasis on ensuring that CTE coursework is rigorous and relevant (Plasman, 2019). The courses and programs within the CTE framework are developed in a way that allow students to attain specific skills they need to be successful in a given career. The courses also teach students the academic skills they need to be successful in high-skill, high-demand careers (Plasman, 2019). Career and technical education programming prepares students to be college and career ready by assisting them in the development of the advanced skills, specialized knowledge, academic diligence, and real-world experience that lead to successful careers in high demand jobs (Advanced CTE, 2023b). Figure 1 illustrates the evolution of major CTE law in the United States.

Figure 1

Evolution of Major CTE law in the US



This figure illustrates the many changes of the Perkins Act over time, while also noting the starting point of Vocational Education legislation with the Smith-Hughes Act of 1917.

CTE Course Structure and Organization in Ohio

The U.S. Department of Education organizes CTE in career clusters and pathways (Plasman, 2019; Plasman et al., 2017;). In Ohio, the CTE framework consists of career clusters, pathways, and programs (Ohio Department of Education [ODE], 2022d). Similar to the career clusters set forth by the U.S. Department of Education, the ODE lists 16 different career fields that encompass its framework:

- agricultural and environmental systems
- arts and communication
- business and administrative services
- construction technologies
- education and training
- engineering and science technologies
- finance
- government and public administration
- health science
- hospitality and tourism
- human services
- information technology
- law and public safety
- manufacturing

- marketing
- transportation systems (ODE, 2022d)

The career clusters include unique courses each containing a specific focus that provides students with the skills they need to succeed in careers within their career field (Plasman, 2019). Each career field has career pathways within it.

Technical content standards, created by the ODE, exist for each career field. These documents are updated every five years. The beginning part of each document is set up the same and includes a section on career pathways and identifies the structure and format of the strands, outcomes, and competencies. Career pathways are coherent, articulated sequences that outline the demanding academic and career-technical coursework that starts in the ninth grade and leads to a college degree, industry certificate, or license (ODE, 2022a). Each career pathway is a broad program of study that lays out the vital knowledge and skills that link secondary and postsecondary curriculum (Advanced CTE, 2023a).

Each course consists of strands, outcomes, and competencies. Figure 2 provides an example from the ODE (2022a) of the organizational structure of a strand (i.e., one outcome in the strand and two of the competencies within the outcome).

Figure 2

Strand, Outcome, and Competency Graphic

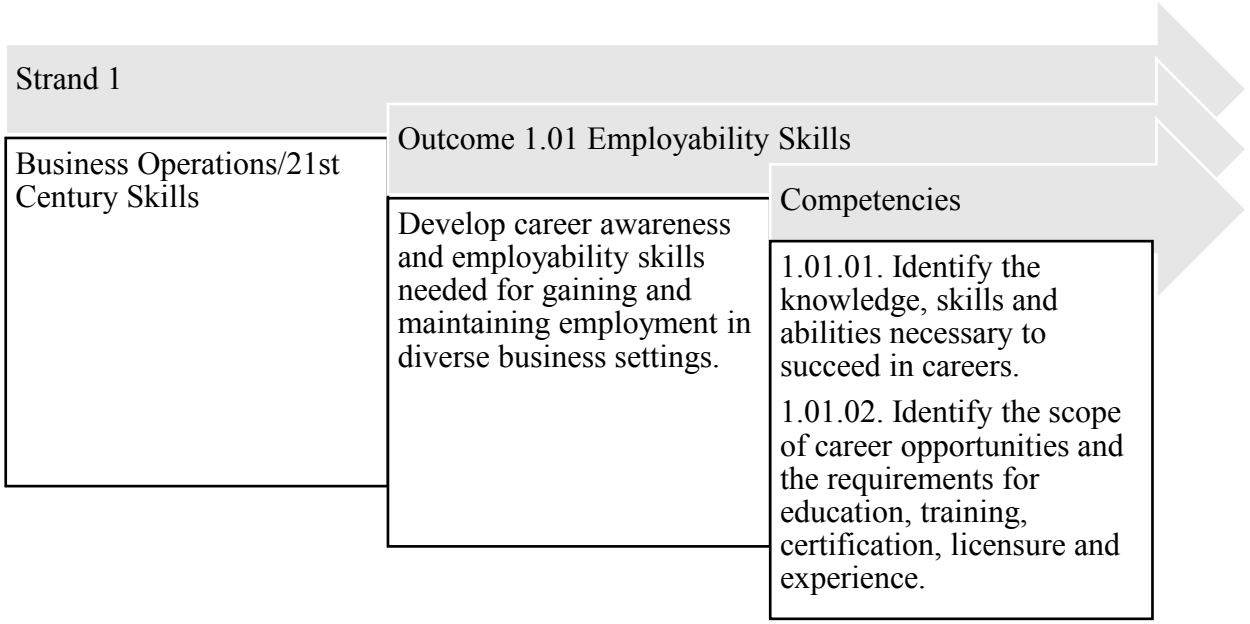


Figure 2 illustrates how the strands, outcomes, and competencies make up what students need to know and be able to do after completing a CTE course. The ODE (2022a) defines a strand as "a large content area under which multiple outcomes are organized, regardless of the pathway" (p. vi). A strand contains a title and succinct description featuring statements that capture various broad domains of knowledge and skills expected throughout the outcomes within the strand. Strand 1, Business Operations/21st Century Skills, is identical for each career field (ODE, 2022a). Strand 1 encompasses various outcomes, "employability skills, leadership and communications, business ethics and law, knowledge management and information technology, global environment, business literacy, entrepreneurship/ entrepreneurs, operations management, financial management, sales and marketing and principles of business economics" (ODE, 2022a, p. vi). Each course has an amalgamation of the outcomes. The ODE (2022a) defines an outcome as an

"overarching statement that summarizes the knowledge and skills described in a set of individual competencies to be learned by the end of the 12th grade" (p. vi). A strand typically has between five and 15 outcomes.

The ODE (2022a) defines a competency as a "specific statement of essential knowledge or skill to be learned in the pathway program" (p. vi). Each outcome typically contains between five and 12 competencies. Career pathways may share outcomes and competencies in the career field (ODE, 2022a). The outcomes and competencies are the foundation of creating secondary courses, programs, instruction, and assessment. They are critical in assisting to facilitate the transition of the student from one educational level to another and/or the workforce (ODEW, 2024b). The outcomes and competencies are vetted by business and industry partners within the pathway.

The technical skill attainment of students regarding their competencies and outcomes is assessed using end-of-course exams as valid and reliable assessments (ODEW, 2024b). All secondary CTE programs require the use of the career field pathway end-of-course assessments (ODEW, 2024b). The assessments are developed and administered by The Ohio State University's Center on Education and Training for Employment (CETE) using a proprietary system known as Webxam. The CETE uses three levels to report student performance: nonproficient, proficient, and advanced (The Ohio State University CETE, 2023a). Teachers who have their students take the pretest of a Webxam will receive a student growth measure after the students take the posttest. The growth measure is used to assign CTE teachers with a teacher effectiveness rating that scales from one to five with levels varying from *least effective* to *most effective* (The Ohio State University CETE, 2023b). Teachers can also access reports within the

Webxam portal to determine how their students performed on any strand and outcome. The setup of CTE programming strives to offer students many benefits as they experience a CTE education. Table 1 shows data from a sampling of Ohio CTE courses from the 2021-2022 school year (Webxam, 2013). The data covers Strand 1 (outcomes 1.01 and 1.02) information that was tested on the Webxam. The pretest and posttest correct columns indicate the percentage students got correct for that outcome.

Table 1

Webxam Percentage Correct by Course for Outcome 1.01 and 1.02 for the State of Ohio for a Sampling of Courses

Course	Code	Outcome	Pretest Statewide	Posttest Statewide
Machine Tools	1.01	Employability Skills	82%	89%
	1.02	Leadership and Communication	79%	88%
Machining with Industrial Milling Machines	1.01	Employability Skills	74%	99%
	1.02	Leadership and Communication	75%	76%
Machining with Industrial Lathes	1.01	Employability Skills	50%	96%
	1.02	Leadership and Communication	63%	94%
Computer Numerical Control Technology with Industrial Mills and Lathes	1.01	Employability Skills	66%	96%
	1.02	Leadership and Communication	60%	96%
Education Principles	1.01	Employability Skills	73%	73%

Child and Adolescent Development	1.01	Employability Skills	44%	66%
Communities, Schools, and Stakeholders	1.01	Employability Skills	73%	87%
	1.02	Leadership and Communication	52%	52%
Foundations of Education and Training	1.01	Employability Skills	70%	76%
	1.02	Leadership and Communication	76%	80%
Construction Technology- Core and Sustainable Construction	1.01	Employability Skills	58%	88%
	1.02	Leadership and Communication	72%	96%
Facility and Building Maintenance	1.01	Employability Skills	61%	76%
	1.02	Leadership and Communication	73%	87%
Principles of Woods Construction	1.01	Employability Skills	-	78%
Structural Coverings and Finishes	1.01	Employability Skills	64%	95%
	1.02	Leadership and Communication	77%	94%
Foundations of Firefighting and Emergency Medical Services*	1.01	Employability Skills	58%	-
	1.02	Leadership and Communications	83%	90%
Engineering Design	1.01	Employability Skills	72%	86%
	1.02	Leadership and Communication	68%	59%
	1.01	Employability Skills	70%	89%

Architecture Design - Site and Foundation Plans	1.02	Leadership and Communication	77%	88%
Engineering Principles	1.01	Employability Skills	71%	65%
	1.02	Leadership and Communication	52%	90%
Plan Reading	1.01	Employability Skills	80%	89%
	1.02	Leadership and Communication	76%	86%
Shielded Metal Arc Welding	1.01	Employability Skills	77%	90%
Flux Cored Arc Welding	1.01	Employability Skills	68%	94%
Gas Metal Arc Welding	1.01	Employability Skills	83%	98%
Gas Tungsten Arc Welding	1.01	Employability Skills	62%	82%
Computer Integrated Manufacturing	1.02	Leadership and Communication	45%	84%
Digital Electronics	1.01	Employability Skills	60%	66%
	1.02	Leadership and Communication	59%	84%

**Note:* Data is from 2022-2023 because 2021-2022 data was not available. Some courses do not have outcome 1.01 or 1.02, as there is variability in the content covered in each specific course.

Table 1 indicates that most students throughout Ohio scored about 75% or higher for outcomes 1.01 and 1.02. Specifically looking at outcome 1.01, employability skills, 17 of the 21 courses showed a state-wide posttest percentage correct of 75% or above. Focusing on outcome 1.02, leadership and communication, 14 of the 16 courses showed a

posttest percentage correct of 75% or above. Students are testing well on the Webxam for Strand 1 items.

Benefits of a Career and Technical Education

Students who enroll in career and technical education (CTE) courses experience many benefits in addition to learning a skill or trade. The objective of CTE is to link students to growing and developing industries in the U.S. economy and provide students with the skills and training they need for sustained success (Dougherty, 2016). The training students receive results in better job prospects, larger financial gains, and a decrease in poverty (Michaels & Barone, 2020). Today's CTE emphasizes fostering universal skills like problem-solving, computer literacy, and teamwork, for extensive, multi-faceted industries instead of training students for specific jobs as was the focus in the past (Dougherty, 2016). CTE students are more likely to cultivate skills such as problem-solving, communication, critical thinking, and employability skills while in high school compared to their non-CTE peers (Research Team 335, 2018). Seventy-nine percent of CTE families state they are content with their child's ability to acquire real-world skills, while only 59% of non-CTE families state the same (Advanced CTE, 2021).

Additionally, 84% of CTE families indicate satisfaction with their child's opportunity to explore different career areas of interest, and 85% of CTE families indicate satisfaction with their child's opportunity to take classes that focus on skills in a specific field (Advanced CTE, 2021). Fifty-four percent of non-CTE families indicate the same satisfaction for both opportunities (Advanced CTE, 2021). These statistics show that families believe that a CTE education provides students with the technical and employability skills to be successful in the workforce.

Career and technical education pathways help alleviate potential and actual hardships that students from a low socioeconomic status (SES) face (Michaels & Barone, 2020). Well-developed CTE programs often provide students access to cutting-edge equipment and facilities, computer technologies with high-speed internet, textbooks, and advising to prepare them for future employment (Michaels & Barone, 2020). Supporters of CTE propose early and frequent exposure to programs in mechanical and health sciences, agriculture, business and information technology, and STEM can mitigate the negative effects a low SES can cause (Johnson & Hendricks, 2019). A study in Massachusetts found students in poverty who attended academic classes one week and were in a technical shop the next had a higher likelihood to graduate high school (82%) compared to students who did not participate in the technical shop program (50%) (Dougherty, 2018). The programming in CTE courses indicates a strong association with student graduation (Hyslop, 2014). Participation in CTE is tied to increased odds of graduation (Plasman 2019). Research shows that relevance is a critical factor for keeping students engaged in their studies (Hyslop, 2014). While increasing the skills students need in the workplace, CTE can reduce potential dropout rates, thereby increasing high school graduation rates (Michaels & Barone, 2020).

A positive association with short-term and long-term employment outcomes exists for high school students who take CTE courses (Cho-Baker et al., 2021). A positive association with wages and employment post-graduation are present, particularly among young men (Dougherty, 2016). Students who participate in CTE are predicted to have higher wages as compared to students who did not take part in any CTE coursework (Dougherty, 2018; Plasman, 2019). Hollenbeck and Huang (2014) found that high school

CTE students received increased wages throughout, and after, CTE enrollment. They also found CTE participants had an increased likelihood to be employed by 10% points compared to non-participants a year after leaving school. Additional research found students who completed a CTE program earned 11% more per year, eight years after graduation, on average compared to those who were not enrolled in CTE coursework (Kemple & Willner, 2008).

In addition to employment benefits, Hyslop (2014) stated that career and technical education students score better on academic assessments. Statistically significant mean differences exist, as measured by the combination of all ACT scores present for CTE students who completed their high school CTE program when compared to non-CTE high school graduates (Michaels & Barone, 2020). In their study, Michaels and Barone discovered statistically significant mean differences among the two groups for the ACT composite score, the ACT English score, the ACT Math score, the ACT Reading score, the ACT Science score, and the ACT Writing score. Using the ACT scores as a source of measurement, these results indicate that CTE curriculum and student completion of a CTE pathway can support student motivation and achievement.

While a CTE program provides students with the opportunity to develop the skills they need to be successful in the workforce, there are also other academic benefits (Plasman et al., 2017). Students who complete at least three CTE courses (labeling them a “concentrator”) have a 93% graduation rate (Research Team 335, 2018). Furthermore, CTE provides students who plan to continue their education in a postsecondary setting with exposure to a career field that might strengthen students’ cognizance of various career options and prospective professional trajectories (Plasman et al., 2017). Many CTE

programs provide students the opportunity to earn dual-enrollment credit where they can earn college credit, as well as the credits needed for high school graduation, as part of their CTE coursework (Hyslop, 2014). The Research Team 335 from the National Center for Construction Education and Research (NCCER) noted that 80% of 18- or 19-year-olds expect to obtain a bachelor's degree after they graduate high school. Many of them believe earning a bachelor's degree will result in a high paying job, which is their primary motivation behind earning the degree (Research Team 335, 2018). Sixty-four percent of students who started earning a bachelor's degree at a four-year university in the fall of 2014 finished that degree at the same university within six years (U.S. Department of Education, 2022). Those who graduate typically do so with a large amount of student loan debt, averaging more than $35,000; however, only 33% of jobs call for a college degree (Research Team 335, 2018). For these reasons, the college pathway alone is not suitable for many high school students. CTE students gain valuable skills along with the industry-recognized credentials their employers are looking for (Hyslop, 2014).

Students are able to earn various types of industry-recognized credentials in most CTE programs (ODEW, 2024a). The U.S. Department of Labor specifies a credential to be a verification of competence or qualification given to an individual by a third party who possesses the power to issue such credentials (Oates, 2010). The term *credential* includes educational certificates, certifications, degrees, and government-issued licenses (Association for Career and Technical Education, 2018). Credentials are awarded to recognize a person's attainment of measurable technical skills necessary to attain employment or further their career (Oates, 2010). Industry-recognized credentials are credentials that are endorsed or created by a nationally recognized industry organization

who represents a large part of the industry sector and then offered to individuals. Employers value credentials because credentials verify skills their employees possess which allows the employers to fill skilled job positions (Oates, 2010). The attainment of an industry-recognized credential signifies to the employer that the student is knowledgeable, appropriately trained, and skilled to carry out the requirements of the job (ODEW, 2024a). Credentials assist in improving an employee's work experience via higher earnings and enhanced job security (Oates, 2010). Students who obtain industry-recognized credentials are ready to enter into the work force right after high school (ODEW, 2024a).

The CTE Teacher

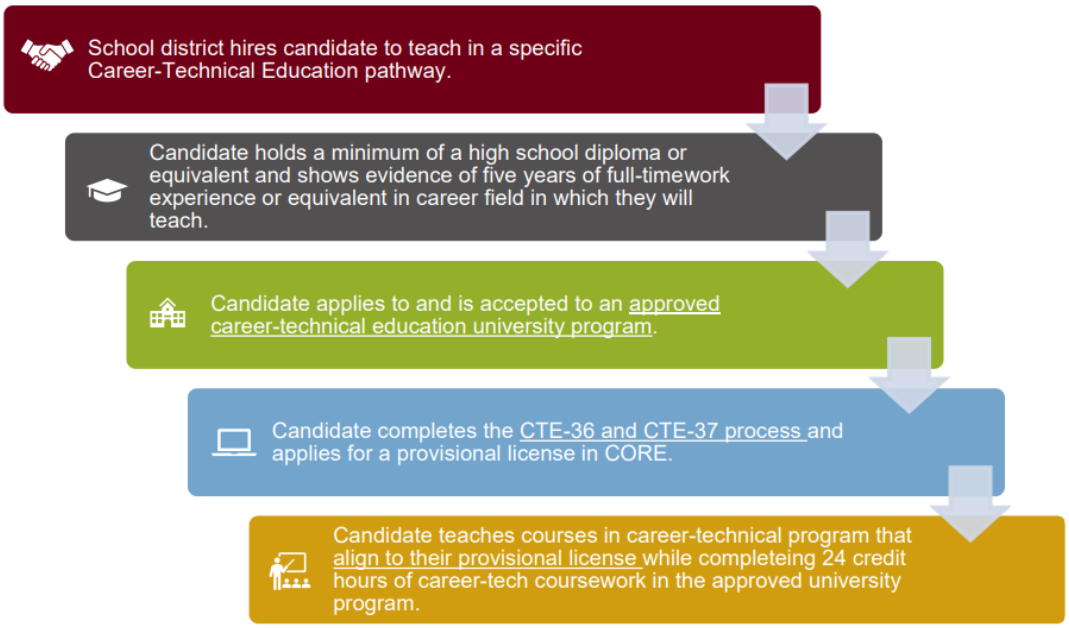
Licensure

All teachers in the state of Ohio need a teaching license. The path for a CTE teacher to obtain licensure involves many moving parts. The first step for a prospective CTE teacher is that they need to be hired by a school district in order to apply for a Career-Technical Workforce Development license (ODE, 2022b). The ODE requires teachers to have a specific amount of recent professional experience to qualify for a Career-Technical Workforce Development license (ODE, 2022b). The minimum amount of work experience varies based on the educational background of the hired teacher. The individual must hold at least a high school diploma or equivalent. Next, the teacher enrolls into an approved teacher preparation program to complete the 24 credit hours of career-tech coursework. The college coursework it taken while the CTE teacher is teaching for the school district. Figure 3 shows a flowchart of the process to obtain a

provisional license for a CTE teacher obtained from the Ohio Department of Education (ODE, 2022b).

Figure 3

CTE Licensure Flowchart



The flowchart above indicates being hired by a school district is the first step in the process of a CTE teacher obtaining the required licensure.

Preparation

The majority of CTE teachers come from their skilled industry into the field of teaching with little college coursework experience (Anglum et al., 2023). Career and technical teachers often transition to the field of education as a second career. Trade, health occupation, and industrial or construction trade teachers typically obtain a teaching certification through a non-traditional route (Zirkle et al., 2007). Conversely, educators coming from agricultural, business, and family consumer science backgrounds typically pursue the conventional path to obtain their teaching credentials (Zirkle et al., 2007).

Secondary CTE teachers are often thrown into a classroom and expected to teach with little to no formal education training. Zirkle et al. (2019) conducted a longitudinal study analyzing demographic data and emerging trends for CTE teachers who completed a summer workshop at The Ohio State University as part of their alternative licensure. The study included all new CTE teacher admissions for academic calendar years 2002-2003 to 2017-2018. A total of 468 CTE teachers were included in the study. Ninety-five (20.23%) teachers had not taken a college course before, and 209 (44.67%) teachers had completed some college courses but had not obtained a college degree of any type (i.e., associates, bachelors, masters, or doctorate) (Zirkle et al., 2019). Of the 468 teachers, 304 (approximately 65%) teachers did not have a college degree in any field. New CTE teachers lack instructional techniques when they begin teaching because they are juggling responsibilities. They must learn on the job while taking courses to work towards obtaining their teacher licensure.

Pedagogy

Once August rolls around, new CTE teachers are expected to teach in the secondary environments they previously encountered when they were in school (Stephens, 2015). While trying to juggle their workload, instructors must determine which teaching strategies they will use to teach each topic. Teachers use a cost-benefit analysis by measuring a strategy's effectiveness with its cost to determine what instructional techniques they use in the classroom (Persky, 2014). Effectiveness can be measured by analyzing students' grades, confidence, attitudes, test scores, or performance (Persky, 2014). Measuring costs includes considering the time necessary to create materials and the use of materials or software (Persky, 2014). CTE teachers tend to

choose lectures to deliver their instruction despite evidence indicating that interactive classroom instructional methods result in superior learning outcomes compared to lectures. (Persky, 2014). The new CTE teacher is expected to teach employability skills to their students as part of Strand 1. Since they come from industry, it is inferred that they possess the knowledge and skills to do so (Wibrow, 2011). Professional development is critical to support the various skills students must master for successful employment in the current job market (Darling-Hammond et al., 2017). Advanced types of teaching methods are required to "develop student competencies such as deep mastery of challenging content, critical thinking, complex problem-solving, effective communication and collaboration, and self-direction" (Darling-Hammond et al., 2017, p. v).

Career and technical education teachers receive professional development just as their colleagues do. The learning never stops in an effort to keep growing in their craft. Continued growth is imperative, as their responsibilities are vast. In addition to delivering instruction to their students every day, they are tasked with creating engaging learning activities, program budgeting, developing lesson plans and curriculum, recruiting for their program, overseeing career and technical student organizations (CTSOs), and analyzing data to ensure their students are learning (Cannon et al., 2013). Professional development needs in the area of teacher pedagogy for CTE teachers include "teaching students to think critically and creatively [and] motivating students to learn..." (Cannon et al., 2013, p. 259). Teaching students to think critically and creatively is part of teaching them employability skills.

Cannon et al. (2013) conducted a study to determine Idaho building principals' perceptions of the professional development needs of secondary CTE teachers.

Instructional leaders rated 56 item statements related to a comprehensive CTE program. Thirty-two items were identified as relating to teaching and learning, while the other 24 were related to program management items. Building leaders rated the items on two Likert-type scales. One scale was the level of importance for a CTE teacher, while the other assessed the proficiency of CTE teachers within their institution. The level of importance scale follows: 1 = not important, 2 = little importance, 3 = somewhat important, 4 = important, 5 = very important. The competence scale follows: 1 = not competent, 2 = little competence, 3 = somewhat competent, 4 = competent, 5 = very competent. Table 2 shows which items principals rated as most important (Cannon et al., 2013).

Table 2

Principals Rating for Most Important Professional Development Item Statements

Item Statement	*M*	*sd*
Teaching students to think critically and creatively	4.78	0.49
Motivating students to learn	4.78	0.47
Teaching proper safety practices in the lab	4.70	0.66
Teaching proper safety attitudes in the classroom	4.64	0.66
Assessing and evaluating student performance	4.63	0.55
Classroom Management	4.61	0.64
Teaching problem-solving and decision-making skills	4.61	0.68

Table 2 indicates how principals of CTE teachers perceive these items as most important. These top seven items fall into the teaching and learning category. Educating students in critical and creative thinking, alongside imparting problem-solving and decision-making abilities, are some of the employability skills that students need to know and be able to put into practice (Engelhart & Mupinga, 2020; SkillsUSA, 2023; U.S. Department of Education, 2015). The ability to motivate students is crucial in being able to teach them. Assigning accurate grades to students is important to elicit appropriate and specific feedback to students while making the teacher aware of deficiencies in students' knowledge and skills.

Principals' perceptions of secondary CTE teacher competence items shown in Table 3 also appear in the top 15 items from Cannon et al.'s (2013) study.

Table 3

Principals Perceptions of Secondary CTE Teacher Competence

Item Statement	*M*	*sd*
Classroom management	4.18	0.78
Teach proper safety attitudes in the classroom	4.17	0.83
Teach problem-solving and decision-making skills	3.87	0.88
Teach students to think critically and creatively	3.86	0.84
Assess and evaluate student performance	3.86	0.88
Motivate students to learn	3.85	0.84

Table 3 indicates many of the items that principals perceive as important are ones that their teachers are at least fairly competent in.

Professional development priorities, according to the perception of the Idaho secondary principals, were determined using mean weighted discrepancy score (MWDS) calculations for each item and subsequently ranked (Cannon et al., 2013). Motivating students to learn was ranked as the highest priority (MWDS = 4.47) and teaching students to think critically and creatively was ranked as the second highest priority (MWDS = 4.43). Assessing and evaluating student performance was ranked 10th (MWDS = 3.57) and teaching problem-solving and decision-making skills was ranked 14th (MWDS = 3.37) (Cannon et al., 2013). Interestingly, items the principals perceived their CTE teachers were at least fairly competent in were also perceived as priorities for professional development. The principals ranked items in the teaching and learning category often with more importance than the program management items. Increasing student motivation may increase student interest and achievement (Cannon et al., 2013). Students will be prepared for postsecondary education or entry into the workforce if they can gain critical and creative thinking skills (Cannon et al., 2013), which are a facet of employability skills. By increasing students' critical and creative thinking skills, their human capital is increased since these skills bring value to company productivity (Flanigan, 2019; Fletcher Jr. et al., 2018; Homan et al., 2019; Price & Magy, 2021; Wyman, 2015). Assessing and evaluating student performance is a critical notion to understanding student mastery of a particular outcome. Principals noted this importance by indicating its need as an area of professional development (Cannon et al., 2013).

The traditional grading scale and averaging of all grades to determine a student's final grade for the marking period is still thriving. Historically, teachers give students a grade that would include "academic achievement, preparedness, cooperation, 'busy-work' or homework completion… and effort" (Beggin & Vaughn, 2017, p. 20). Grading is difficult to interpret when trying to determine a student's strengths and weaknesses. This is important because CTE teachers assign grades in their classrooms to assess student achievement, including Strand 1 outcomes and competencies. Grades should provide an indication of students' progress towards mastering the content of the course, but the grade in the CTE lab is being distorted by behavior, character, and work ethic (Beggin & Vaughn, 2017).

Student Grades

Definition of Grades

Grades can be defined as the "symbols assigned to individual pieces of student work or … composite measures of student performance on student report cards" (Brookhart et al., 2016, p. 804). In the 19th century, student progress updates were originally given to parents via a conversation during a home visit by the teacher (Brookhart et al., 2016). Later in the century, student progress was given as a written narrative. During the 20th century, percentages began being utilized to determine student grades in high schools because student populations had become more diverse over the years (Brookhart et al., 2016). There were many more students entering high school which increased the teacher's workload. Elementary schools still used narrative descriptions to communicate student progress (Brookhart et al., 2016). Teachers began to use grading systems with fewer categories (i.e., the A-F scale) in the 1920s. By the

1940s, over 80% of U.S. schools were using the A-F grading scale (Brookhart et al., 2016). The switch from the oral or narrative grades sped up the grading process but took away the important aspect of indicating detailed information about what students know and can do (Brookhart et al., 2016).

The Purpose of Grades

The purpose of the grade students receive should be to provide feedback to students about their work and current understanding of the topic or learning objective that is presently being studied in class. The purpose also includes providing the teacher with feedback about the students' academic progress (Brookhart et al., 2016; Carifio & Carey, 2009; Chen & Bonner, 2017; Feldman & Reeves, 2020; Kunnath, 2017; Reeves, 2008). Simply put, a grade indicates what a student knows and can do, as well as gives the teacher an idea of how close the student is to mastering the learning objective. Grades need to be given in a timely manner, so students can understand where they have misunderstandings or gaps in their knowledge (Brookhart et al., 2016; Carifio & Carey, 2009; Chen & Bonner, 2017; Feldman & Reeves, 2020; Kunnath, 2017; Reeves, 2008). Grades should be used as a tool for feedback. Teachers should review class grades to adjust future learning while also doing the same for students on an individual basis (Brookhart et al., 2016; Carifio & Carey, 2009; Chen & Bonner, 2017; Feldman & Reeves, 2020; Kunnath, 2017; Reeves, 2008).

Many teachers include other data points (e.g., completing homework, turning in assignments on time, class participation, behavior, effort, and collaboration, in student grades) which make the grade less informative in relation to student academic progress (Guskey, 2020; Kunnath, 2017). When this happens, grades no longer only represent

what students know and can do, but they become a combination of other topics that are not related to academic achievement (Barton & Thomas, 2017). A combination of factors that make up students' grades provides unreliable information to the student and teacher that fails to paint a clear picture of what the student knows and can do (Barton & Thomas, 2017). This makes it unclear to the teacher what support the student needs to be successful. Additionally, it can also make the student's grades higher or lower than they should be relative to the student's understanding of course content (Barton & Thomas, 2017). Research studies have been conducted to identify the grading practices teachers use in their classroom.

Teacher Grading Practices

McMillan (2001) sought to identify the extent that secondary teachers utilized various assessment and grading practices (McMillan, 2001). McMillan determined that teachers identify academic achievement is the most important part of a student's grade. Academic enablers are also very important for teachers (2001). McMillan's survey was used in a study with permission and adaptation to determine the classroom assessment practices of secondary school members of the National Council of Teachers of Mathematics (Ohlsen, 2007). The study surveyed teachers in nine states to investigate if any relationships were present between the classroom assessment types used in high school math classrooms and high-stakes state tests (Ohlsen, 2007). The study concluded that there remains a strong reliance on traditional means of tests and quizzes to evaluate student learning (Ohlsen, 2007). The survey was also used with permission and adaptation to examine whether factors such as class size, school size, and subject matter had any impact on the assessment strategies and grading practices of teachers in a

Western Canadian province (Duncan & Noonan, 2007). A stratified random sample identified 66 high schools, and 513 secondary teachers responded to the survey. The study found that high school teachers in that Western Canadian province used assessments that they developed on their own much more than assessments used by the province (Duncan & Noonan, 2007). Academic enablers and nonachievement factors were used between "some" and "quite a bit" of the time (Duncan & Noonan, 2007).

McMillan et al. (2002) used the survey to assess elementary teachers' classroom assessment and grading practices. The items were revised and strengthened by having a group of 15 elementary teachers review them for clarity and completeness (McMillan et al., 2002). The revised questionnaire still included 34 items, just like the original, and the breakdown of items in each category remained the same. The study found that many elementary teachers consider various factors when grading students (McMillan et al., 2002). Academic performance was found to be the most important factor when grading students, but nonachievement factors were also very important to many elementary teachers (McMillan et al., 2002).

A mixed-methods study conducted by Kunnath (2017) investigated teacher grading in a large California urban school district. The survey from Kunnath contained elements from McMillan's Survey of Assessment and Grading Practices—Secondary Form for the purpose of collecting data on grading influences and practices. The findings indicated that the desire to promote student understanding and the philosophy of teaching and learning influence teacher grades the most (Kunnath, 2017). Teachers reported that the grading practices used for their semester grades were most dependent on student

academic achievement and the specific learning targets mastered by the student (Kunnath, 2017).

Teacher Beliefs About Grading

Teacher Beliefs and their Grading Practices

Teacher beliefs about the function of grades differ among individual teachers (Brookhart et al., 2016). Cox (2011) states each teacher's beliefs and values are key influences on their grading practices. Teachers create their grading protocols based on tradition, what they believe is important, and what they have learned through their own "personal philosophy, college classes and professional development, school or district policy, and perceived consequences" (Kunnath, 2017, p. 69). United States teachers' grading practices are often described as a "hodgepodge" approach that intertwines content mastery and other factors related to effort, conduct, attitude, and progress (Chen & Bonner, 2017; Guskey, 2020; Hope, 2020). Chen and Bonner found in their 2017 study that the grading practices that a teacher uses are influenced by reliable aspects of their values and beliefs. These aspects create a strategic and thoughtful grading system for their classroom use.

The issue that presents itself is that not everyone's beliefs and values are the same. Since those beliefs and values influence a teacher's grading practice, there is a lack of consistency between teachers in the same school building or district, even when the grading scale is the same (Chen & Bonner, 2017). Kunnath (2017) did note that the desire to enhance student comprehension and a teacher's educational beliefs heavily influence their grading practices. When grading the same assignment, the grade different teachers assign varies (Brookhart et al., 2016). The degree to which a teacher is a strict or more

lenient grader and ambiguous and unclear grading criteria are some reasons there is variability in grades for the same assignment. Good grades are interpreted by teachers as a reward for completing work, students' commitment to achievement through homework completion, and progressing in their learning (Brookhart et al., 2016). As mentioned above, teachers also include other factors when determining a student's grade (Brookhart et al., 2016). These factors are classified as nonachievement factors, and a subset of these factors are academic enablers (Brookhart et al., 2016).

Nonachievement Factors, Academic Enablers, and Their Effect

Many teachers use nonachievement factors in determining students' grades (Brookhart et al., 2016). A subcategory of nonachievement factors are academic enablers. Academic enablers are carved out as an entity of nonachievement factors because they are typically more positive in nature (Chen & Bonner, 2017; McMillan, 2001). Different academic enablers can include effort, potential, work habits, attentiveness, and classroom participation (Brookhart et al., 2016). Teachers view academic enablers differently from separate nonachievement factors like student behavior and personality (Brookhart et al., 2016). Teachers who include academic enablers as a part of their grading system are concerned about being pragmatic, realize the enablers provide useful information regarding the student, and value the social-emotional requirements of their students above complete fidelity in reporting grades (Chen & Bonner, 2017). Along with student behavior and personality, other nonachievement factors teachers include in students' grades are compliance, punishment, and test-taking skills (O'Connor et al., 2018). Teachers believe taking off points for assignments being turned in late helps ready the students for life in the real world (Kunnath, 2017).

The use of these factors muddies the water and distorts what a grade should indicate (i.e., what a student knows and is able to do) (Barton & Thomas, 2017). Chen and Bonner (2017) pointed out that in a study of 169 inservice and preservice teachers, the majority determined "a number of grading practices to be ethical that are considered unethical by professional standards" and identify these factors as "consideration of student growth and effort, weighting according to class participation or attendance, and lowering scores for bad behavior or work habits" (p. 84). Great variation exists among the grades that teachers give to students' assignments (Brookhart et al., 2016). When nonachievement factors of any kind are used, grades are not a reliable measure to indicate the degree to which a student has mastered the material over a given topic, grading period, or course (Kunnath, 2017). Fairness is a theme that appears in many studies of teachers' perceptions of grades (Brookhart et al., 2016).

To make grades more reliable, school districts can break up a student's grade into different categories (Guskey, 2020). The first category would be the letter grade which indicates how the student is progressing in learning the course material. Other categories can be created (e.g., homework, participation, and effort) for teachers to report on factors that are not directly tied to the student's academic achievement (Guskey, 2020). These category grades can use a numbered rubric such as a "one" indicating poor performance and a "four" indicating exemplary performance and are determined by the district (Guskey, 2020). All of these categories would be reported separately on a report card. Breaking up grades in this manner makes them more reliable because they are not distorted by nonachievement factors—a characteristic colleges appreciate (Guskey, 2020;

O'Connor et al., 2018). Teachers use these factors in hopes to motivate students; however, these factors often fail to spur the students to comply.

Student Motivation

Teachers are tasked with motivating students to be active participants in their own learning. The challenge is students wanting to be involved in the classroom experience instead of having to be involved in the classroom experience. Motivation is "the process in which goal-directed behavior is initiated and sustained" (Palmer, 2017, p. 99). Due to being an internal function, motivation is a complex construct to measure (Schwan, 2021). To measure, it requires observing different behaviors or traits or directly asking. Indicators of motivation used in classroom studies have been "the variables of effort, engagement, and interest" (Schwan, 2021, p. 77). Motivated students have increased feelings about an idea or object, as well as display effort, controlled behavior, interest, and a willingness to take part in learning activities (Schwan, 2021). This is difficult for a teacher to determine because some students complete classroom tasks and assignments because they are compliant learners in an effort to chase points (Cain et al., 2022). Points are used in this case to incentivize behavior more than to measure learning (Cain et al., 2022). Compliant learners are students who teachers would describe as good students; they get good grades, turn in assignments on time, and do not cause many disruptions in the classroom (Schwan, 2021). Students might also experience a state of amotivation which is illustrated by a lack of purpose, ambition, or desire to accomplish a task. An unmotivated student does not want to do the work or perform the task that is set before them (Schwan, 2021).

There are two different neural circuits that make up the brain's natural reward system. One circuit is for *liking* while the other is for *wanting* (Palmer, 2017). These circuits are thought to oversee most simple, goal-directed behavior. The *liking* system is on a sliding scale where one can experience pleasure and displeasure (Palmer, 2017). Pleasure experiences are those that produce positive emotions like happiness, whereas displeasure experiences are those that produce negative emotions like fear. The *wanting* system is also on a sliding scale, where the *wanting* can be either positive/desire, or negative/dread, and it refers to observed behaviors in response to a prominent incentive (Palmer, 2017). Palmer describes several motivational concepts related to education and the idea of *liking* (i.e., the experience of pleasure) and *wanting* (i.e., instant desire to get involved) in an educational activity.

Intrinsic motivation can be linked to both *wanting* and *liking* (Palmer, 2017). Generally, it is characterized by the drive to partake in an activity driven by a natural curiosity and proclivity to acquire knowledge and skills without any extrinsic reward (Cain et al., 2022; Palmer, 2017,). Individuals typically have a predisposition to want to attempt to gain more knowledge and take pleasure in its achievement (Palmer, 2017). People are intrinsically motivated at other times because they like doing something and find it interesting or enjoyable (Palmer, 2017). As someone conquers learning a new task, they receive positive feelings of accomplishment which reinforce the desire to engage in similar future learning activities. If a student's attempt at new tasks is often met with frustration and failure, it can lead to amotivation (Palmer, 2017; Schwan, 2021). Students who participate in classroom experiences that allow them to understand a concept seek out those same opportunities again.

On the other hand, students who are extrinsically motivated participate in activities to receive an external reward (Cain et al., 2022). Using grades as an external motivator for students can be effective when students value the activities beyond the grade (Cain et al., 2022). External rewards result in less powerful motivation compared to intrinsic motivation (Cain et al., 2022).

Different Grading Systems

There are two main grading systems used in the United States. The first is the traditional grading system using the 100-point scale. This is the scale many are accustomed to, as it has been used in schools for many years. The scale is broken up into intervals, which vary by school district. As seen in Table 4, these intervals are typically distributed (Feldman, 2019; Reeves, 2004; Reeves et al., 2017). There are some instances where a grade of an *F* starts somewhere in the 60s, even as high as 69. The teacher grades each student's assignment by determining which answers are correct or incorrect if the responses are strictly right or wrong (Feldman, 2019). The number of correct responses is then divided by the total number of responses, and the points earned are typically entered into a grade book. If the assignment is scored using a rubric, the teacher identifies how many points the student earns and similarly puts that total into the grade book (Feldman, 2019). The total points earned are calculated and divided by the number of points available to determine the student's overall grade for the grading period. Most electronic grade books have made this easier for teachers (Feldman, 2019). This system takes the information over the marking period into account by averaging the scores to produce a final number that is the student's grade for that period. Table 4 illustrates the breakdown of percentages and grades for the traditional grading system.

Table 4

Typical Percentage Range and Corresponding Letter Grade

Letter Grade	Percentage Interval
A	90-100
B	80-89
C	70-79
D	60-69
F	0-59

Table 4 shows how most percentage points available for a grade fall in the F percentage interval.

The other grading system that is gaining popularity is standards-based grading (SBG). Brookhart et al. (2016) state that SBG emphasizes "communicating student progress in relation to grade-level standards (e.g., adding fractions, computing area) that describe performance using ordered categories (e.g., below basic, basic, proficient, advanced) and involve separate reporting of work habits and behavior" (p. 828). The grade book is organized to show student performance on standards (Feldman, 2019). Grades in this system are not averaged as they are in the traditional 100-point grading system. Teachers who use this system consider the evidence they have to determine what grade most accurately represents the student's current level of achievement (Feldman, 2019). This system allows teachers the ability to make informed decisions regarding student grades based on accurate information specific to what the students know (Feldman, 2019). This information is shown by the categories that demonstrate how the students are progressing towards mastery of each content standard. It does not include data points that are not related to academic progress.

Because the student's academic achievement is broken down by standard, it is easy to distinguish a student's strengths and weaknesses (Feldman 2019). This allows the teacher to have more productive conversations with the student and their parents about the students' progress. The information is much more detailed than the teacher just being able to articulate a percentage or letter grade (Feldman, 2019). Using nonachievement factors to determine grades fails to provide substantial information to teachers and students about what skills they still need to master. Without proper information, CTE teachers will struggle identifying which of their students are not showing mastery regarding employability skills. The use of various types of assessment is critical in assisting teachers to identify where students have gaps in their learning (Cotton, 2017), specifically regarding employability skills.

Assessments

All teachers, including CTE teachers, use various types of assessments to aid in identifying what students know and can do (Cotton, 2017). Teachers use both formative and summative assessments (Dixson & Worrel, 2016). What often separates these two types of assessment is how the data from them are used (Dixson & Worrel, 2016). Formative assessment involves the teacher gathering data to improve student learning throughout the unit of study (Dixson & Worrel, 2016; Northern Illinois University Center for Innovative Teaching and Learning [NICITL], 2012). Summative assessment uses data to judge what a student knows at the end of the learning process (Dixson & Worrel, 2016; NICITL, 2012).

Formative assessments are activities utilized by teachers and students that produce information regarding students' understanding and provide feedback to the teacher

(Dixson & Worrel, 2016). Teachers use the feedback to adjust their teaching and learning activities according to students' needs (Cotton, 2017; Dixson & Worrel, 2016; Kloser et al., 2017; NICITL, 2012). The nature of formative assessments enables teachers to make the adjustments immediately (Cotton, 2017). Formative assessments assist the teacher in creating interventions that improve student learning, communicate to students and those who support them about their progress towards current learning goals, and how to improve future performance (Dixson & Worrel, 2016). CTE teachers can use formative assessments to identify outcomes and competencies in Strand 1 (business operations/21st-century skills) that students struggle with and prepare remediation activities for them. Formative assessments are typically not used in a student's final grade calculation (Dixson & Worrel, 2016; NICITL, 2012). There are various types of formative assessment which allows teachers to get different information student mastery (NICITL, 2012). Teachers use observations during class activities to gauge the non-verbal feedback students give. Homework is assigned to practice and identify misconceptions. Reflection journals, question and answer sessions, conferences with the student and teacher, and informal student presentations are other ways teachers can utilize formative assessments (NICITL, 2012). Career and technical educators should use various types of assessments to identify and fill educational gaps for students.

Summative assessments capture a student's understanding of material over the course of a teaching unit or period of time and judges the student's mastery of the corresponding standards (Dixson & Worrel, 2016). Summative assessments evaluate students' knowledge and abilities (Cotton, 2017). The information summative assessments provide sums up the process of teaching and learning that has taken place in

the classroom (NICITL, 2012). Summative assessments are usually high-stakes tests to get an overall indication of the extent of learning achieved, commonly assigned with grades (Dixson & Worrel, 2016). Examples of high-stakes assessments are final exams, end-of-course assessments, college entrance exams, term papers, and final performances (Dixson & Worrel, 2016; NICITL, 2012). Summative assessments give students an opportunity to show what they know and can do, as well as give them the opportunity to think critically to apply their knowledge in unique circumstances to solve new problems (Dixson & Worrel, 2016). Besides a test, a common type of summative assessment is a performance-based assessment (Dixson & Worrel, 2016). An activity that gives students the ability to demonstrate their learning or knowledge could be considered a performance-based assessment (Dixson & Worrel, 2016).

CTE teachers can use performance-based assessments to determine if their students meet the outcomes and competencies listed in Strand 1 of their course. These may take the shape of a product-assessment where students create a final product that could be used in the real world. Another option is a performance-assessment which requires the teacher to directly observe a student applying the skills or information taught. Additionally, a process-focused assessment could be used where the teacher evaluates the process of learning and the outcome (Dixson & Worrel, 2016). Other types of summative assessments not yet mentioned are projects and portfolios (NICITL, 2012). Teachers often include the scores of summative assessments in a student's grade (Dixson & Worrel, 2016; NICITL, 2012). Career and technical educators should use various types of assessments to identify and fill educational gaps for students in all areas, specifically for outcomes and competencies in Strand 1.

Executive Functioning

Both formative and summative assessments should measure student learning and achievement. Teachers who use nonachievement factors as part of student grades are assessing students' executive functioning skills. Different academic enablers can be effort, potential, work habits, attentiveness, and classroom participation (Brookhart et al., 2016). Executive functions are the processes and skills the prefrontal cortex of the brain manages (Hodgkinson & Parks, 2016). Executive functioning includes three clear-cut, but interconnected, processes: working memory, cognitive flexibility, and inhibitory control (Cumming et al., 2023). Students rely on executive functioning in their brains when they work on an assignment, interact with their peers, and manage their behavior (Cumming et al., 2023).

During a person's adolescent years, there is an increase in the growth of these cognitive skills and processes (Cumming et al., 2023; Hodgkinson & Parks, 2016). Adolescents develop greater memory capacity, increased self-awareness, stronger reasoning, and abstract thinking skills, organizational skills that fit them as an individual, and self-regulation of their behavior (Hodgkinson & Parks, 2016). Executive functioning skills are critical to a person's success in school and the real world (Hodgkinson & Parks, 2016). Not only do executive functioning skills assist students in starting and finishing tasks, planning, organizing, and persisting through challenges and obstacles, but they also allow students to determine the magnitude of unforeseen situations and create different solutions (Hodgkinson & Parks, 2016). Executive functioning skills also include organization, time management, focus on current tasks, work completion rate, regulating emotions, empathy, and self-awareness (McGlynn & Kelly, 2020).

Students who have poor executive functioning skills typically have difficulty handling increasing demands of school (Hodgkinson & Park, 2016). Teachers often associate behaviors linked to poor executive functioning with a lack of student motivation (Hodgkinson & Park, 2006). Students with poor executive functioning skills typically:

- do not bring necessary materials to class,
- lose or forget to turn in assignments,
- have trouble starting new tasks or lose focus on new tasks,
- experience difficulty switching from one activity to another,
- struggle to determine how much time a task will take,
- become quickly frustrated when learning becomes hard, and
- active impulsively (Hodgkinson & Park, 2016)

Poor executive functioning skills factor into a student's grade through the use of nonachievement factors (e.g., compliance, punishment, and test-taking skill) (O'Connor et al., 2018). Employability skills encompass some of the skills of executive functioning which are included in a grade through the use of achievement factors. A gap in the literature exists in identifying how CTE teachers grade employability skills.

Employability Skills

Employability Skills Definition

Employability skills are skills that employees bring to the workplace as a part of who they are (DiMattina & Ferris, 2013). Other phrases or terms for employability skills are 21st-century skills, soft skills, or workforce readiness skills (Beggin & Vaughn, 2017; DiMattina & Ferris, 2013; Slyter & Wickam, 2021; Wilson, 2022; Wyman, 2015). Graduates who possess employability skills that encompass a collection of achievements,

skills, knowledge, and personal attributes increase the likelihood of securing employment and finding success in their chosen occupations (Engelhart & Mupinga, 2020; Slyter & Wickam, 2021). A person who advances their knowledge and skills with education increases their productivity in the workplace (Tan, 2014). The increase of employability skills in the workplace is a critical component of productivity. A heightened awareness exists of the importance of non-cognitive skills with respect to human capital (Kyllonen, 2013). Employability skills indicate essential functional and enabling knowledge, capabilities, and attitudes necessary for the world of work in the 21st century. The habits, attitudes, and values an individual possesses are a part of the human capital framework (Michaels & Barone, 2020). Some of these skills include teamwork, creativity, professionalism, punctuality, communication, etc. (DiMattina & Ferris, 2013; Lerman, 2013) and can be broken down into academic, personal management, and teamwork categories (Slyter & Wickam, 2021). The ability to think, learn, and communicate are academic skills. Personal management skills encompass accountability, flexibility, and maintaining a positive attitude. Teamwork involves collaborating with others to accomplish a defined task or shared objective. (Slyter & Wickam, 2021).

Employability skills can be applied to jobs in various industries. A person can develop these skills throughout their life in many ways (Slyter & Wickam, 2021). Enhancing and refining these abilities is achievable through various methods, such as engaging in skill-based activities, observing others' proficiency, reflecting on personal experiences during practice or observation, evaluating performance to establish improvement targets, and consistently practicing the skill. Employability skills include problem-solving, teamwork, professionalism, verbal and written communication, time

management, creative and critical thinking, technology, and leadership skills (Chan et al., 2018; DiMattina & Ferris, 2013; Fajaryati et al., 2020; Holmber-Wright & Hirbar, 2016; Rasul et al., 2014; Wyman, 2015). Engelhart and Mupinga (2020) stated that some of the skills rated as most important by employers are critical thinking, flexibility/adaptability, leadership, professionalism/work ethic, problem solving, communication, information technology application, and teamwork/collaboration. The value a person brings to their company by applying their skills, knowledge, and expertise to provide a necessary means for solving business problems is part of their human capital (Holmberg-Wright & Hribar, 2016). These skills cover a wide range of topics and can be cognitive abilities, attitudes, interests, talents, knowledge, dispositions, etc. (Kyllonen, 2013). Thus, employability skills are a facet of an employee's human capital. The definition of employability skills guiding this research is "a set of achievements–skills, understandings, and personal attributes–that make graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community, and the economy" (Yorke & Knight, 2006, p. 3).

Employability Skills Frameworks

The organization of skills embedded within the employability skills framework often varies among institutions. The U.S. Department of Education (2015) developed a framework for employability skills as part of its efforts to bolster state standards in career and technical education. This initiative was spearheaded by the Office of Career, Technical, and Adult Education. They identified three main categories of employability skills: effective relationships, workplace skills, and applied knowledge (U.S. Department of Education, 2015). Each category has various skills embedded within it. The effective

relationship category consists of interpersonal skills and personal qualities. The workplace skills category consists of technology use, systems thinking, communication skills, information use, and resource management. Applied knowledge consists of critical thinking and applied academic skills. Figure 4 illustrates the framework created by the U.S. Department of Education (2015) that depicts the set of skills in each main category and the actions required to master those skills.

Figure 4

U.S. Department of Education Employability Skills Framework

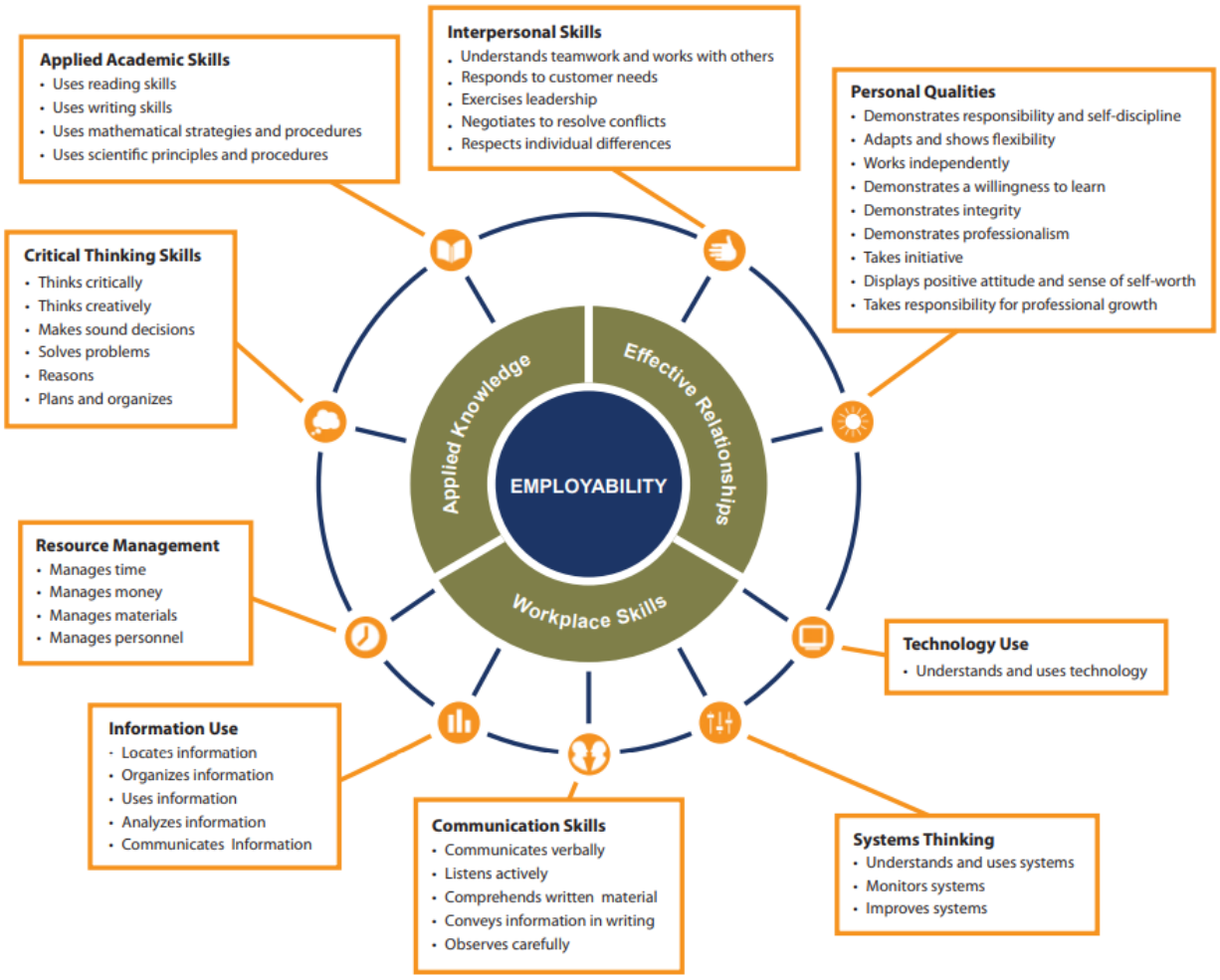


Figure 4 illustrates the importance of workplace skills by showing the number of categories within that main skill. The subcategories summarize what each of those skills should address.

SkillsUSA (2013), a national career and technical student organization (CTSO), has its own framework, shown in Figure 5.

Figure 5

SkillsUSA Framework

Figure 5 indicates the three main categories of the SkillsUSA Framework as technical skills grounded in academics, personal skills, and workplace skills. The structure

provides a shared language that allows students to express what they gain from their involvement in SkillsUSA to various educational stakeholders while also evaluating the development of student skills (SkillsUSA, 2023). Engelhart and Mupinga (2020) note the framework overcomes two problems facing today's workforce: skilled labor gap and lack of readiness skills. The framework also stresses the importance of employability skills that employees should possess to effectively function in the workplace (Engelhart & Mupinga, 2020). The SkillsUSA framework embeds a variety of employability skills, but programs that do not participate in that CTSO have limited access to implementing the framework. The state of Ohio has an employability skills checklist that is accessible to everyone.

Strand 1 for each CTE course in Ohio covers employability skills. The ODE (2016) created an employability skills checklist that identifies critical skills students can display to future employers. The checklist has three different categories and further distinguishes various skills within each category. Table 5 depicts the application of academic and technical knowledge and skill category, the skills embedded within the category, and the descriptors associated with each skill (ODE, 2016).

Table 5

Skills and Descriptors for the Application of Academic and Technical Knowledge and Skills Employability Category from the ODE Employability Skills Checklist

Employability Category	Specific Skills	Descriptors
Application of Academic and Technical Knowledge and Skills	Literacy	Read and understand relevant academic and technical texts.
	Math	Select and apply applicable mathematical concepts to solve problems and perform tasks.
	Industry-specific technical skills	Demonstrate industry-specific technical skills obtained from field training and/or experience.
	Industry-specific safety skills	Adherence to industry-specific safety regulations.
	Understanding career paths	Plan and navigate education/career paths aligned personal goals.
	Planning	Develop and implement a personalized student-learning plan.
	Reflection	Reflect on experiences through the creation of a personal portfolio.

Table 5 depicts the importance of academic coursework and content, as well as technical industry skills. Table 6 includes the 21st century learning and innovation skills category, the skills embedded within the category, and the descriptors associated with each skill (ODE, 2016).

Table 6

Skills and Descriptors for the 21st Century Learning and Innovation Skills Employability Category from the ODE Employability Skills Checklist

Employability Category	Specific Skills	Descriptors
21st Century Learning and Innovation Skills	Creativity and innovation	Think creatively, work creatively with others, and implement innovations.
	Critical thinking and problem-solving	Reason effectively, make judgments and decisions and solve problems.
	Communication	Apply oral and written communication and active listening skills.
	Collaboration	Exercise flexibility and willingness to accept shared responsibility and work with diverse teams.
	Information literacy	Manage and evaluate information accurately and ethically.
	ICT (information, communications, and technology) Knowledge	Use technology effectively and appropriately.

Table 6 depicts the importance of the soft skills necessary to be effective employees and contains many of the skills employers identify as extremely important. Table 7 includes the personal and social skills category, the skills embedded within the category, and the descriptors associated with each skill (ODE, 2016).

Table 7

Skills and Descriptors for the Personal and Social Skills Employability Category from the ODE Employability Skills Checklist

Employability Category	Specific Skills	Descriptors
Personal and Social Skills	Initiative	Work independently; demonstrate resourcefulness, curiosity, and willingness to learn.
	Professionalism, ethics, and interpersonal skills	Demonstrate reliability, integrity, responsibility, proper etiquette, and ethical behavior.
	Cultural and global competence	Exhibit interpersonal and social skills that are respectful of cultural differences.
	Adaptability and flexibility	Demonstrate flexibility in both roles and responsibilities and exhibit preparedness to adapt to change as needed.
	Productivity	Set goals and priorities and manage time and projects: display punctuality determination; and accuracy. Complete projects to the fulfillment of agreed-upon standards

Table 7 depicts the importance of the social skills necessary to be effective employees and contains many of the skills employers identify as extremely important. The skills from the employability skills checklist from the ODE (2016) are similar to the ones created by the U.S. Department of Education and SkillsUSA.

Employability Skills in the Workplace

Employees will encounter tasks that require them to effectively communicate using various communication skills and strategies (Rasul et al., 2014). Communication

skills are verbal and non-verbal and require the employee to read and interpret textual information in documents, communicate information, thoughts and ideas, listen and reply to verbal messages and body language, and to engage in conversations, discussions, and group meetings (Rasul et al., 2014). Communication is critical because it supports everyday workplace operations (Chan et al., 2018). Employees need to engage in casual conversations on the job, clarify verbal instructions from a superior, and discuss workplace procedures with their peers (Price & Magy, 2021). In addition, employees need teamwork skills that enable them to work supportively in a group and contribute suggestions and effort within the group (Rasul et al., 2014). Good communication skills allow for better relationship-building practices, a decrease in stress, and an increase in productivity (Gonzales & Vodicka, 2021). Employees also need to coach others to learn new knowledge and skills and be able to work appropriately with others who have a different ethnic, social, or educational background (Rasul et al., 2014). Teamwork requires the employee to function appropriately and work effectively among various teams with people who have different strengths (Chan et al., 2018).

An employee with strong problem-solving skills is able to demonstrate critical, creative, and innovative thinking that enables them to come up with new ideas, identify alternative solutions to problems through analysis, and can choose the best solution (Rasul et al., 2014). Leadership skills include behaviors such as being able to direct and motivate team members, resolve conflict, and being accountable for themselves and other members of their team (Rasul et al., 2014). Leaders notice the potential in people and are able to develop that potential while empowering, motivating, and inspiring those on their team (Gonzales & Vodicka, 2021). Professionalism includes responsibility for the job,

honesty and integrity, a consistently positive attitude, flexibility and adaptability in the work environment, and a strong work ethic that is evident by task completion (Rasul et al., 2014). As employers rely on employees to fill a variety of roles and functions within their company, adaptability skills are becoming more critical (Chan et al., 2018). Employees with strong flexibility and adaptability skills work well under pressure, possess open minds, are strong at prioritizing tasks, and can adjust to changing deadlines and constraints (Gonzales & Vodicka, 2021). Many skills that employers are looking for their future employees to have are part of Strand 1 in CTE courses.

Employability Skills and Strand 1

Employability skills are a part of each CTE course in Strand 1. Some courses cover more outcomes in this strand than others. Table 8 shows a sampling of CTE courses and the percentage of item bank questions that the *employability skills* and *leadership and communication* outcomes make up within the overall Webxam test for that course (The Ohio State University CETE, 2022).

Table 8

Item Bank Percentages for Outcomes 1.01 and 1.02 For a Sampling of CTE Courses

Course	Subject Code	% of questions in item bank for outcome 1.01	% of questions in item bank for outcome 1.02
Business Management for Agricultural and Environmental Systems	010115	12.64	13.79
Business of Arts and Communications	340006	5.75	3.45
Business Applications and Economics	141005	3.16	2.11
Unmanned Aircraft Systems	177024	2.08	1.04
Foundations of Education and Training	350002	15.38	15.38
Hydraulics and Pneumatics	010225	3.42	3.42
Personal Finance Management	091052	3.36	6.72
Business Foundations	141000	11.90	5.95
Health and Science Technology	072001	6.67	6.67
Hospitality Fundamentals	330000	12.09	4.40
Salon Operations and Communications	174155	5.95	9.52
Information Technology	145005	8.42	9.47
Foundations of Firefighting and Emergency Medical Services	170342	1.98	1.98
Manufacturing Operations	175003	0.57	0.57
Management Principles	141025	5.41	3.60
Outdoor Power Technology	010235	3.23	3.23

As indicated in Table 8, variability exists among the number of questions in each item bank for the CTE course Webxams. The included Strand 1 outcomes differ among CTE courses. Each pathway consists of four courses, so students receive a mix of outcomes from Strand 1 in their instruction in the CTE pathway if they complete all four courses. Teachers receive data that identifies student performance within each course they are enrolled in. The report provides teachers with information identifying how students performed on each outcome assessed via the Webxam in that course (The Ohio State University CETE, 2022). Teachers can compare their students' results to that of the state for each outcome (The Ohio State University CETE, 2022). Teachers can use this data to determine what concepts students are having difficulty mastering in any strand to help prepare students to be college and career ready.

Employers state time and again their new employees do not exhibit the employability skills to be successful in the workplace (Flanigan, 2019; Fletcher Jr. et al., 2018; Homan et al, 2019; Price & Magy, 2021). Prospective employees do not exhibit problem-solving, teamwork, critical thinking, and oral and written communication skills in addition to lacking punctuality, follow-through, and collegiality (Flanigan, 2019; Fletcher Jr. et al., 2018; Homan et al., 2019; Price & Magy, 2021; Wyman, 2015). These skills enhance an individual's value to the company which makes the skills a critical component of the employee's human capital (Kyllonen, 2013). Webxam data indicates that students are testing well on Strand 1 items. Strand 1 encompasses various outcomes, particularly employability skills and leadership and communications among other outcomes (ODE, 2022a). Students have the knowledge regarding employability skills as

measured by the Webxam, yet employers continue to struggle to find employees who put these skills into practice.

Employability Skills Gap

Students need to have a variety of skills at their disposal to be college and career-ready (Beggin & Vaughn, 2017). Until recently, the prevailing notion at the policy level, in workforce settings, and in education at all levels was that cognitive skills mattered most (Kyllonen, 2013). The No Child Left Behind Act of 2001 had accountability and results as its cornerstone (Kyllonen, 2013). Accountability and results were measured through administering cognitive tests to children to determine their progress and achievement (Kyllonen, 2013). Colleges utilize standardized cognitive tests as part of their admissions process, and companies and the military have historically utilized cognitive selection tests (Kyllonen, 2013). A generation was taught that only their technical skills mattered and other variables like personality were not a factor of concern at their workplace (Kyllonen, 2013). A shift began in the 1990s as psychology began to converge around a five-factor personality model (Goldberg, 1990; Holmber-Wright & Hribar, 2016).

By the middle of the first decade in the 2000s, researchers were linking vast areas of human effort and results to personality (Roberts et al., 2007). Morality, occupational attainment, leadership effectiveness, creativity, team and job performance, absenteeism, and leadership success were just a few of the factors that personality measures were able to predict (Kyllonen, 2013). The big-five personality factors (i.e., surgency, agreeableness, emotional stability, conscientiousness, and intellect) were able to predict success in the workplace (Ones et al., 2007) and academically (Mammadov, 2022).

Kyllonen references a study that controls for family characteristics and cognitive test scores. The study has teachers rate eighth-grade male students on the following non-cognitive item checklist:

1. Is the student frequently tardy?
2. Is the student frequently absent?
3. Is student frequently inattentive?
4. Is the study frequently disruptive?
5. Do they rarely complete their homework?

In comparison to cognitive assessments, the ratings on the non-cognitive item checklist more accurately predicted educational attainment and workplace earnings 12 years later (Kyllonen, 2013). Educational attainment was not a factor using the ratings to predict workplace earnings, though cognitive assessment scores predicted earnings for students with a college degree (Kyllonen, 2013). Non-cognitive measures were able to predict employment outcomes regardless of educational attainment level, whereas cognitive measures could only predict employment outcomes for those above the median level of educational attainment (Kyllonen, 2013). Twenty percent of the educational-attainment effects are attributable to technical skills for labor market outcomes (Kyllonen, 2013). In the 80% that remains, nontechnical skills play a factor.

Academic knowledge and technical skills are only pieces of what makes students career and college ready. A certificate or credential no longer suffices as a guarantee of employment in the competitive world today (Chan et al., 2018). Employers require students to have employability skills before beginning work. Employability skills are critical because they give students with the ability to adjust to the frustrations and

obstacles they encounter in their adult life, along with the demands of work (Gonzales & Vodicka, 2021). Zinser (2003) referred to a study where 81% of chief school officers noted that preparing students for the workforce was the most important issue facing public education over the next 20 years. The study he referred to was conducted in the year 2000. That time is now. In addition to getting a job, employability skills are a factor for individuals keeping a job (Slyter & Wickam, 2021). Beggin and Vaughn (2017) reported findings from a survey by the Seattle Jobs Initiative, indicating that over 75 percent of employers emphasized the significance of soft skills, ranking them equally or more crucial than technical skills for securing entry-level positions. Lerman (2013) referenced a survey conducted in the mid-1990s involving 3,200 employers across four major cities. The findings revealed that employers regarded personal traits such as responsibility, integrity, and self-management as equally or more significant than fundamental skills.

A separate survey conducted around the same time that included a similar number of employers found that the employers prioritized attributes such as attitude, communication skills, past work experience, recommendations from past employers, and industry certifications over educational attainment, grades, and test scores during the interviewing phase. (Lerman, 2013). Wilson (2022) reports that employability skills are in high demand, and employers proclaim their importance regardless of the industry or role of the prospective employee. A lack of employability skills can lead to unemployment and impact a person's career development (Fajaryati et al., 2020). The importance of employability skills has not changed over the last 30 years. Research that looks at predicting the future career success of students suggests that some soft skills are

a better predictor of adult success than technical skills (Beggin & Vaughn, 2017). Employers want employees who they can depend on and who take ownership of their employment (Engelhart & Mupinga, 2020). They seek self-motivated employees who are intrinsically motivated to tackle new challenges and grapple with unexpected obstacles on their own (Engelhart & Mupinga, 2020).

In 2017, the Hechinger Report launched a project exploring the necessary traits to rise to the middle class in the transforming economy and found employers reporting that soft skills are weak in job candidates (Flanigan, 2019). The significance of workforce readiness skills is making its way to the forefront of skills gap discussions, alongside technical and academic skills (Beggin & Vaughn, 2017; Plasman, 2019). Career and technical educators frequently hear from industry partners that graduates lack these employability skills and are not ready to enter the workplace (Beggin & Vaughn, 2017; Fletcher Jr. et al., 2018; Price & Magy, 2021; Wyman, 2015). High school and college graduates are not prepared with the employability skills necessary to enter the workforce. Employers state that professionalism, communication, teamwork, and reliability are among the top employability skills necessary for entry-level employment (Beggin & Vaughn, 2017; Flanigan, 2019; Pate, 2020). Employers are frustrated as they try to find employees who can meet deadlines, show up to work on time, and get along with their coworkers (Flanigan, 2019). The need for hourly employees to have an appropriate level of employability skills is critical (Lerman, 2013). A 1996 national study reported that 69% of employers reject hourly applicants due to a lack of employability skills like punctuality and possessing a strong work ethic. A Washington state survey from 2007 indicated 60% of employers found difficulty hiring employees (Lerman, 2013). The

employers had a simpler time finding workers with appropriate academic skills than with adequate employability skills. Lack of soft poses challenges for workers striving to advance and excel in their careers. (Price & Magy, 2021).

The employability skills gap is not partial to one specific industry. The healthcare industry does not have a lack of applicants who have the technical skill to perform the job, but the industry struggles to find applicants who possess the necessary employability skills (Saeger et al., 2019). The healthcare industry looks for their prospective employees to possess the ability to communicate effectively, work well on a team, be adaptable, show empathy, and have time management. Professionals in the information technology field typically exhibit extraordinary technical skills (Saeger et al., 2019). The informational technology industry wants its employees to have analytical skills, interpersonal skills, negotiation skills, and communicate well, yet prospective employees often lack these skills. This causes great concern in an industry that is rapidly growing.

The employability skills gap is not only an issue that employers in the United States notice. The current state of globalization and technological disruption make employability skills indispensable (Fajaryati et al., 2020). Kashefpakdel et al. (2018) reported that employers in the United Kingdom are frequently looking for employees who are flexible and responsive to unpredictable work situations. They also indicated public and private sector employers have difficulty finding work-ready, employable young people trying to enter the workforce right after high school or college. United Kingdom employers prioritize hiring individuals with transferable employability skills over those with numerous academic qualifications, as these skills enable employees to

excel in any business setting. (Kashefpakdel et al., 2018). Many recruiters report young people's employability skills are often extremely deficient (Mann & Huddleston, 2015). Roughly 75 million young people in developing nations are not employed (Fajaryati, 2020). In most countries, the youth unemployment rate is two to four times greater than that of adults (Fajaryati, 2020). The economy gives greater emphasis on a worker's ability to use their knowledge and skills in novel situations in the workplace instead of relying solely on their technical training. Wibrow (2011) states that employability skills are regarded by employers as extremely important in Australia as well. Technical skills alone are not enough for individuals entering and advancing in the workplace. A lack of communication skills is what employers believe potential employees are lacking most (Wibrow, 2011). Wibrow stated that in a survey of CEOs, 33 percent of them believe that employability skills are the most crucial aspect when hiring graduates. Only 19 percent of employers ranked relevant work experience ahead of employability skills (Wibrow, 2011).

Typically, companies train their employees to acquire the skills they lack (Engelhart & Mupinga, 2020). However, because loyalty to a specific employer by an employee no longer exists, employers are shying away from providing training to their staff (Cappelli, 2012). Employers worry that trained employees will leave for competitor companies before reaping the benefits of the training for their company (Engelhart & Mupinga, 2020). The responsibility of workforce development has been placed upon educational institutions because of the reluctance of companies to train their employees (Bhagra & Sharma, 2018). Both employers and the public expect schools to teach employability skills (Engelhart & Mupinga, 2020). CTE teachers need to use appropriate

grading and assessment practices to determine the employability skills their students already possess, as well as determine areas for growth.

The grading and assessment practices CTE teachers utilize to determine student mastery of employability skills are unknown. Based on extant research, it is evident that research is needed to determine how CTE teachers are assessing their students in their mastery of understanding, utilizing, demonstrating, and performing employability skills in their courses. The current investigation identifies these practices. By identifying these grading and assessment practices, further research can be conducted to determine the practices that will lead to an increase in employers seeing employees exhibit these skills in the workplace.

Summary

Career and technical education programming prepares students to be college and career ready by providing students opportunities to develop skills, specialized knowledge, and academic diligence through providing real-world experience in a job field that has high demand and requires its workers to have advanced skill levels (Advanced CTE, 2023b). Upon graduation, students either further their skills or enter the workforce. Employers unquestionably state that students do not possess the employability skills to be successful on the job (Beggin & Vaughn, 2017; Fletcher Jr. et al., 2018; Price & Magy, 2021; Wyman, 2015). The human capital of an employee is the skill set that enhances their productivity (Kyllonen, 2013) and describes the value a person brings to their company through applying their skills, knowledge, and expertise to solve problems (Holmberg-Wright & Hribar, 2016). A greater understanding of the importance of non-cognitive skills has come to the forefront over the years (Kyllonen, 2013). Non-cognitive

skills impact workplace success to a higher degree compared to cognitive skills (Kyllonen, 2013). Employers expect educational institutions to teach and develop employability skills in their students, as the expense of developing human capital is on the rise (Rasul et al., 2014).

Embedded within the CTE educational framework in Ohio are outcomes that cover employability skills (ODE, 2022a). Teachers are expected to teach, assess, and grade their students' employability skills. Career and technical education principals consider assessing and evaluating student performance something that CTE teachers are relatively competent in (Cannon et al., 2013). The CTE principals in Cannon et al.'s study also believed that assessing and evaluating student performance was an important item for professional development for CTE teachers. Teachers often set up their classroom grading policies based on their beliefs and values (Cox, 2011). The beliefs teachers hold regarding grading influence their grading practices (Brookhart et al., 2016; Cox, 2011; Kunnath, 2017). Grades should provide feedback to students and the teacher about the students' academic progress (Brookhart et al., 2016; Carifio & Carey, 2009; Chen & Bonner, 2017; Feldman & Reeves, 2020; Kunnath, 2017; Reeves, 2008). Teachers use various types of assessments within the classroom to aid in identifying what students know and can do (Cotton, 2017). CTE students are also given an end of course assessment, Webxam, to assess their academic mastery of all the content in their courses. Ohio's Webxam data indicate students have the academic knowledge regarding employability skills. A disconnect is evident between what the students know and what employers are seeing in the workplace. Students are lacking in this area of their human

capital to make them career ready. This lack of human capital becomes problematic for workers attempting to succeed and further their position in a job (Price & Magy, 2021).

Grading practices of CTE teachers focusing on employability skills have not been explored. Investigating the ways CTE teachers assess and grade students' mastery of employability skills shines a light on the gap employers see in the workplace. A gap in the literature is evident between what employers see in potential employees and how students perform on a multiple-choice test. Research is needed to determine how CTE teachers are assessing their students in their mastery of understanding, utilizing, demonstrating, and performing employability skills in their courses. The current study addresses the gap in research and identifies the grading and assessment practices CTE teachers use in determining study mastery of employability skills.

Chapter Three

Methodology

This chapter presents an overview of the methodology employed in this quantitative study. Research methodology outlines the rules and procedures of sensible thought processes that are used in a scientific investigation (Sutrisna, 2009). The plan to achieve the goals and objectives of the research is explained by the research methodology (Creswell & Poth, 2018). The objective of this study was to quantitatively document the way CTE teachers grade and assess employability skills and identify the variations between the grading and assessment practices based on gender, level of education, career field, number of years teaching, number of years working in industry before entering the teaching profession, and the type of career and technical planning district. There exists much research with regards to grading and assessment practices of teaches who work in a comprehensive school district; however, research regarding CTE teachers and their grading practices is minimal. Focusing on how CTE teachers grade and assess employability skills does not exist. The current investigation examines and identifies the grading and assessment practices of CTE teachers with respect to student employability skills.

Research Questions

The study examined the grading and assessment practices of employability skills that CTE teachers utilize through the following research questions:

- Are there grading practices that CTE teachers use more than others with respect to employability skills?

- Are there assessment practices that CTE teachers use more than others with respect to employability skills?
- Is there a relationship between teachers' employability skills grading and assessment practices and their related career field, educational attainment level, gender, number of years spent in education, number of years spent in industry before starting their career in education, related career field, or age?

Participants

The sampling population for this study was CTE teachers in the state of Ohio who were teaching high school CTE courses in one of the 16 career fields. There are 611 distinct public school districts in the state of Ohio according to the Ohio Department of Education's Ohio Educational Directory System (ODEW, 2024c). Every student in the state of Ohio can enroll in a career-technical education program (Ohio Association of Career and Technical Education, n.d.). Schools make this possible through a variety of configurations. A CTPD is a local education agency that offers state-sanctioned CTE programing by meeting the requirements set forth by the law and standards (ODE, 2005).

The CTPD has three different configurations. One configuration is a compact/contract district. In this model, numerous school districts agree to collectively provide students with CTE programming (ODE, 2005). In this model, students can take advantage of CTE programs at various school sites. Another configuration is a comprehensive district, and the district must have at least 1500 students and provide career-technical education courses at their existing high school or career centers (ODE, 2005). The last CTPD configuration is a joint vocational school district (JVSD). A JVSD serves two or more neighboring school districts, with its school board consisting of

representatives from these participating districts (ODE, 2005). The state is comprised of 15 compact/contract districts, 25 comprehensive districts, and 49 JVSDs (ODE, n.d.). Each CTPD employees a variety of CTE teachers and offers varying CTE programs. Participants were selected from the target population using purposive convenience sampling. Purposive sampling allowed the researcher to reach a target sample quickly (Trochim et al., 2016). The survey stated that only teachers who met the following criteria should complete the study:

- Participants must currently teach in Ohio.
- Participants much currently teach career and education courses within a career field pathway.
- Participants must currently teach students in Grades 9-12.
- Participants must currently hold one of the following educator licenses:
    - a two (2) year provisional career and technical workforce development license
    - a five (5) year advanced career and technical workforce development license
    - a five (5) year professional career technical license
    - a five (5) year professional vocational education license

Instrumentation

The Secondary Career and Technical Educators Grading and Assessment of Employability Skills Survey (see Appendix A) was adapted with permission (see Appendix E) from The Survey of Assessment and Grading Practices—Secondary Form created by James H. McMillan of the Virginia Commonwealth University (McMillan,

2001). McMillan (2001) developed the closed-form questionnaire to document the extent that teachers utilized various assessment and grading practices. The instrument is a six-point scale that ranges from “not at all” to “completely” (McMillan, 2001). The six-point scale provides teachers the flexibility to assess their usage of various grading and assessment practices without the limitations of an ipsative scale that is commonly employed in this context (e.g., the percentage each item is attributable to grades) (McMillan, 2001). The initial set of items used in the instrument was taken from prior questionnaires that were documented in literature, along with studies regarding teachers’ grading and assessment practices (McMillan, 2001). The items addressed three different categories: factors that teachers consider as they assign grades, the types of assessments a teacher uses, and the cognitive level of assessments (McMillan, 2001). The initial survey instrument included 47 items. After a second revision, the questionnaire was decreased to 27 items. After a third revision, the instrument totaled 34 items (McMillan, 2001). Of the 34 items, 19 assessed factors teachers used to determine grades, another 11 analyzed various types of assessments used, and four items analyzed the cognitive level of the assessments (McMillan, 2001).

The survey was projected to take approximately 10 minutes to complete. Participants were advised that by selecting the “I agree” option, they were providing their consent to take part in the research. Participants are asked to complete a 41-item online survey that contains a set of 8 demographic questions, 30 items on their grading and assessment practices, and 3 open-ended questions. All responses were confidential, and responses remained anonymous through the course of the research, including the research report. Participants were allotted three weeks to fill out the online questionnaire. Google

Forms provides a private online platform that is safe and secure to conduct survey research. Participants were told that the online survey would not obtain identifiable details like IP addresses or emails. Participants were informed that their responses were stored with a password protected link, and no one would be able to discern if they participated in the survey or not.

Psychometrics

McMillan (2001) established validity and reliability through a piloting process. After compiling items from the literature and research, items with correlation above .90 were eliminated. Coefficients of agreement were determined by identifying the portion of item matches (McMillan, 2001). Items with less than a 60 percent exact match were eliminated or merged with other items. Internal consistency evidence for reliability was determined for elements resulting from a factor analysis of items among each of the three primary categories where three or more items loaded on the element (McMillan, 2001).

Procedures

Data collection occurred through the use of an online survey. A survey provides a systematic way to gather information about people's opinions and behaviors (Trochim et al., 2016). The collection instrument was approved by the Youngstown State University Institutional Review Board (see Appendix B). All policies and guidelines of the Institutional Review Board were followed. The instrument was shared with colleagues who then forwarded the survey to their CTE colleagues electronically. The email contained an invitation to participate (see Appendix C) and respondent recruitment materials (see Appendix D). This quantitative method provided the researcher with the ability to statistically analyze the data collected. Using online surveys has many

advantages. The use of an online survey eliminates paper, mail, and data entry costs (Trochim et al., 2016). Electronic surveys have a quick turnaround time and allow the researcher to cover a geographically large area of participants (Trochim et al., 2016). The use of an online survey also has disadvantages. Many individuals still do not have reliable internet access to complete an electronic survey (Trochim et al., 2016). Another issue that arises is ensuring that each participant completes the survey only once.

The snowball sampling method was used in this study. Snowball sampling involves gaining research participants through a referral process (Trochim et al., 2016). The researcher sent the survey link in an email to their colleagues at various CTPDs throughout the state of Ohio. Those colleagues were then asked to forward the survey link to CTE teachers in their CTPD. The survey and scope of the study was explained in the email. The qualifications to participate in the study and the survey instrument were included in the email as well. Teachers could take the online survey wherever they had internet access; however, taking it on a computer was best. The teachers had three weeks to complete the survey from the day the survey was sent out. Reminders were sent to the initial recipients to encourage participation in the survey at the start of each week.

The Secondary Career and Technical Educators Grading and Assessment of Employability Skills Survey will be given to CTE teachers via email. The email will invite teachers to participate in the study and introduce the researcher. The link will contain a link for teachers to click on to participate in the study. Google Forms will host the survey for participants who are willing to participate in the study. The survey will begin with the consent form and proceed with demographic questions and then the

Secondary Career and Technical Educators Grading and Assessment of Employability Skills Survey.

Proposed Data Analysis

The data for this study was gathered using a secure Google Form, downloaded to an Excel spreadsheet, and subsequently uploaded to the statistical analysis program, SPSS. Statistical methods are useful for examining relationships and patterns, as well as showing those patterns with numbers (Rudestam & Newton, 2015). The following were used as independent variables; age, CTPD type, the number of years spent in the workforce, the number of years spent teaching, their career field, and level of educational attainment. Ethnicity and gender were control variables. The dependent variables were the factors used in grading, the assessment types utilized by the teacher, and the cognitive levels of the assessments. Basic descriptive statistics were conducted based on age, CTPD type, the number of years spent in the workforce, the number of years spent teaching, their career field, and level of educational attainment. Descriptive statistics characterize the patterns of behavior (Rudestam & Newton, 2015).

Correlational/regression analysis was conducted on the outcome variables. The specific analysis was established once tests of statistical assumptions were conducted. The initial analyses of the data were descriptive, reporting the percentages for each survey item CTE teachers indicated they used to determine student mastery of employability skills. The survey items relating to the grading and assessment practices of CTE teachers were broken up into three factors: grading factors, types of assessments, and cognitive level of assessments. Another factor, average time weekly teaching

competencies (competency score), was also created. The factors were created by summing the survey item responses in each category. There were 10 items that were included in the grading factor, 11 items in the types of assessments used factor, 4 items in the cognitive level of assessments factors, and 5 items in the average time weekly teaching competencies factors. The higher the score for each factor, the more CTE teachers use the items within the factor. Cronbach's alpha indicated reliability of the four factors was acceptable, as it was between the values of 0.7 and 0.95 (Tabachnick & Fidell, 2013). A correlation analysis was run against the four component scores and the indicated age, gender, time in associated career field, years spent teaching, career field, and educational attainment level. Due to a lack of diverse responses, ethnicity and CTPD type were not included in the analysis. The correlation analysis provided a way to compare CTE teacher demographic information with what the teachers reported as their grading and assessment practices. A Pearson's zero-order correlation was conducted to examine the relationship of each factor score to the demographic data. A multivariate analysis of variance was conducted to simultaneously examine the four factors against demographic variables that were significantly correlated with some of the factors. Tests of between subjects effects were conducted to identify significant interactions between demographic variables and the multivariate factor. Focusing on where the between subjects test identifies a significant effect, the multivariate analysis of variance was conducted a second time.

Summary

The purpose of this descriptive study was to identify the grading and assessment practices of CTE teachers. This was a quantitative, non-experimental study. The study

participants were Ohio CTE teachers. Each participant completed the Secondary Career and Technical Educators Grading and Assessment of Employability Skills Survey (McMillan, 2001). The survey incorporated demographic questions to assist in analyzing the data collected. This study sought to fill gaps in the research on the grading and assessment practices of CTE teachers regarding their students' mastery of employability skills in Strand 1 of their CTE courses. The results of this study contribute to the understanding of CTE teachers' grading and assessment practices and can yield valuable information in closing the employability skills gap documented by industry employers.

Chapter Four

Results

Introduction

This chapter is a presentation of the findings from the quantitative study that examined the grading and assessment practices of employability skills utilized by CTE teachers. The following research questions were investigated:

- Are there grading practices that CTE teachers use more than others with respect to employability skills?
- Are there assessment practices that CTE teachers use more than others with respect to employability skills?
- Is there a relationship between teachers' employability skills grading and assessment practices and their related career field, educational attainment level, gender, number of years spent in education, number of years spent in industry before starting their career in education, related career field, or age?

This chapter includes a presentation of the analyzed data culminating in the findings of the factors that CTE teachers use in determining grades, the cognitive level of their assessments, and the types of assessments CTE teachers use all in relation into evaluating student mastery of employability skills. Their grading and assessment practices were examined with regard to the collected demographic information including gender, age, career technical planning district type, time spent working in their career field before teaching, time spent teaching, their career field, educational attainment level, and ethnicity.

Demographic Data

The data indicate that *n* = 56 (56.6%) of participants were male and *n* = 43 (43.4%) were female. On the national level, females make up the majority of the CTE teacher workforce at 55 percent, while males make up 45 percent of the CTE teacher workforce (Alvarado, 2023). Participants indicated that *n* = 4 (4.0%) teach in a compact CTPD, *n* = 6 (3=6.1%) teach in a comprehensive CTPD, and *n* = 89 (89.9%) teach in a joint vocational school district (JVSD) CTPD. The results show that *n* = 1 (1.0%) of participants was Hispanic or Latino, *n* = 1 (1.0%) was Black or African American, *n* = 1 (1.0%) was Multiracial or Biracial, and *n* = 96 (97.0%) were White. Nationally, 7.9 percent of CTE teachers are Black, and Hispanic CTE teachers make up 6.8 percent of all CTE teachers (Alvarado, 2023). The descriptive analysis for age is in Table 9.

Table 9

Descriptive Breakdown of Age

Age	*n*	*%*
21-25 years old	1	1.00
26-30 years old	2	2.00
31-35 years old	10	10.10
36-40 years old	6	6.10
41-45 years old	15	15.20
46-50 years old	13	13.10
51-55 years old	23	23.20
56+ years old	29	29.30

Table 9 indicates the majority of respondents were 51 years old or older. Table 10 indicates the time CTE teachers spent in their career field before becoming a teacher.

Table 10

Time in Associated Career Field

Years	*n*	*%*
0-5	14	14.10
6-10	16	16.20
11-15	16	16.20
16-20	19	19.20
21-25	19	19.20
26-30	9	9.10
31+	6	6.10

The majority of the survey respondents spent 20 years or less in their associated career field before becoming a teacher, as indicated in Table 10. The number of years spent teaching, as indicated by the respondents, is in Table 11.

Table 11

Number of Years Spent Teaching

Years	*n*	*%*
0-5	17	17.20
6-10	13	13.10
11-15	19	19.20
16-20	16	16.20
21-25	15	15.20
26-30	17	17.20
31+	2	2.00

Over 65 percent of the respondents had been teaching for more than 10 years, as seen in Table 11. The educational attainment level of respondents is found in Table 12.

Table 12

Educational Attainment Level

Education Attainment Level	*n*	*%*
High school diploma or equivalent	2	2.00
Some college but no degree	21	21.20
Associate's Degree	10	10.10
Bachelor's Degree	25	25.30
Master's Degree	39	39.40
Doctorate Degree	2	2.00

Table 12 indicates more than 65 percent of participants had a Bachelor's degree or higher. This is much lower than the national percentage of CTE teachers, where roughly 89 percent hold a Bachelor's degree or higher (Alvarado, 2023). Table 13 identifies the career field of the respondents.

Table 13

Associated Career Field of the Teachers

Career Field	*n*	*%*
Agricultural and Environmental Systems	7	7.10
Arts and Communication	5	5.10
Business and Administrative Services	4	4.00
Construction Technologies	9	9.10
Education and Training	5	5.10
Engineering and Science Technologies	5	5.10
Health Science	14	14.10
Hospitality and Tourism	4	4.00
Human Services	7	7.10
Information Technology	10	10.10
Law and Public Safety	4	4.00
Manufacturing	10	10.10
Marketing	6	6.10
Transportation Systems	9	9.10

As seen in Table 13, the majority of CTE teachers who completed the survey were from the fields of health science, information and construction technology, manufacturing, or transportation systems. Nationally, the majority of CTE teachers are in the business management, agriculture, and consumer science fields (Alvarado, 2023).

CTE Teachers' Grading and Assessing Practices of Employability Skills

Career and technical education teachers reported the grading practices they use in determining mastery of employability skills to answer the first research question.

Research Question One

Are there grading practices that CTE teachers use more than others with respect to employability skills?

Table 14 illustrates the survey results regarding the factors in determining grades for students' mastery of employability skills.

Table 14

Percentages of Teachers' Responses of Items that Teachers use as Factors in Determining Grades for Students' Mastery of Employability Skills

	Frequency of Factors					
	1	2	3	4	5	6
	Not At All	Very Little	Some	Quite A Bit	Extensively	Completely
Performance compared to a set scale of percentage correct	5.1	10.1	26.3	35.4	19.2	4.0
Specific competencies or outcomes mastered	4.0	4.0	13.1	29.3	36.4	13.1
Student effort how much the student tried to learn	2.0	7.1	25.3	34.3	24.2	7.1
Degree to which student pays attention and or participates	4.0	8.1	25.3	28.3	27.3	7.1
Effort	4.0	5.1	16.2	28.3	39.4	7.1
Improvement	5.1	8.1	10.1	32.3	35.4	9.1
Behavior	4.0	5.1	15.2	29.3	34.3	12.1
Work habits	3.0	2.0	6.1	30.3	40.4	18.2

Disruptive student performance	9.1	14.1	24.2	24.2	22.2	6.1
Professionalism/ employability points	4.0	4.0	8.1	22.2	39.4	22.2

Table 14 illustrates how CTE teachers place a high level of importance on professionalism/employability points, student work habits, specific outcomes or competencies mastered, and behavior as factors in determining grades attributable to student mastery of employability skills. The results indicate that 75.7% of the CTE teachers use behavior *quite a bit* or more in students' employability grades. Responses indicate 88.9% of CTE teachers use work habits *quite a bit* or more, and 58.6% of CTE teachers use work habits *extensively* or *completely* to determine students' grades for employability skills. Responses also indicate that 83.8% of CTE teachers use professionalism/employability points *quite a bit* or more, and 61.6% of CTE teachers use professionalism/employability points *extensively* or *completely* to determine students' grades for employability skills.

Responses to the 10 grading factors were summed in an effort to establish a grading score. The higher the score, the more the items are being used. The descriptive analysis for the factor score for grading factors indicate $M = 40.92$ ($sd = 8.44$) and a normal level of skewness (-.97) and kurtosis (1.91).

The survey asked CTE teachers if they agree with how students' mastery of employability skills is currently evaluated while describing why, to share what their ideal assessment for determining student mastery of employability skills would look like, as well as why a discrepancy exists between high student achievement for employability

skills on Webxams and the lack of employability skills employers see in their new employees. Three teachers reported they cannot include employability points in student grades.

In response to these three prompts, many CTE teachers indicated the evaluation and assessment of employability skills should hold students accountable like the "real world" holds adults accountable. Throughout all the responses for the three prompts, 11 CTE teachers mentioned students needing to be held accountable, and nine mentioned a lack of accountability on the part of students. The desire to hold students accountable often focuses on student behavior. More than 75% of teachers reported using behavior at least *quite a bit* or more to grade student mastery of employability skills.

Accountability also came up when CTE teachers were asked why industry employers state their new employees do not possess employability skills, yet CTE students test well on Webxams. Others indicate there are no consequences for students doing poorly on the Webxam. Some CTE teachers want to be able to hire and fire students from their classrooms, essentially sending them back to their associate schools if they are not meeting expectations. Career and technical education teachers describe their ideal assessment of employability skills that also include behavior measures. These sentiments further illustrate the high level of importance CTE teachers place on effort, improvement, behavior, work habits, and professionalism/employability points in determining student grades.

To answer the second research question, career and technical education teachers reported their assessment practices to determine student mastery of employability skills.

Research Question Two

Are there assessment practices that CTE teachers use more than others with respect to employability skills?

The Table 15 shows survey results regarding the types of assessments used to measure students' mastery of employability skills.

Table 15

Percentages of Teachers' Responses for Items that Teachers use in Assessing Students' Mastery of Employability Skills

	Frequency of Factors					
	1 Not At All	2 Very Little	3 Some	4 Quite A Bit	5 Extensively	6 Completely
Assessments designed primarily by yourself	2.0	3.0	25.3	31.3	25.3	13.1
Performance quizzes	6.1	9.1	22.2	25.3	25.3	12.1
Objective assessments	8.1	6.1	25.3	25.3	24.2	11.1
Essay type questions	16.2	27.3	26.3	23.2	6.1	1.0
Performance assessments	6.1	12.1	17.2	28.3	26.3	10.1
Projects completed by individual students	2.0	8.1	12.1	27.3	32.3	18.2
Projects completed by teams of students	2.0	14.1	21.2	30.3	21.2	11.1
Major exams	13.1	28.3	22.2	18.2	14.1	4.0

Authentic assessments	1.0	1.0	5.1	20.2	45.5	27.3
Assessments provided by publishers or supplied to the teacher	13.1	20.2	21.2	19.2	17.2	9.1
Oral presentations	8.1	25.3	32.3	19.2	10.1	5.1

Table 15 illustrates that career and technical education teachers indicated they mostly use authentic assessments, individual student projects, and CTE teacher-created assessments to measure student mastery of employability skill. Survey results show 93% of respondents use authentic assessments *quite a bit* or more to assess student mastery of employability skills. Of these, 72.8% use authentic assessments *extensively* or *completely*. Projects completed by individual students are used by 77.8% of CTE teacher respondents *quite a bit* or more as assessments to determine student mastery of employability skills. Responses indicate that 69.7% of respondents use teacher-created assessments *quite a bit* or more as a form of assessment to measure student mastery of employability skills; however, when usage is identified as *extensively* or *completely*, this amount drops to 38.4%. Responses to the 11 assessment factors were summed in an effort to establish an assessment score. The higher the score, the more the items are being used. The descriptive analysis for the factor score for assessment factors indicate $M = 41.19$ ($sd = 8.75$) and a normal level of skewness (-.38) and kurtosis (1.19).

Teachers were asked if they agreed with how students' mastery of employability skills are currently evaluated and to explain why or why not. Of the 99 responses, 43 (43.4%) teachers indicated that they agreed with how student mastery of employability

skills are currently evaluated, $n = 40$ (40.4%) did not agree with how student mastery of employability skills are currently evaluated, and $n = 16$ (16.2%) were unsure. Individuals who stated both "yes" and "no" in their answers or did not give a definitive answer were marked as unsure. Eight teachers who did not agree referred to using an assessment that measures knowledge of employability skills but not mastery of performing tasks. The CTE teachers did not think using Webxams was effective to measure skills that require students to perform tasks.

Other teachers had a difficult time assessing employability skills. One teacher believed it was difficult to assess workplace behavior for students. Others thought too much variability exists in the way student mastery of employability skills is evaluated by different teachers and schools. Teachers who indicated they agreed with how employability skills were evaluated appreciated the ability to use their own methods of assessing these skills. Other teachers who believed the current evaluation method was working indicated using observations of employability skills that students perform. Career and technical education teachers appreciate the ability to use their own practices for assessing and grading employability skills. These ideas illustrate the variability of teacher practices in grading and assessing employability skills.

The survey asked CTE teachers to describe what their ideal assessment for determining student mastery of employability skills would look like. Many indicated that it should mimic what happens in the real world. The real-world experiences teachers want in their ideal assessment are authentic assessments, as over 90% of CTE teachers reported using at least *quite a bit* or more to assess student mastery of employability skills. Also mentioned were internships, apprenticeships, clinicals, and work-based learning. Four

teachers mentioned they would like to view video footage of the student in action working on the job site.

Table 16 indicates the survey results regarding the cognitive level of assessments CTE teachers use to measure students' mastery of employability skills.

Table 16

Percentages of Teachers' Responses of Items that Measure the Cognitive Level of Assessments Teachers Use to Determine Students' Mastery of Employability Skills

	Frequency of Assessment					
	1 Not At All	2 Very Little	3 Some	4 Quite A Bit	5 Extensively	6 Completely
Assessments that measure student understanding	13.1	28.3	22.2	18.2	14.1	4.0
Assessments that measure how well students apply what they learn	1.0	1.0	5.1	20.2	45.5	27.3
Assessments that measure student reasoning	13.1	20.2	21.2	19.2	17.2	9.1
Assessments that measure student recall knowledge	8.1	25.3	32.3	19.2	10.1	5.1

Results presented in Table 16 indicate that the cognitive level of CTE teachers' assessments of employability skills most often measure how well students apply what they learn. Assessments that measure how well students apply what they learn about employability skills were reported to be used *quite a bit* or more by 93% of

respondents. *Extensive* or *complete* use of assessments that measure how well students apply what they learn was indicated by 72.8% of respondents. Assessments that measure student recall knowledge were used *extensively* or *completely* by 15.2% of respondents. Including *quite a bit* as a response brings the use percentage up to 34.4%%. Responses to the four cognitive factors were summed in an effort to establish a cognitive level of assessment score. The higher the score, the more the items are being used. The descriptive analysis for the factor score for the cognitive level of assessment factors indicate $M = 16.91$ ($sd = 3.94$) and a normal level of skewness (-.98) and kurtosis (2.09).

Teachers reported limited use of assessments that measure student understanding. When asked about why a discrepancy exists between employers stating students lack employability skills and students testing well on Strand 1 items on the Webxam, CTE teachers indicated the students can determine the answers on the test, but they have difficulty putting the skills into practice. CTE teachers understand that assessments measuring the knowledge a student has about employability skills fall short in determining if students can perform the desired employability skills.

Career and technical education teachers were asked to indicate the amount of time per week they spend teaching the five different competencies in Strand 1 that focus on various employability skills. Table 17 shows the amount of time CTE teachers spend teaching five employability competencies within Strand 1.

Table 17

The Amount of Time CTE Teachers Spend Teaching Various Employability Skills per Week

	Amount of Time			
	No Time	< 20 Minutes	Up to 40 Minutes	> 40 Minutes
Competency 1.1.6 Work Ethic, Accountability, Responsibility in the Work Place	0.0	35.4	34.3	30.3
Competency 1.1.7 Problem Solving and Critical Thinking Skills	1.0	19.2	39.4	40.4
Competency 1.1.8 Professionalism	0.0	28.3	42.4	29.3
Competency 1.2.3 Effective Communication	0.0	25.3	43.4	31.3
Competency 1.2.4 Conflict Resolution	4.0	53.5	34.3	8.1

Career and technical education teachers spend the least amount of time per week teaching conflict resolution, as reported in Table 17. More than 70% of teachers spend more than 20 minutes per week teaching problem solving and critical thinking skills, professionalism, and effective communication skills. Responses to the reported time spent teaching the five selected employability competencies were summed to establish a competency teaching time score. The higher the score, the longer CTE teachers spend teaching employability skills. The descriptive analysis for the factor score for time teaching employability skills factor indicate $M = 14.68$ ($sd = 3.01$) and a normal level of skewness (-.09) and kurtosis (-.86).

Career and technical education teachers reported grading and assessment practices of employability skills, time spent teaching the five employability skills competencies, and demographic information. As described above, their practices and time spent teaching those five competencies were combined into the four factors. A correlation analysis was conducted on the four factors and demographic information to determine if significant variable interactions existed. Multivariate analysis was then used to answer the third research question.

Research Question Three

> *Is there a relationship between teachers' employability skills grading and assessment practices and their related career field, educational attainment level, gender, number of years spent in education, number of years spent in industry before starting their career in education, related career field, or age?*

A correlation analysis was run against the four factor scores and the indicated age, gender, time in associated career field, years spent teaching, career field, and educational attainment level. Ethnicity and CTPD type were not included in the analysis due to a lack of diverse responses. The correlation analysis provided a way to compare CTE teacher demographic information with what the teachers reported as their grading and assessment practices. A Pearson's zero-order correlation was conducted to examine the relationship of each factor score to the demographic data. The Pearson's correlation revealed no significant interaction between the four factors and age, gender, years spent teaching, or educational attainment level. Two variables, time in associated career field and career field, showed a significant correlation to some of the factors. The correlation was conducted again with the four factors and those two variables. The results of the

correlation analysis are shown in Table 18 for the variables with a significant interaction with the factors.

Table 18

Pearson's Correlational Analysis with Factor Scores and Significant Variable Interaction

	Grading Factors	Types of Assessments	Cognitive Level of Assessments	Average Time Weekly Teaching Competency Score	Time In Associated Career Field	Career Field
Grading Factors	1	.506**	.507**	.321**	.206*	.115
Types of Assessments		1	.754**	.126	-.037	.248*
Cognitive Level of Assessments			1	.211*	.016	.228*
Average Time Weekly Teaching Competency Score				1	.030	.122
Time In Associated Career Field					1	.100
Career Field						1

*** Correlation is significant at the 0.01 level (2-tailed).*

** Correlation is significant at the 0.05 level (2-tailed).*

Table 18 shows the time a teacher spends in their associated career field is positively correlated with grading factors with a small effect $r = .206$ (Field, 2018). A teacher's career field is positively correlated with the types of assessments, $r = .248$, and the

cognitive level of the assessments, r =.228, with a small effect. Reliability analysis was conducted to determine the reliability of each factor, and it is presented in Table 19.

Table 19

Reliability Analysis for Each Multivariate Factor

	Cronbach's Alpha	*n* of items
Grading Factor	.880	10
Assessment Type	.835	11
Cognitive Level of Assessments	.890	4
Competency Score	.847	5

Cronbach's alpha measures in Table 19 indicate reliability is acceptable (Tabachnick & Fidell, 2013).

Multivariate Analysis and Statical Assumptions

A multivariate analysis of variance was conducted to simultaneously examine the four factors against time in associated career field and career field. Statistical assumptions of a multivariate analysis were examined. Due to error variance being greater than 20, homogeneity of variance is assumed tenable (Tabachnick & Fidell, 2013). Based on the levels of skewness and kurtosis for each of the four multivariate factors (i.e., grading practices, types of assessments, cognitive levels of assessments, and time spent teaching employability skills competencies), the assumption of a normal distribution is tenable. Table 20 presents the mean and levels of skewness and kurtosis for each multivariate factor.

Table 20

Mean, and Levels of Skewness and Kurtosis for Multivariate Factors

	n	*M*	Skewness	Kurtosis
Grading Factors	99	40.92	-0.97	1.96
Types of Assessments	99	41.19	-0.38	1.19
Cognitive Level of Assessments	99	16.91	-0.98	2.09
Competency Score	99	14.68	-0.09	-0.86

Table 20 illustrates normal levels skewness and kurtosis for each multivariate factor based on the guidelines of |2.0| and |5.0| for skewness and kurtosis, respectively (Field, 2006). The outcome variables are continuous and correlated with each other, as shown in the correlational analysis above. Levene's test of Homogeneity of Variance is shown is Table 21.

Table 21

Levene's Test of Homogeneity of Variance of the Four Factor Scores (Based on Mean)

	F	*df*1	*df*2	*p*
Grading Factors	1.498	13	85	.135
Types of Assessments	1.419	13	85	.168
Cognitive Level of Assessments	1.625	13	85	.094
Average Time Weekly Teaching Competency Score	0.652	13	85	.803

The Levene's Tests in Table 21 indicate that the assumption of homogeneity is tenable. The Box's M test is tenable, F (10, 347.64) = 1.47, p = .151. Multivariate analysis of variance results is in Table 22.

Table 22

*Roy's Largest Root Multivariate Test of Time in Associated Career Field, Career Field, and Time in Associated Career Field*Career Field*

Effect	Θ	*F*	Hypothesis *df*	Error *df*	*p*
Intercept	76.413	687.716a	4	36	<.001
Time In Associated Career Field	0.475	3.087[b]	6	39	.014
Career Field	1.500	4.500[b]	13	39	<.001
Time In Associated Career Field * Career Field	1.538	1.500[b]	40	39	.104

Note. Design: Intercept + Time In Associated Career Field + Career Field + Time In Associated Career Field * Career Field
a. Exact statistic
b. The statistic is an upper bound on F that yields a lower bound on the significance level.

The results in Table 22 show the multivariate factor had no significant interaction among the time in associated career field * career field. There is a significant main effect of time in the associated career field with the multivariate factor, p = .014. There is a significant main effect of career field with the multivariate factor, p < .001.

Additional analyses were conducted between the four factors and the career field, time in the associated career field, and the time in the associated career field*career field. Tests of between-subject effects were conducted, and no significant interactions were

revealed between the time in associated career field * career field and the multivariate factor. The results of the tests of between-subjects effects are in Table 23.

Table 23

Tests of Between-Subjects Effects for Time in Associated Career Field and Career Field

Source	Variable	Type III Sum of Squares	*df*	Mean Square	*F*	*p*
Corrected Model	Grading Factors	4341.770a	59	73.589	1.091	.392
	Types of Assessments	3686.387b	59	62.481	0.637	.942
	Cognitive Level of Assessments	735.898c	59	12.473	0.620	.952
	Average Time Weekly Teaching Competency Score	551.357d	59	9.345	1.090	.392
Intercept	Grading Factors	117306	1	117306	1738.480	<.001
	Types of Assessments	115493	1	115493	1178.200	<.001
	Cognitive Level of Assessments	19976.400	1	19976.400	993.363	<.001
	Average Time Weekly Teaching Competency Score	15175.400	1	15175.400	1770.390	<.001
Time In Associated Career Field	Grading Factors	581.959	6	96.993	1.437	.225
	Types of Assessments	339.813	6	56.636	0.578	.746
	Cognitive Level of Assessments	72.418	6	12.070	0.600	.728
	Average Time Weekly Teaching Competency Score	54.771	6	9.129	1.065	.400
Career Field	Grading Factors	1898.350	13	146.027	2.164	.032
	Types of Assessments	976.997	13	75.154	0.767	.688
	Cognitive Level of Assessments	226.502	13	17.423	0.866	.592

	Average Time Weekly Teaching Competency Score	173.529	13	13.348	1.557	.141
Time In Associated Career Field * Career Field	Grading Factors	1246.530	40	31.163	0.462	.992
	Types of Assessments	2269.240	40	56.731	0.579	.955
	Cognitive Level of Assessments	428.243	40	10.706	0.532	.975
	Average Time Weekly Teaching Competency Score	351.134	40	8.778	1.024	.471

**Note.* a. R Squared = .623 (Adjusted R Squared = .052)
b. R Squared = .491 (Adjusted R Squared = -.279)
c. R Squared = .484 (Adjusted R Squared = -.296)
d. R Squared = .623 (Adjusted R Squared = .052)

Table 23 shows a significant effect, $p = .032$, of the career field on grading factors. While the multivariate analysis shows that the time in associated career field and the career field are significant main effects with the multivariate factor, when examined with the between-subjects effects, only the dependent variable of career field on grading factors is where the significance is present. A Scheffe's post hoc analysis revealed no significant interaction between any of the four factors and any particular career field or time in associated career field.

The multivariate analysis was conducted a second time to save power by eliminating time in associated career field. Power is compromised in the model with both variables due to multicollinearity. The multivariate analysis of variance was conducted with the multivariate factor and career field. The Box's M test is tenable, F (100, 2879.60) = 1.28, $p = .033$. Multivariate analysis of variance results is in Table 24.

Table 24

Roy's Largest Root Multivariate Test of Career Field and the Four Factor Scores

Effect	Θ	*F*	Hypothesis df	Error df	*p*
Intercept	52.418	1074.562[a]	4	82	<.001
Career Field	0.699	4.571[b]	13	85	<.001

**Note.* Design: Intercept + Career Field
a. Exact statistic
b. The statistic is an upper bound on F that yields a lower bound on the significance level.

The data in Table 24 indicate a significant interaction between career field and the multivariate factor, p <.001. A test of between subjects effects was conducted with the results illustrated in Table 25.

Table 25

Tests of Between-Subjects Effects for Career Field

Source	Dependent Variable	Type III Sum of Squares	*df*	Mean Square	*F*	*p*
Corrected Model	Grading Factors	2500.943a	13	192.380	3.656	<.001
	Types of Assessments	1061.638b	13	81.664	1.077	.390
	Cognitive Level of Assessments	243.199c	13	18.708	1.245	.263
	Average Time Weekly Teaching Competency Score	140.691d	13	10.822	1.235	.270
Intercept	Grading Factors	141990	1	141990	2698.570	<.001
	Types of Assessments	144359	1	144359	1903.080	<.001
	Cognitive Level of Assessments	24280.70	1	24280.700	1616.200	<.001

Career Field	Average Time Weekly Teaching Competency Score	18657.600	1	18657.600	2128.820	<.001
	Grading Factors	2500.940	13	192.380	3.656	<.001
	Types of Assessments	1061.640	13	81.664	1.077	.390
	Cognitive Level of Assessments	243.199	13	18.708	1.245	.263
	Average Time Weekly Teaching Competency Score	140.691	13	10.822	1.235	.270

**Notes.* a. R Squared = .359 (Adjusted R Squared = .261)
b. R Squared = .141 (Adjusted R Squared = .010)
c. R Squared = .160 (Adjusted R Squared = .032)
d. R Squared = .159 (Adjusted R Squared = .030)

A significant interaction between the career field and grading factors is shown in Table 25. This result should be interpreted with caution due to the sample size. Answering the research question three, with respect to student mastery of employability skills, there is a relationship between a CTE teacher's career field and their grading factors. A Sheffe's post hoc analysis revealed no significant interaction between the grading factors and any particular career field. All data analyses can be found in Appendix F.

Summary

Chapter Four provided the findings from this survey study. The grading practices CTE teachers reported using the most to determine student mastery of employability skill were work habit, professionalism/employability points, specific competencies or outcomes mastered, and other nonachievement factors such as behavior, effort, and improvement. Career and technical education teachers have a desire to hold students

accountable, as is illustrated by more than 75% of respondents using behavior *quite a bit* or more to grade student mastery of employability skills.

The CTE teacher respondents reported using the following assessment practices the most to determine student mastery of employability skills: authentic assessments, individual student projects, and CTE teacher created assessments. Career and technical education teachers value having students put their employability skills into action and visually observe students performing tasks, as seen by over 90% of respondents reporting they use authentic assessments *quite a bit* or more. CTE teachers report the cognitive level of their employability skills assessments they use most are assessments that apply what they learn.

The correlation analysis between the four factors and the time in associated career field revealed a positive correlation with grading factors with a small effect. The CTE teacher's career field was positively correlated with the cognitive level of assessments and the types of assessments with a small effect. The multivariate analysis of variance found no significant interaction between the multivariate factor and the time in associated career field * career field. However, a significant main effect was found between the time in associated career field and the multivariate factor. A significant main effect was also present between the career field and the multivariate factor. Upon further analysis, a significant interaction between the career field and the multivariate factor was found $p < .001$. Additionally, a significant interaction was identified between the grading factors and the CTE teachers' identified career field.

Chapter Five

Discussion

This quantitative research study sought to document the grading and assessment practices CTE teachers use to determine student mastery of employability skills. Most survey participants indicated a greater use of student effort, behavior and work habits, specific competencies or outcomes mastered, and professionalism/employability points as the main determinants of students' grades concerning mastery of employability skills. Respondents identified the use of authentic assessments, individual student projects, and assessments they create on their own as the types of assessments they use the most to determine student mastery of employability skills. The cognitive level of their assessments typically focuses on how well students apply their knowledge of employability skills. Assessments that measure recall knowledge of employability skills are utilized in a much lesser capacity.

The study also sought to identify if a relationship existed among CTE teachers' grading and assessment practices of employability skills and their related career field, educational attainment level, gender, number of years spent in education, number of years spent in the industry before starting their career in education, related career field, or age. A CTE teacher's career field was linked to the types of assessments they give and the cognitive level of the assessments, but this connection was only modest. A strong relationship between the time spent in a particular career field and different career fields overlapping each other was not found. However, the time spent in a career field does have a noticeable overall impact. The career field itself also has a significant overall

effect. A relationship was found between the grading factors used to determine student mastery of employability skills and the CTE teacher's career field.

Research Question One

Are there grading practices that CTE teachers use more than others with respect to employability skills?

Once the respondents answered the demographic questions, they were asked to complete The Secondary Career and Technical Educators Grading and Assessment of Employability Skills Survey that was adapted, with permission, from The Survey of Assessment and Grading Practices—Secondary Form created by James H. McMillan of the Virginia Commonwealth University (McMillan, 2001). McMillan (2001) developed the closed-form questionnaire to document the extent that teachers utilized various assessment and grading practices. The instrument is a six-point scale that ranges from "not at all" to "completely" (McMillan, 2001). With its focus on items teachers use to grade and assess students, the survey was appropriate to use for this study.

The CTE teacher participants indicated a higher usage of professionalism/employability points, work habits, mastery of specific outcomes or competencies, and behavior compared to the other grading factor items related to grading employability skills. The largest percentage of CTE teachers (61.6%) indicated that they use professionalism/employability *extensively* or *completely* when compared to the other items for determining grades. This percentage would have been higher, however, some teachers indicated in the extended response questions that they cannot use professionalism/employability points or include grades based on employability in student grades. The survey asked CTE teachers if they agree with how students' mastery of

employability skills are currently evaluated while describing why, to describe what their ideal assessment for determining student mastery of employability skills would look like, and why a discrepancy exists between high student achievement for employability skills on Webxams and the lack of employability skills employers see in their new employees. One teacher stated, *"We are now not allowed to grade on employability in our own classes and I believe this takes away from the accountability that is necessary for student."* Another teacher stated:

> *In the past, lab instructors gave their own employability points and it was included as part of the lab grade…. Since the students know it 'does not count' there is very little motivation to complete any work for these modules, and I cannot use employability in their actual grade in any way.*

A third teacher simply said, *"I can not (sic) give employability points…"*. The responses illustrate teachers' frustration regarding their inability to use employability points.

In their responses to the three open-ended questions, many CTE teachers indicated the evaluation and assessment of employability skills should hold students accountable like the "real world" holds adults accountable. Throughout all the responses for the three prompts, 11 CTE teachers mentioned students need to be held accountable, and nine mentioned a lack of accountability on the part of students. The desire to hold students accountable often focuses on student behavior. More than 75% of teachers reported using behavior at least *quite a bit* or more as a way to grade student mastery of employability skills. One CTE teacher stated that *"employability skills should be treated just like in the work force. You show up and work, you get paid, absenteeism would be based on reasoning."* Another CTE teacher response also focused on student absences

stating, *"we aren't allowed to deduct points for a student absence. That isn't how the real world works."* One response mentioned several aspects of employability skills where a teacher laments what they frequently hear from their employers. That teacher stated:

> *...what employers want them to learn we can no longer teach…our employers have repeatedly told us that they want students who can pass a background check, show up to work every day and on time, look and act professionally, and pass a drug screen.*

Accountability also came up when CTE teachers were asked why industry employers state their new employees do not possess employability skills, yet CTE students test well on Webxams. A teacher reported that this discrepancy will continue to exist *"until students are held accountable for their actions,"* and another stated that *"parents at home [d]o not hold their student to the same standard that the student is required to meet either by the school or on the job."* Another teacher even stated the *"…lack of accountability in school attendance, tardiness, and other employability skills…"* is the reason for the discrepancy. Others indicated there are no consequences for students doing poorly on the Webxam.

The CTE teachers' believe that since there is no accountability for students to do well on Webxams, students do not try hard to do well on the exam. This belief is misplaced. First, data presented indicates students show mastery on Webxam questions related to employability skills. Second, research suggests that teachers have more influence regarding the degree of importance students place on assessments. The classroom assessment environment is less about student perceptions and more about teacher practices (Brookhart & Durkin, 2003). A teacher establishes their own classroom

assessment setting by considering various factors: the objectives guiding teachers in using assessments, the methods employed, how they're chosen and their effectiveness, how teachers utilize feedback, their expertise in assessment, their views on students, and the assessment policy environment. Except for the policy environment, teachers have direct influence over these aspects (Brookhart & Durkin, 2003). Consequently, a teacher's classes develop a distinctive assessment "character" shaped by their overall assessment approach (Brookhart & Durkin, 2003, p. 28). However, there is research that supports teachers' perceptions that students are not motivated when they fail to see the value in an assessment. Tests with low stakes typically do not directly impact students, but they can affect teachers, schools, or districts (Nichols & Berliner, 2007). In situations where the stakes are low, students tend to see little personal significance in the exams, leading to less effort invested in the task (Wise & DeMars, 2005). Teachers who create a classroom assessment environment where students understand the value of their assessments can help motivate students to put forth effort on their assessments.

Some CTE teachers want to be able to hire and fire students from their classrooms, essentially sending them back to their associate schools if they are not meeting expectations. Career and technical education teachers describe their ideal assessment of employability skills as one that also includes behavior measures. One CTE teacher stated their ideal assessment:

> *…would consist of students actually being hired and fired in labs…. There is a need for…accountability. If students numbers/enrollment were not an issue, [the ideal assessment] would consist of being able to hold students to an…environment*

> *with actual real standards in the workforce and if you did not meet the standards or comply, you would be let go just like the real [world].*

Another teacher commented that the ideal assessment would take into consideration *"attendance, behavior, adhering to dress code, being on task, being prepared."* Similarly, another respondent indicated the assessment would include items such as *"do they show up, do they manage their time and not have to be prompted to complete tasks, do they approach task[s] with a good attitude, are they improving at task[s] they have attempted multiple time[s]."* Still identifying the need to hold students accountable, a teacher wrote that their ideal assessment would *"turn the classroom into a real world job site, [h]ire and fire students. Give promotions."* While some comments were in response to the ideal assessment to determine student mastery of employability skills, these responses further illustrate the high level of importance CTE teachers place on effort, improvement, behavior, work habits, and professionalism/employability points in determining student grades.

The data indicate CTE teachers use a variety of grading factors at various frequencies to determine student mastery of employability skills. This finding aligns with current research illustrating variability in the grades teachers give to student work (Brookhart et al., 2016). When grading students' mastery of employability skills, CTE teacher responses indicate the use of a hodgepodge approach that combines achievement (i.e., competencies or outcomes mastered), work habits, behavior, and employability points. This hodgepodge approach is consistent with previous findings where teachers in various grades and subjects use a variety of factors in determining student grades (Brookhart et al., 2016; Guskey, 2020). These factors include effort, attitude, behavior,

achievement, and improvement. The use of nonachievement factors in determining student mastery of employability skills is used by CTE teachers, and the typical teacher uses them in their classroom as well (Brookhart et al., 2016; Kunnath, 2017; O'Connor et al., 2018). The data indicate specific competencies or outcomes mastered, work habits, behavior, and employability points were the grading factors used most often related to student grades for employability skills. McMillan (2001) and previous researchers found academic performance and academic enablers as the grading factors teachers deem most important when determining grades. Teachers see high grades as recognition for diligent effort, excellence in work, positive attitude, and advancement in learning shown by students. CTE teachers share these views.

Career and technical education teachers often use professionalism/employability points as a grade students earn every day. The points are typically tied to certain behaviors such as being prepared, on time, in attendance, in uniform, following directions, work habits, effort, and participating in the classroom setting. Two of the grading factors CTE teachers indicate they use often are typically embedded within employability points. The teacher typically assigns the same point value to each individual item that makes up their professionalism/employability points and determines a total by summing the points together. Students receive these daily points as the teacher assigns points based on students complying with the categories within the professional/employability points assignment. Serving as motivation to comply, the CTE teachers may treat the points students earn towards their grades as the paycheck a student would earn on a job. Deducting points because a student was not in school fails to appropriately measure student mastery of any employability skill. Effort was identified

by Kunnath (2017) as a grading factor that teachers view as necessary to motivate students. The statements provided by teachers who are unable to use professionalism/employability points show their frustration with not being able to use these points to motivate students and hold them accountable. However, research has shown that grades do not motivate students into compliance (Reeves, 2004; Reeves, 2008). Giving poor grades to serve as a punishment fails to motivate students to change their behavior and does not lead to improved student performance. Teachers believe grades become more equitable when they are reduced due to insufficient effort or participation (Brookhart et al., 2016). The accuracy of the grades that students receive to show their mastery of employability skills can be compromised when professionalism/employability points use penalties for absences, poor behavior, and not following directions (O'Connor et al., 2018).

The deduction of employability points because a student did not follow a direction or failed to meet an expectation in the name of accountability in the "real world" is grounded in an idea that is not applicable to the world of work. An interviewee in Cox's (2011) study commented that the "real world" provides second chances and that everyone makes mistakes. Specifically, regarding the notion of absences, Ohio law provides teachers with 15 sick days per year with pay (Ohio Revised Code, 2012). The focus on absences by some CTE teachers is striking when they are afforded 15 sick days per year. Teachers can accumulate at least 120 unused sick days under Ohio law, but districts can increase this amount with board approval. Teachers with this focus on student absences are misplacing their priorities. To increase student motivation, CTE teachers should work to explain to students why mastering employability skills are relevant to them and how

they will impact their future (Schwan, 2021). Student motivation increases when students have some type of control in their learning. An overuse of professionalism/employability points may provide CTE teachers with a muddy understanding of student mastery of employability skills.

The CTE teachers also indicate they use the specific competencies or outcomes mastered by the student as a main grading factor for grading employability skills. This grading factor indicates what a student knows and can do related to a specific employability skills outcome or competency. A grade demonstrates a student's knowledge and abilities, while providing the teacher with insight into the student's progress towards mastering the learning objectives (Brookhart et al., 2016; Carifio & Carey, 2009; Chen & Bonner, 2017; Feldman & Reeves, 2020; Kunnath, 2017; Reeves, 2008). Relying more on this grading factor will provide teachers with a better understanding and a more accurate depiction of the employability skills in which students are proficient. When CTE teachers rely on using the specific outcomes or competencies students master, they incorporate components of a standards-based grading system. Educators employing this approach weigh the available evidence to ascertain the grade that best reflects a student's present level of accomplishment (Feldman, 2019). The grade book is organized to show student performance on standards (Feldman, 2019). The standards, as they relate to employability skills, would be the outcomes or competencies in Strand 1 within the CTE course. Employing this method empowers teachers to make well-founded judgments on student grades, rooted in precise data pertaining to students' knowledge (Feldman, 2019). These data are illustrated through various categories that track students' advancement toward mastering each content standard. Notably, non-academic data points are excluded

from consideration, ensuring focus solely on academic progress. Breaking down student mastery of employability skills by outcome and competency, teachers can easily distinguish a student's strengths and weaknesses as they work towards mastering the outcomes and competencies embedded in Strand 1. Career and technical education teachers who have a better understanding of their students' progress as they work towards mastering these competencies can better assist students in addressing student areas of improvement. As teachers fill in gaps for students in their understanding and mastery of employability skills, the teacher increases the human capital of students, better preparing them with the skills employers state their new employees lack (Michaels & Barone, 2020; Krieger et al., 2021; Kyllonen, 2013; Tan, 2014).

Research Question Two

Are there assessment practices that CTE teachers use more than others with respect to employability skills?

The CTE teacher survey participants indicated a high use of authentic assessments, individual student projects, and CTE teacher created assessments. A large percentage (72.8) of CTE teachers reported use of authentic assessments *extensively* or *completely*. By including those who use authentic assessments *quite a bit*, this percentage increases to 93 percent. Authentic assessments require students to apply their knowledge and skills in practical, real-life situations, scenarios, or challenges (Messier, 2022). These assessments foster a student-focused learning approach, allowing students to engage in problem-solving, inquiry, and the creation of new understanding and insights. The significance of authentic assessments has been examined in relation to workforce readiness and the development of graduate attributes. In a project-based learning context,

78% of students stated that their experience had equipped them for the workforce due to the practical, real-world skills they gained from authentic assessments (Indrawn et al., 2019). Career and technical education teachers realize the importance of using authentic assessments to determine student mastery of employability skills. With 72.8% of CTE teachers reporting the use of authentic assessments *extensively* or *completely*, the use of performance quizzes or assessments at the same frequency is quite low, 37.4% and 36.4%, respectively. Performance and authentic assessments have common meanings. The interpretations of performance and authentic assessments underscore the utilization of tasks that draw out essential skills and end goals of education, closely mirroring real-life situations encountered outside the classroom (Palm, 2019). The disparity in the use of performance quizzes or assessments and authentic assessments is notable.

Comments gathered from respondents when asked if they agree with how students' mastery of employability skills are currently evaluated and to explain why or why not illustrate the high value CTE teachers place on having students perform tasks and apply knowledge to show mastery of employability skills. The CTE teachers do not place value in multiple choice or paper and pencil tests to measure employability skills. A teacher mentioned that they do not agree with how students' master of employability skills are evaluated because the *"current evaluation is merely questions on paper."* Others also mentioned the use of a multiple-choice test is not effective. One teacher stated that *"the WebXam is great for testing if students know what BEST choice is between a handful of options. It isn't necessarily the best for testing to see if students will use that best choice to inform their actions each and every day."* Another teacher stated, *"I do not believe student's mastery of employability skills are best evaluated through a*

multiple choice EOC but through modeling behavior and having real world conversations and lab projects that raise students up to the level of employment success." A separate teacher agreed, while also expressing frustration with the system saying *"these skills are called soft skills and are specifically differentiated from hard skills which are easier to measure using standardized tests. Trying to measure soft skills with standardized tests like the WebXams is an exercise in futility*." Other teachers have a difficult time assessing employability skills. One teacher stated that *"Students' behaviors in the classroom are much different (than) they are in the workplace. Workplace behavior is hard to assess."*

A piece of the career and technical framework in Ohio is work-based learning. Work-based learning involves a structured series of opportunities aimed at equipping students with real-world learning through collaborations with local businesses and industries (ODEW, 2023a). Work-based learning opportunities offer students authentic opportunities to integrate academic, technical, and professional skills. Collaboration between business and education partners is pivotal in overseeing and assessing these experiences. Experiences included within the work-based learning model are apprenticeships, job shadowing, internships, and student-run businesses (Dougherty et al., 2021; Fletcher et al., 2018). For work-based learning to have significance, it should connect and enhance the knowledge, skills, and attitudes students acquire in school. This involves guidance from both a supervisor and mentor (e.g., a teacher or employer), with clear goals, objectives, and identified skill sets that are regularly assessed. Additionally, students should have time to reflect on their experiences through both written and verbal means. The authentic opportunities students are provided with through a work-based learning setting increase both their technical skills and employability skills that are

transferable and critical to workplace success, thus increasing a student's human capital (Mindham & Schultz, 2019). Career and technical education students have access to participating in work-based learning. The CTE teachers provide meaningful, real-world, experiences for their students in the classroom and through work-based learning. Career and technical education teachers should consider how they assess the work-based learning experiences of their students. Considering attendance in a grade can serve as an indicator for less demanding experiences, such as attending a school-hosted job fair or a guest speaker's presentation (Dougherty et al., 2021). However, a more rigorous assessment framework may be necessary to gauge the caliber of students' engagements in high-intensity interactions, such as paid internships or apprenticeships. Just being involved in a work-based learning experience does not automatically guarantee benefits (Fletcher et al., 2018). Assessment frameworks for work-based learning experiences that are more rigorous should include frequent communication between the CTE teacher and employer regarding the student's progress. A mechanism for formative and summative feedback should be utilized. Students should be provided a structure to reflect on their learning and development throughout their work-based learning experience(s).

The CTE teachers were asked to describe their ideal assessment to determine student mastery of employability skills. Many respondents indicate their ideal assessment should mimic what happens in the real-world. One teacher advocated for a *"student run enterprise…"*. Many teachers indicated the importance of observing students on the job. One teacher stated their ideal assessment would *"assess them (students) through a real job situation rather than just [in] a classroom setting."* Other individuals shared this sentiment by saying, *"jobs are the best way to check employability"* or that *"observing*

the student in a real work environment" and to *"…observe each student 'on the job'…".* Additionally, another teacher mentioned an *"on the job observation with employer and instructor."* This teacher finds value in observing the interactions between a student and their boss. Several other teachers mentioned real-world experience. One teacher mentioned their ideal assessment would be *"hands-on, real world projects…",* and another teacher stated the ideal assessment should include *"real world experience."* Another respondent said the ideal assessment should be *"problem based, and critical thinking scenarios."* The real-world experiences teachers want in their ideal assessment are authentic assessments, as over 90% of CTE teachers reported using at least *quite a bit* or more to assess student mastery of employability skills. Also mentioned were internships, apprenticeships, clinicals, and work-based learning.

The focus of describing an ideal assessment as one that mimics the real-world creates a disparity from what teachers report doing. Many teachers report using authentic assessments to assess student mastery or employability skills, yet the indication of an ideal assessment contradicts this reported usage. Teachers report using professionalism/employability to a high degree as well. The CTE teachers may identify these as one in the same. If CTE teachers believe their use of professionalism/ employability points constitute authentic assessments that measure student mastery of employability skills, they do not have a firm and usable understanding of authentic assessments. Authentic assessments do not measure complicity or compliance in following directions such as professionalism/employability points often do. Within the CTE classroom, authentic assessments should allow for CTE teachers to measure student mastery of employability skills in ways that allow teachers to put the skills into practice

through problem-solving, demonstrate their learning (not simply complying with rules or directives), provide students with means to take risks, collaborate, accurately illustrate and real-world situation, and allow the student to transfer their knowledge into practice (Messier, 2022).

Four teachers mentioned they would like to view video footage of the student in action working on the job site. The mention of viewing video footage speaks to the concern teachers place on accountability. The troubling notion is that this also points to a poor level of trust between the CTE teacher and students. Teachers need to develop positive relationships with students. A tenant of developing these types of relationships is building the relationship on trust and repairing the trust when it is broken.

Teachers who indicated they agree with how employability skills are evaluated appreciate the ability to use their own method of assessing these skills. A teacher indicated, *"Using a daily grade to make students aware of important employability skills works fine."* Another person simply stated, *"yes, let up to [the] classroom."* A different respondent wrote, *"Yes as far as what I am using…"*. Other teachers who believed the current evaluation method works indicate the use of observation of employability skills that students perform. One respondent indicated, *"…They need to be able to show that they can complete the task."* Another said, *"…I put them in situations they will encounter in a work environment and evaluate them…"*. A different teacher reported, *"…seeing the task in action is the most important way to assess."* Career and technical education teachers appreciate the ability to use their own practices for assessing and grading employability skills. These responses provide evidence of the variability of teacher practices in grading and assessing employability skills.

The CTE teacher respondents indicated the cognitive levels of their assessments that pertain to employability skills. Of the CTE teacher respondents, 93% indicated they use assessments that measure how well students apply what they learn *quite a bit* or more frequently. These assessments were used by 72.8% of respondents *extensively* or *completely* to assess student mastery of employability skills. This percentage is vastly different from the 15.2% of CTE teachers who *extensively* or *completely* use assessments that measure recall knowledge to determine student mastery of employability skills. The high percentage of teachers who use assessments that make students apply what they learn corresponds to the high percentage of teachers who use authentic assessments to measure to employability skills. Data indicate CTE teachers understand that to measure employability skills, they need to see students performing these skills. When asked about why a discrepancy exists between employers stating students lack employability skills and students testing well on Strand 1 items on the Webxam, CTE teachers indicate the students can determine the answers on the test, but they have difficulty putting the skills into practice. One teacher stated, *"students know what they should do. Actually doing is another matter."* Similarly, another teacher reported that *"students do not always do what they know that they should…"*. A different CTE teacher said, *"students are smart enough to know the correct answers on a test but have a hard time implementing what they learned in real life…"*. Another teacher explained their view stating, *"Webxam is a memorization exam, not a performance assessment"*. The CTE teachers understand that assessments that measure the knowledge a student has about employability skills fall short in determining if students can perform the desired employability skills.

The CTE teacher respondents indicated a high use of authentic assessments and an application-based cognitive level of assessments to determine mastery of employability skills. A multiple-choice test (e.g., Webxam) falls short in determining mastery of employability skills in the view of the CTE teachers. CTE teachers repeatedly share the belief that there is difficulty in getting their students to implement what they have learned to a real-life situation. They share the view that students also have difficulty choosing the appropriate action in the workplace. With this knowledge and viewpoint, CTE teachers have the data to address, in part, this issue in their classrooms. The use of various types of assessment is critical in assisting teachers to identify where students have gaps in their learning (Cotton, 2017). The gap employers see with students possessing employability skills might be related to CTE teachers not utilizing their assessment data to determine student gaps in mastery of their employability skills and providing intentional remediation to address and close these gaps for students. By closing these gaps, the student's human capital will be increased and allow them to bring value to their workplace. The CTE teachers should analyze their highly used authentic assessment data regarding employability skills to determine the skills students are not exhibiting in those real-world scenarios. Employability skills gaps can be addressed by the CTE teacher analyzing their assessment data as it relates to student performance on the assessments related to and addressed by Strand 1. Remediation and additional instruction that meets students' needs and focuses on employability skills outcomes and competencies that students have not mastered can address the specific deficiencies. Students can then be reassessed to determine if they have progressed in their ability to

apply the employability skills in various workplace situations that they were deficient in previously.

Research Question Three

Is there a relationship between teachers' employability skills grading and assessment practices and their related career field, educational attainment level, gender, number of years spent in education, number of years spent in industry before starting their career in education, related career field, or age?

No significant interaction was found between a particular career field and the grading factors within the post hoc analysis. In general, the career field of a CTE teacher can influence their grading practices of student mastery of employability skills. Certain career fields, themselves, do not distinguish the grading practices of employability skills, but it is likely a combination of them. The influence of the career field on grading practices may come from the educational attainment needed to enter various career fields, the difference in the workplace environment among the various career fields, or personal convictions regarding the education held by the CTE educator.

Teachers use a hodgepodge approach to grading. This is also the case for CTE teachers' grading practices of employability skills, as revealed by the analysis. Different career fields may emphasize different employability skills or have established professional standards that influence grading criteria. Career and technical education teachers make the connection to the need to use grading criteria that is reflective of what happens in the real world. The grading factors of employability skills could be subjectively interpreted by instructors based on the specific demands and expectations of different career fields. This can lead to variations in how grading is conducted across

fields. While educational attainment level showed no significance, there is variety in the educational level needed in certain industries. More coursework may lead to a more flexible style of grading practices. The rigidity of some industries may lead to certain career fields being less flexible in their grading practices of employability skills.

Assumptions

First, there was an assumption that teachers assess and grade students' work every day. Teachers observe their students and note their progress in informal and formal ways throughout a class period (Dixson & Worrel, 2016). The grading and assessment practices of teachers can be measured by using The Secondary Career and Technical Educators Grading and Assessment of Employability Skills Survey. The knowledge obtained about the grading and assessment practices of CTE teachers regarding employability skills was an objective process that could be measured. The measurement and objective report were reliable and useful knowledge. The score for grading and assessment practices can objectively inform the various ways CTE teachers grade and assess the mastery of employability skills of their students, which is valuable. The Secondary Career and Technical Educators Grading and Assessment of Employability Skills Survey consisted of 23 items using a six-point Likert-type scale that identified three dimensions of grading and assessment practices:

- factors used in determining grades
- types of assessments used
- cognitive level of assessments

Another assumption present was that teachers' grading and assessment practices varied. With approaches that intertwine content mastery and other factors related to

effort, conduct, attitude, and improvement, teachers' grading practices in the United States vary from classroom to classroom (Chen & Bonner, 2017; Guskey, 2020; Hope, 2020). The grading practices teachers use are influenced by reliable aspects of their values and beliefs (Chen & Bonner, 2017). Since those beliefs and values influence a teacher's grading practice, there is a lack of consistency between teachers in the same school building or district, even when the grading scale is the same (Chen & Bonner, 2017); therefore, it must be assumed that teachers' grading and assessment practices vary.

Limitations

Validity in research measures refers to how accurately the score interpretations and uses of the measurement instrument measure the research questions (Frisbie, 2005; Sullivan, 2011). Validity assists in determining how strong the argument of the conclusions of the study are that are made from the interpretation of the analysis of the results obtained from the measurement tools. Like in a courtroom, evidence is needed to make the case that generalizations made from the data are valid. Sullivan (2011) states that evidence can come from the following places: content, the process of gathering responses, how the variables relate to each other, and consequences. Validity threats can be internal or external. External validity refers to the degree that the findings of the study can be generalized to other groups, locations, and time periods beyond the scope of the study (Trochim et al., 2016). There might be concerns regarding external validity related to this study due to the use of the convenience sampling method. The sample was drawn from CTE teachers in Ohio who were part of a career and technical planning district that were not employed by a charter or private school. Purposive convenience sampling was used to recruit study participants. While the survey was sent out to various individuals in

different CTPDs, the overwhelming majority of responses (89.9%) indicated study participants were employed by a joint vocational school district. The lack of variability among CTPD representation may have impacted results. Many JVSDs vary in the coursework they offer. Some JVSDs only have CTE courses in the building, not offering academics, while others offer full academic and CTE courses. Others may fall in between and offer a couple of academic courses for their CTE students. Grading practices may be influenced by having other academic teachers available to discuss teaching practices. An increase of respondents who were in a compact or comprehensive district could help to substantiate this idea.

Respondents may have participated in hypothesis guessing to have some of their grading or assessment practices of employability skills viewed in a positive manner. A large percentage (72.8%) of CTE teachers indicated they *extensively* or *completely* use assessments that measure how well students apply the employability skills they learn. Additionally, 72.8% also stated they use authentic assessments *extensively* or *completely* to determine student mastery of employability skills. The comments teachers made regarding students not being able to demonstrate appropriate employability skills in the workplace brings the reported percentage of use into question. Students should be able to demonstrate these skills if teachers are using these types of assessments with a high frequency. Teachers should also believe their students possess these skills from their assessment data.

Future Directions

The study sought to identify the grading and assessment practices CTE teachers utilize to determine student mastery of employability skills. The study determined the

teacher's career field has a significant relationship to their grading factors using a multivariate analysis. Career and technical education teachers also use a hodgepodge approach of grading practices to determine student mastery of employability skills. The hodgepodge approach to grading practices is also found in many studies for how different types of teachers grade students. Further research can be conducted to determine what the specific grading practices look like in CTE teacher classrooms related to employability skills.

Professionalism/employability points are used to a high degree by CTE teachers to measure student mastery of employability skills. There is a dearth of research on professionalism/employability points. There is not a common definition to be found in research of what these are, how they are used, how they are incorporated into a student's grade, how they differ in the items included in this category that make up this grade by the teacher, how the teacher assigns the points, and how they impact teacher instruction to move students towards mastering employability skills. Future research can look to define the heavily used grading factor of employability skills. Teachers may use a rubric to grade employability points. Others assign the same number of points for various factors such as being in uniform, attendance, working hard, and following directions. Future research can assist in identifying how CTE teachers incorporate employability skills into their gradebook and how they assign the individual points. Determining how teachers match the professionalism/employability points to the totality of components in Strand 1 from their career field technical content standards would also be an area for future research.

Authentic assessments are used often by CTE teachers to measure student mastery of employability skills. To assist in determining why employers state their new hires do not possess the appropriate employability skills, future research should focus on what the authentic assessments look like that CTE teachers use for assessing students' mastery of employability skills. Determining the components of these authentic assessments can shine a light on any gaps CTE teachers may have within their authentic assessments that may fail to accurately measure student mastery of employability skills. The understanding of authentic assessments that CTE teachers possess could also be a point of interest. Identifying any training the CTE teachers have in assessment creation can provide insight into their understanding of authentic assessments. Research that investigates assessment frameworks for work-based learning as measured by CTE teachers and best practices of how to assess students in their work-based learning experiences is needed.

The study identified the time CTE teachers reported spending teaching five competencies from Strand 1. The instructional practices CTE teachers use to teach the outcomes and competencies within Strand 1 of their career field technical content standards were not included in the scope of this study. Investigating how CTE teachers teach employability skills will assist in determining why employers have new employees who do not possess the necessary employability skills to be successful on the job. Determining if CTE teachers are using the best instructional practices to teach employability skills is critical to students mastering the items that focus on employability skills. Research should investigate way to get academic teachers in the CTE setting incorporate and assess employability skills. Taking this a step further and expanding this

to all teachers in and outside of career and technical education can also help to determine if non-career and technical education students are receiving instruction addressing employability skills. Analyzing the results of the instruction CTE and non CTE students receive regarding employability skills can further assist in addressing the lack of employability skills students possess as they enter the workforce.

There is a significant relationship between a CTE teacher's career field and their grading practices. Further research can seek to determine why this relationship may exist. With 16 different career fields, the sample was relatively small to analyze why this relationship exists. The lack of participants made it difficult to find a relationship between the CTE teacher's career field and their grading practices. A larger study similar in process might be beneficial to determine if a more nuanced relationship exists.

Human Capital Theory

The main premise of human capital theory is that individuals' learning capabilities are similar to other resources used in the production of goods and services (Nafukho et al., 2004). This theory advocates for the improvement of human resources—such as skills, knowledge, values, and health—to generate advantages for both society and individuals (Brown & Washburn, 2019; Nafukho et al., 2004; Rinker et al., 2020; Tan, 2014). Career and technical education teachers who closely monitor their students' progress in mastering competencies can more effectively help them improve. By addressing gaps in students' understanding and mastery of employability skills, teachers enhance students' overall human capital. Through genuine work-based learning experiences, students enhance both their technical and employability skills, which are essential for workplace success (Mindham & Schultz, 2019). In turn, this boosts their

overall human capital. Grades that indicate what a student knows and can do allow for teachers to identify strengths and weaknesses of their students as students work to master specific course competencies. Effective grading practices are paramount to identifying gaps in student knowledge and performance of employability skills. When teachers identify these deficiencies and fill in the gaps, they improve the skills and knowledge of their students' employability skills, which in turn creates advantages for the students, the school, future employers, and society as a whole.

Conclusion

The study sought to contribute to the gap in literature related to CTE teachers' grading and assessment practices of their students' mastery of employability skills. The results show that CTE teachers use a hodgepodge approach to their grading and assessment practices of student mastery of employability skills. The hodgepodge approach is similar to the grading practices of teachers in general. A CTE teacher's career field is significantly related to their grading practices. These research study results lay the groundwork for further research in the CTE arena, as it directly impacts the workforce of the nation and the local community. Increasing the ability of CTE students to master employability skills makes them better prepared for the world of work by adding to their human capital. In doing so, they are set apart from their peers when they have the necessary tools to be successful in the workplace. Career and technical education institutions need to invest in their teachers to provide quality professional development focusing on sound grading practices using a streamlined, research-backed approach to implement grading practice reform within their school. Increasing the human capital of CTE teachers through educating them on sound grading practices can help CTE teachers

better ensure their students possess the necessary employability skills to be successful in the workplace. Students who possess these skills fill a need in the local economy, are valued by their employers, and will easily adapt to personal and professional challenges they may face as adults. These are the individuals every school should work to produce.

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Appendix A

Secondary Career and Technical Educators Grading and Assessment of Employability Skills Survey

Descriptive questions added by the researcher are found below.

What best describes your gender?

- ❑ Male
- ❑ Female
- ❑ Transgendered Woman
- ❑ Transgendered Man
- ❑ Non-Binary
- ❑ Agender/I do not identify with any gender
- ❑ Gender not listed. My gender is ____

Please indicate your age.

- ❑ 21-25
- ❑ 26-30
- ❑ 31-35
- ❑ 36-40
- ❑ 41-45
- ❑ 46-50
- ❑ 51-55
- ❑ 56+

Please indicate your Career Technical Planning District Type.

- ❑ Compact/Contract
- ❑ Comprehensive
- ❑ JVSD

Please indicate how many years you spent working in your as associated career field before you started teaching.

- ❑ 0-5
- ❑ 6-10
- ❑ 11-15
- ❑ 16-20
- ❑ 21-25
- ❑ 26-30
- ❑ 31+

Please indicate the number of years you have been teaching.

- ❑ 0-5
- ❑ 6-10
- ❑ 11-15
- ❑ 16-20
- ❑ 21-25
- ❑ 26-30
- ❑ 31+

Please indicate your career field.

- ❑ Agricultural and Environmental Systems

- ❑ Arts and Communication
- ❑ Business and Administrative Services
- ❑ Construction Technologies
- ❑ Education and Training
- ❑ Engineering and Science Technologies
- ❑ Finance
- ❑ Government and Public Administration
- ❑ Health Science
- ❑ Hospitality and Tourism
- ❑ Human Services
- ❑ Information Technology
- ❑ Law and Public Safety
- ❑ Manufacturing
- ❑ Marketing
- ❑ Transportation Systems

Please indicate your highest level of educational attainment.

- ❑ High school diploma or equivalent
- ❑ Some college but no degree
- ❑ Associate's Degree
- ❑ Bachelor's Degree
- ❑ Master's Degree
- ❑ Professional Degree (MD, JD, PharmD)
- ❑ Doctorate Degree

Please indicate your ethnicity.

- ❑ Hispanic or Latino
- ❑ Non-Hispanic or Latino
- ❑ American Indian or Alaska Native
- ❑ Asian
- ❑ Black or African American
- ❑ Native Hawaiian or Pacific Islander
- ❑ White
- ❑ Multiracial or Biracial
- ❑ Other (please specify)

Appendix A, continued

Rating Scales & Extended Response

To what extent are the following items used to capture your students' understanding and mastery of the following outcomes from Strand 1; Outcome 1.01, Employability Skills and Outcome 1.02, Leadership and Communications as a part of their course grade?						
	1	2	3	4	5	6
	Not at all	Very little	Some	Quite a bit	Extensively	Completely
Factors used in determining grades						
Performance compared to a set scale of percentage correct						
Specific competencies or outcomes mastered						
Student effort-how much the student tried to learn						
Degree to which the student pays attention and/or participates in class						
Effort						
Improvement						
Behavior						
Work habits						
Disruptive student performance						
The use of professionalism/employability points						
Types of assessments used						
Assessments designed primarily by yourself						
Performance quizzes						
Objective assessments (e.g., multiple choice, matching, short answer)						
Essay-type questions						
Performance assessments (e.g., structured teacher observations or ratings of						

performance such as a speech or paper)						
Projects completed by individual students						
Major exams						
Authentic assessments (e.g., "real world" performance tasks)						
Projects completed by teams of students						
Assessments provided by publishers or supplied to the teacher (e.g., in instructional guides or manuals)						
Oral presentations						
Cognitive level of assessments						
Assessments that measure student understanding						
Assessments that measure how well students apply what they learn						
Assessments that measure student reasoning						
Assessments that measure student recall knowledge						

On average, how long do you typically spend each week teaching the following employability skills in Strand 1?				
	No Time	Less Than 20 Minutes	Up To 40 Minutes	More Than 40 Minutes
Competency 1.1.6: Work Ethic, Accountability, and Responsibility in the Work Place				
Competency 1.1.7: Problem-Solving and Critical-Thinking Skills				
Competency 1.1.8: Professionalism				

Competency 1.2.3: Effective Communication				
Competency 1.2.4: Conflict Resolution				

Extended Response Questions

Do you agree with how students' mastery of employability skills and currently evaluated? Why or why not?

If you had a magic wand to create any assessment for determining student mastery of employability skills, what would the ideal assessment look like?

Data indicates students test well on their Webxams on outcome 1.01 (Employability Skills) and outcome 1.02 (Leadership and Communication). Industry employers state their new employees lack employability skills. In your opinion, why does this discrepancy exist?

Appendix B

IRB Email Approval

do-not-reply@cayuse.com <do-not-reply@cayuse.com>
Mon 11/27/2023 4:00 PM
To:Brandon A Kushinski <bakushinski@student.ysu.edu>;Karen H Larwin <khlarwin@ysu.edu>

YOUNGSTOWN STATE UNIVERSITY

Nov 27, 2023 4:00:16 PM EST

Karen Larwin
Teacher Ed and Leadership St

Re: Exempt - Initial - 2024-49 Grading and Assessment Practices of CTE Teachers of Employability Skills

Dear Dr. Karen Larwin:

Youngstown State University Human Subjects Review Board has rendered the decision below for Grading and Assessment Practices of CTE Teachers of Employability Skills

Decision: Exempt

Selected Category: Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met: The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;

Any changes in your research activity should be promptly reported to the Institutional Review Board and may not be initiated without IRB approval except where necessary to eliminate hazard to human subjects. Any unanticipated problems involving risks to subjects should also be promptly reported to the IRB.

The IRB would like to extend its best wishes to you in the conduct of this study.

Sincerely,
Youngstown State University Human Subjects Review Board

Appendix B, continued

IRB Approval

Date: 5-30-2024

IRB #: 2024-49
Title: Grading and Assessment Practices of CTE Teachers of Employability Skills
Creation Date: 10-5-2023
End Date:
Status: Approved
Principal Investigator: Karen Larwin
Review Board: YSU IRB Board
Sponsor:

Study History

Submission Type Initial	Review Type Exempt	Decision Exempt

Key Study Contacts

Member Brandon Kushinski	Role Co-Principal Investigator	Contact Bakushinski@student.ysu.edu
Member Karen Larwin	Role Principal Investigator	Contact khlarwin@ysu.edu
Member Karen Larwin	Role Primary Contact	Contact khlarwin@ysu.edu

Appendix C

Invitation to Participate

Greetings! I am a doctoral student at Youngstown State University, and I am completing my dissertation research in the field of grading and assessment practices of employability skills. I am inviting you to participate in a short online survey about your grading and assessment practices of employability skills in your career and technical education program. You are receiving this email because you are a career and technical education teacher in the state of Ohio. The survey will take approximately 10 minutes to complete, and your participation would be greatly appreciated.

The purpose of the study is to identify career technical education teachers' grading and assessment practices of employability skills that are present in Strand 1 within their career and technical pathway and examine it in relationship to various demographic variables such as gender, level of education, career field, number of years teaching, and the number of years spent working in the career field. If you agree to take part in this study, you will be asked to complete a set of 8 demographic questions, complete a 30 item questionnaire on grading and assessment practices, and answer 3 open-ended questions.

The 41-item survey will only take approximately 10 minutes to complete.

You may not benefit directly from the research, but by participating in the study, you will provide meaningful information regarding the grading and assessment practices of career and technical education teachers concerning employability skills. This information will provide a foundation for future research regarding grading and assessment practices and employability skills.

We believe this study has no known risks; however, as with any online activity, the risks related to confidentiality are always possible. To the best of our ability, your answers in this study will be kept confidential. We will minimize any risks by using the secure, password-protected website of Google Forms. The online survey will not collect personal information, such as emails or computer IP addresses. Your answers will be sent to and stored on a password-protected link. No one, including the researcher, will know if you participated in the study.

Your participation in the study is completely voluntary and you can withdraw at any time.

The online survey link will be open for three weeks. If you have questions about this project or have a problem with the survey, you may contact the researcher, Brandon Kushinski at xxx-xxx-xxxx or the Doctoral Chair, Dr. Karen Larwin, at xxx-xxx-xxxx. If you have questions about your rights as a participant in a research project, you may contact the Office of Research Services at YSUIRB@ysu.edu or at YSU 330-941-2377.

Thank you for your participation!

Appendix D

Respondent Recruitment Materials

Greetings! I am a doctoral student at Youngstown State University, and I am completing my dissertation research in the field of grading and assessment practices of employability skills. I am seeking participants to take part in my research study. Participants are asked to complete a 41-item online survey that contains a set of 8 demographic questions, 30 items on their grading and assessment practices, and 3 open-ended questions. The responses will be examined in relationship to various demographic variables such as gender, level of education, career field, number of years teaching, and the number of years spent working in the career field.

The criteria to participate in the study is outlined below:

- Participants must currently teach in Ohio.
- Participants much currently teach career and education courses within a career field pathway.
- Participants must currently teach students in grades 9-12.
- Participants must currently hold one of the following educator licenses:
    - a two (2) year provisional career and technical workforce development license
    - a five (5) year advanced career and technical workforce development license
    - a five (5) year professional career technical license
    - a five (5) year professional vocational education license

The 41-item survey will only take approximately 10 minutes to complete.

The online survey link will be opened for three weeks. If you have questions about this project or have a problem with the survey, you may contact the researcher, Brandon Kushinski at xxx-xxx-xxxx or the Doctoral Chair, Dr. Karen Larwin, at xxx-xxx-xxxx. If you have questions about your rights as a participant in a research project, you may contact the Office of Research Services at YSUIRB@ysu.edu or at YSU 330-941-2377.

Thank you for your participation!

Appendix E

Permission to Use and Adapt Survey

Re: Secondary Teachers' Classroom Assessment and Grading Practices survey use permission

James McMillan <jhmcmill@vcu.edu>
Sun 6/4/2023 7:16 PM

To:Brandon A Kushinski <bakushinski@student.ysu.edu>

Thank you Brandon for reaching out and your interest in utilizing the survey that I employed for the 2001 study. You have my permission to use it and make appropriate modifications, with of course the proper citation. Best of wishes for success with your investigation, Jim McMillan

James H. McMillan, Ph.D.
Distinguished Career Professor
Professor Emeritus
Department of Foundations of Education
Pronouns: he/him/his

On Sat, Jun 3, 2023 at 9:41 AM Brandon A Kushinski <bakushinski@student.ysu.edu> wrote:

> Hi Dr. McMillan,
>
> I am Brandon Kushinski and I am working towards obtaining my Doctor of Education in Educational Leadership through Youngstown State University. I am currently enrolled in my methods course. My focus is the grading practices of career and technical education (CTE) teachers in Ohio as they assess students' mastery of employability skills. I am writing this email to ask your permission to use and adapt the survey you created in your 2001 article "Secondary Teachers' Classroom Assessment and Grading Practices". By utilizing and adapting items in your survey, I should be able to gain insight into how CTE teachers in Ohio grade students' employability skills. This is important to me because I work in a CTE school and research has shown that employers continue to state that they struggle to find new employees with the necessary employability and social skills necessary to be successful on the job. Please let me know if you have any questions or would like more information.
>
> Thank you for your time and consideration,
>
> Brandon Kushinski

Appendix F

Raw Data

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	56	56.6	56.6	56.6
	Female	43	43.4	43.4	100.0
	Total	99	100.0	100.0	

CTPD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Compact/Contract	4	4.0	4.0	4.0
	Comprehensive	6	6.1	6.1	10.1
	Joint Vocational School District (JVSD)	89	89.9	89.9	100.0
	Total	99	100.0	100.0	

Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hispanic or Latino	1	1.0	1.0	1.0
	Black or African American	1	1.0	1.0	2.0
	Multiracial or Biracial	1	1.0	1.0	3.0
	White	96	97.0	97.0	100.0
	Total	99	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21-25 years old	1	1.0	1.0	1.0
	26-30 years old	2	2.0	2.0	3.0
	31-35 years old	10	10.1	10.1	13.1
	36-40 years old	6	6.1	6.1	19.2
	41-45 years old	15	15.2	15.2	34.3
	46-50 years old	13	13.1	13.1	47.5
	51-55 years old	23	23.2	23.2	70.7
	56+ years old	29	29.3	29.3	100.0
	Total	99	100.0	100.0	

Time_In_Associated_Career_Field

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	14	14.1	14.1	14.1
	6-10	16	16.2	16.2	30.3
	11-15	16	16.2	16.2	46.5
	16-20	19	19.2	19.2	65.7
	21-25	19	19.2	19.2	84.8
	26-30	9	9.1	9.1	93.9
	31+	6	6.1	6.1	100.0
	Total	99	100.0	100.0	

Years_Spent_Teaching

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	17	17.2	17.2	17.2
	6-10	13	13.1	13.1	30.3
	11-15	19	19.2	19.2	49.5
	16-20	16	16.2	16.2	65.7
	21-25	15	15.2	15.2	80.8
	26-30	17	17.2	17.2	98.0
	31+	2	2.0	2.0	100.0
	Total	99	100.0	100.0	

Educational_Attainment_Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High school diploma or equivalent	2	2.0	2.0	2.0
	Some college but no degree	21	21.2	21.2	23.2
	Associate's Degree	10	10.1	10.1	33.3
	Bachelor's Degree	25	25.3	25.3	58.6
	Master's Degree	39	39.4	39.4	98.0
	Doctorate Degree	2	2.0	2.0	100.0
	Total	99	100.0	100.0	

Career_Field

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agricultural and Environmental Systems	7	7.1	7.1	7.1
	Arts and Communication	5	5.1	5.1	12.1
	Business and Administrative Services	4	4.0	4.0	16.2
	Construction Technologies	9	9.1	9.1	25.3
	Education and Training	5	5.1	5.1	30.3
	Engineering and Science Technologies	5	5.1	5.1	35.4
	Health Science	14	14.1	14.1	49.5
	Hospitality and Tourism	4	4.0	4.0	53.5
	Human Services	7	7.1	7.1	60.6
	Information Technology	10	10.1	10.1	70.7
	Law and Public Safety	4	4.0	4.0	74.7
	Manufacturing	10	10.1	10.1	84.8
	Marketing	6	6.1	6.1	90.9
	Transportation Systems	9	9.1	9.1	100.0
	Total	99	100.0	100.0	

Performance_compared_to_a_set_scale_of_percentage_correct

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	5	5.1	5.1	5.1
	Very Little	10	10.1	10.1	15.2
	Some	26	26.3	26.3	41.4
	Quite A Bit	35	35.4	35.4	76.8
	Extensively	19	19.2	19.2	96.0
	Completely	4	4.0	4.0	100.0
	Total	99	100.0	100.0	

Specific_competencies_or_outcomes_mastered

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	4	4.0	4.0	4.0
	Very Little	4	4.0	4.0	8.1
	Some	13	13.1	13.1	21.2
	Quite A Bit	29	29.3	29.3	50.5
	Extensively	36	36.4	36.4	86.9
	Completely	13	13.1	13.1	100.0
	Total	99	100.0	100.0	

Student_effort_how_much_the_student_tried_to_learn

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	2	2.0	2.0	2.0
	Very Little	7	7.1	7.1	9.1
	Some	25	25.3	25.3	34.3
	Quite A Bit	34	34.3	34.3	68.7
	Extensively	24	24.2	24.2	92.9
	Completely	7	7.1	7.1	100.0
	Total	99	100.0	100.0	

Degree_to_which_student_pays_attention_and_or_participates

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	4	4.0	4.0	4.0
	Very Little	8	8.1	8.1	12.1
	Some	25	25.3	25.3	37.4
	Quite A Bit	28	28.3	28.3	65.7
	Extensively	27	27.3	27.3	92.9
	Completely	7	7.1	7.1	100.0
	Total	99	100.0	100.0	

Effort

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	4	4.0	4.0	4.0
	Very Little	5	5.1	5.1	9.1
	Some	16	16.2	16.2	25.3
	Quite A Bit	28	28.3	28.3	53.5
	Extensively	39	39.4	39.4	92.9
	Completely	7	7.1	7.1	100.0
	Total	99	100.0	100.0	

Improvement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	5	5.1	5.1	5.1
	Very Little	8	8.1	8.1	13.1
	Some	10	10.1	10.1	23.2
	Quite A Bit	32	32.3	32.3	55.6
	Extensively	35	35.4	35.4	90.9
	Completely	9	9.1	9.1	100.0
	Total	99	100.0	100.0	

Behavior

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	4	4.0	4.0	4.0
	Very Little	5	5.1	5.1	9.1
	Some	15	15.2	15.2	24.2
	Quite A Bit	29	29.3	29.3	53.5
	Extensively	34	34.3	34.3	87.9
	Completely	12	12.1	12.1	100.0
	Total	99	100.0	100.0	

Work_habits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	3	3.0	3.0	3.0
	Very Little	2	2.0	2.0	5.1
	Some	6	6.1	6.1	11.1
	Quite A Bit	30	30.3	30.3	41.4
	Extensively	40	40.4	40.4	81.8
	Completely	18	18.2	18.2	100.0
	Total	99	100.0	100.0	

Disruptive_student_performance

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	9	9.1	9.1	9.1
	Very Little	14	14.1	14.1	23.2
	Some	24	24.2	24.2	47.5
	Quite A Bit	24	24.2	24.2	71.7
	Extensively	22	22.2	22.2	93.9
	Completely	6	6.1	6.1	100.0
	Total	99	100.0	100.0	

Professionalism_employability_points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	4	4.0	4.0	4.0
	Very Little	4	4.0	4.0	8.1
	Some	8	8.1	8.1	16.2
	Quite A Bit	22	22.2	22.2	38.4
	Extensively	39	39.4	39.4	77.8
	Completely	22	22.2	22.2	100.0
	Total	99	100.0	100.0	

Assessments_designed_primarily_by_yourself

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	2	2.0	2.0	2.0
	Very Little	3	3.0	3.0	5.1
	Some	25	25.3	25.3	30.3
	Quite A Bit	31	31.3	31.3	61.6
	Extensively	25	25.3	25.3	86.9
	Completely	13	13.1	13.1	100.0
	Total	99	100.0	100.0	

Performance_quizzes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	6	6.1	6.1	6.1
	Very Little	9	9.1	9.1	15.2
	Some	22	22.2	22.2	37.4
	Quite A Bit	25	25.3	25.3	62.6
	Extensively	25	25.3	25.3	87.9
	Completely	12	12.1	12.1	100.0
	Total	99	100.0	100.0	

Objective_assessments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	8	8.1	8.1	8.1
	Very Little	6	6.1	6.1	14.1
	Some	25	25.3	25.3	39.4
	Quite A Bit	25	25.3	25.3	64.6
	Extensively	24	24.2	24.2	88.9
	Completely	11	11.1	11.1	100.0
	Total	99	100.0	100.0	

Essay_type_questions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	16	16.2	16.2	16.2
	Very Little	27	27.3	27.3	43.4
	Some	26	26.3	26.3	69.7
	Quite A Bit	23	23.2	23.2	92.9
	Extensively	6	6.1	6.1	99.0
	Completely	1	1.0	1.0	100.0
	Total	99	100.0	100.0	

Performance_assessments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	6	6.1	6.1	6.1
	Very Little	12	12.1	12.1	18.2
	Some	17	17.2	17.2	35.4
	Quite A Bit	28	28.3	28.3	63.6
	Extensively	26	26.3	26.3	89.9
	Completely	10	10.1	10.1	100.0
	Total	99	100.0	100.0	

Projects_completed_by_individual_students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	2	2.0	2.0	2.0
	Very Little	8	8.1	8.1	10.1
	Some	12	12.1	12.1	22.2
	Quite A Bit	27	27.3	27.3	49.5
	Extensively	32	32.3	32.3	81.8
	Completely	18	18.2	18.2	100.0
	Total	99	100.0	100.0	

Major_exams

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	13	13.1	13.1	13.1
	Very Little	28	28.3	28.3	41.4
	Some	22	22.2	22.2	63.6
	Quite A Bit	18	18.2	18.2	81.8
	Extensively	14	14.1	14.1	96.0
	Completely	4	4.0	4.0	100.0
	Total	99	100.0	100.0	

Authentic_assessments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	1	1.0	1.0	1.0
	Very Little	1	1.0	1.0	2.0
	Some	5	5.1	5.1	7.1
	Quite A Bit	20	20.2	20.2	27.3
	Extensively	45	45.5	45.5	72.7
	Completely	27	27.3	27.3	100.0
	Total	99	100.0	100.0	

Projects_completed_by_teams_of_students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	2	2.0	2.0	2.0
	Very Little	14	14.1	14.1	16.2
	Some	21	21.2	21.2	37.4
	Quite A Bit	30	30.3	30.3	67.7
	Extensively	21	21.2	21.2	88.9
	Completely	11	11.1	11.1	100.0
	Total	99	100.0	100.0	

Assessments_provided_by_publishers_or_supplied_to_the_teacher

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	13	13.1	13.1	13.1
	Very Little	20	20.2	20.2	33.3
	Some	21	21.2	21.2	54.5
	Quite A Bit	19	19.2	19.2	73.7
	Extensively	17	17.2	17.2	90.9
	Completely	9	9.1	9.1	100.0
	Total	99	100.0	100.0	

Oral_presentations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not At All	8	8.1	8.1	8.1
	Very Little	25	25.3	25.3	33.3
	Some	32	32.3	32.3	65.7
	Quite A Bit	19	19.2	19.2	84.8
	Extensively	10	10.1	10.1	94.9
	Completely	5	5.1	5.1	100.0
	Total	99	100.0	100.0	

Assessments_that_measure_student_understanding

	Valid						
	Not At All	Very Little	Some	Quite A Bit	Extensively	Completely	Total
Frequency	3	1	12	30	42	11	99
Percent	3.0	1.0	12.1	30.3	42.4	11.1	100.0
Valid Percent	3.0	1.0	12.1	30.3	42.4	11.1	100.0
Cumulative Percent	3.0	4.0	16.2	46.5	88.9	100.0	

Assessments_that_measure_how_well_students_apply_what_they_learn

	Valid					
	Not At All	Some	Quite A Bit	Extensively	Completely	Total
Frequency	3	10	33	37	16	99
Percent	3.0	10.1	33.3	37.4	16.2	100.0
Valid Percent	3.0	10.1	33.3	37.4	16.2	100.0
Cumulative Percent	3.0	13.1	46.5	83.8	100.0	

Assessments_that_measure_student_reasoning

	Valid						
	Not At All	Very Little	Some	Quite A Bit	Extensively	Completely	Total
Frequency	5	4	20	36	27	7	99
Percent	5.1	4.0	20.2	36.4	27.3	7.1	100.0
Valid Percent	5.1	4.0	20.2	36.4	27.3	7.1	100.0
Cumulative Percent	5.1	9.1	29.3	65.7	92.9	100.0	

Assessments_that_measure_student_recall_knowledge

	Valid						
	Not At All	Very Little	Some	Quite A Bit	Extensively	Completely	Total
Frequency	4	7	18	34	27	9	99
Percent	4.0	7.1	18.2	34.3	27.3	9.1	100.0
Valid Percent	4.0	7.1	18.2	34.3	27.3	9.1	100.0
Cumulative Percent	4.0	11.1	29.3	63.6	90.9	100.0	

Competency_1_1_6_Work_Ethic_Accountability_Responsibility_in_the

	Valid			
	Less Than 20 Minutes	Up To 40 Minutes	More Than 40 Minutes	Total
Frequency	35	34	30	99
Percent	35.4	34.3	30.3	100.0
Valid Percent	35.4	34.3	30.3	100.0
Cumulative Percent	35.4	69.7	100.0	

Competency_1_1_7_Problem_Solving_and_Critical_Thinking_Skills

	Valid				
	No Time	Less Than 20 Minutes	Up To 40 Minutes	More Than 40 Minutes	Total
Frequency	1	19	39	40	99
Percent	1.0	19.2	39.4	40.4	100.0
Valid Percent	1.0	19.2	39.4	40.4	100.0
Cumulative Percent	1.0	20.2	59.6	100.0	

Competency_1_1_8_Professionalism

	Valid			
	Less Than 20 Minutes	Up To 40 Minutes	More Than 40 Minutes	Total
Frequency	28	42	29	99
Percent	28.3	42.4	29.3	100.0
Valid Percent	28.3	42.4	29.3	100.0
Cumulative Percent	28.3	70.7	100.0	

Competency_1_2_3_Effective_Communication

	Valid			
	Less Than 20 Minutes	Up To 40 Minutes	More Than 40 Minutes	Total
Frequency	25	43	31	99
Percent	25.3	43.4	31.3	100.0
Valid Percent	25.3	43.4	31.3	100.0
Cumulative Percent	25.3	68.7	100.0	

Competency_1_2_4_Conflict_Resolution

		Valid			
	No Time	Less Than 20 Minutes	Up To 40 Minutes	More Than 40 Minutes	Total
Frequency	4	53	34	8	99
Percent	4.0	53.5	34.3	8.1	100.0
Valid Percent	4.0	53.5	34.3	8.1	100.0
Cumulative Percent	4.0	57.6	91.9	100.0	

Statistics

	N							
	Valid	Missing	Mean	Std. Deviation	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis
Grading Factors	99	0	40.9192	8.43544	-.970	.243	1.961	.481
Types Of Assessments	99	0	41.1919	8.75363	-.378	.243	1.192	.481
CognitiveLevelOfAssessment	99	0	16.9091	3.93854	-.975	.243	2.093	.481
CompetencyTime	99	0	14.6768	3.00621	-.093	.243	-.855	.481

Correlations

		Grading Factors	Types Of Assessments	Cognitive Level Of Assessments	Average Time Weekly Teaching Competency Score	Age	Gender	Time In Associated Career Field	Years Spent Teaching	Career Field	Educational Attainment Level
Grading Factors	Pearson Correlation	1	.506**	.507**	.321**	-.079	-.030	.206*	-.131	.115	-.082
	Sig. (2-tailed)		<.001	<.001	.001	.435	.765	.041	.195	.258	.422
	N	99	99	99	99	99	99	99	99	99	99
Types Of Assessments	Pearson Correlation	.506**	1	.754**	.126	-.065	-.029	-.037	.022	.248*	.006
	Sig. (2-tailed)	<.001		<.001	.215	.520	.778	.714	.832	.013	.955
	N	99	99	99	99	99	99	99	99	99	99
Cognitive Level Of Assessments	Pearson Correlation	.507**	.754**	1	.211*	-.061	-.032	.016	.040	.228*	.031
	Sig. (2-tailed)	<.001	<.001		.036	.547	.756	.875	.695	.023	.758
	N	99	99	99	99	99	99	99	99	99	99
Average Time Weekly	Pearson Correlation	.321**	.126	.211*	1	.104	.102	.030	.145	.122	.038

Teaching Competency Score	Sig. (2-tailed)	.001	.215	.036		.307	.317	.766	.152	.230	.706
	N	99	99	99	99	99	99	99	99	99	99
Age	Pearson Correlation	-.079	-.065	-.061	.104	1	-.189	.495**	.591**	.089	-.110
	Sig. (2-tailed)	.435	.520	.547	.307		.061	<.001	<.001	.384	.279
	N	99	99	99	99	99	99	99	99	99	99
Gender	Pearson Correlation	-.030	-.029	-.032	.102	-.189	1	-.231*	.067	-.139	.355**
	Sig. (2-tailed)	.765	.778	.756	.317	.061		.022	.509	.169	<.001
	N	99	99	99	99	99	99	99	99	99	99
Time In Associated Career Field	Pearson Correlation	.206*	-.037	.016	.030	.495**	-.231*	1	-.011	.100	-.300**
	Sig. (2-tailed)	.041	.714	.875	.766	<.001	.022		.910	.323	.003
	N	99	99	99	99	99	99	99	99	99	99
Years Spent Teaching	Pearson Correlation	-.131	.022	.040	.145	.591**	.067	-.011	1	.050	.073
	Sig. (2-tailed)	.195	.832	.695	.152	<.001	.509	.910		.627	.472
	N	99	99	99	99	99	99	99	99	99	99

Career Field	Pearson Correlation	.115	.248*	.228*	.122	.089	-.139	.100	.050	1	-.205*
	Sig. (2-tailed)	.258	.013	.023	.230	.384	.169	.323	.627		.042
	N	99	99	99	99	99	99	99	99	99	99
Educational Attainment Level	Pearson Correlation	-.082	.006	.031	.038	-.110	.355**	-.300**	.073	-.205*	1
	Sig. (2-tailed)	.422	.955	.758	.706	.279	<.001	.003	.472	.042	
	N	99	99	99	99	99	99	99	99	99	99

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Grading Factors	Types Of Assessments	Cognitive Level Of Assessments	Average Time Weekly Teaching Competency Score	Gender	Time In Associated Career Field
Grading Factors	Pearson Correlation	1	.506**	.507**	.321**	-.030	.206*
	Sig. (2-tailed)		<.001	<.001	.001	.765	.041
	N	99	99	99	99	99	99
Types Of Assessments	Pearson Correlation	.506**	1	.754**	.126	-.029	-.037

	Sig. (2-tailed)	<.001		<.001	.215	.778	.714
	N	99	99	99	99	99	99
Cognitive Level Of Assessments	Pearson Correlation	.507**	.754**	1	.211*	-.032	.016
	Sig. (2-tailed)	<.001	<.001		.036	.756	.875
	N	99	99	99	99	99	99
Average Time Weekly Teaching Competency Score	Pearson Correlation	.321**	.126	.211*	1	.102	.030
	Sig. (2-tailed)	.001	.215	.036		.317	.766
	N	99	99	99	99	99	99
Gender	Pearson Correlation	-.030	-.029	-.032	.102	1	-.231*
	Sig. (2-tailed)	.765	.778	.756	.317		.022
	N	99	99	99	99	99	99
Time In Associated Career Field	Pearson Correlation	.206*	-.037	.016	.030	-.231*	1
	Sig. (2-tailed)	.041	.714	.875	.766	.022	
	N	99	99	99	99	99	99

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Box's Test of Equality of Covariance Matrices[a]

Box's M	30.164
F	1.464
df1	10
df2	347.636
Sig.	.151

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Time_In_Associated_Career_Field + Career_Field + Time_In_Associated_Career_Field * Career_Field

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.987	687.716[b]	4.000	36.000	<.001
	Wilks' Lambda	.013	687.716[b]	4.000	36.000	<.001
	Hotelling's Trace	76.413	687.716[b]	4.000	36.000	<.001
	Roy's Largest Root	76.413	687.716[b]	4.000	36.000	<.001
Time_In_Associated_Career_Field	Pillai's Trace	.685	1.343	24.000	156.000	.145
	Wilks' Lambda	.459	1.322	24.000	126.799	.163
	Hotelling's Trace	.896	1.287	24.000	138.000	.184
	Roy's Largest Root	.475	3.087[c]	6.000	39.000	.014
Career_Field	Pillai's Trace	1.391	1.599	52.000	156.000	.015
	Wilks' Lambda	.154	1.690	52.000	141.538	.008
	Hotelling's Trace	2.671	1.772	52.000	138.000	.005
	Roy's Largest Root	1.500	4.500[c]	13.000	39.000	<.001
Time_In_Associated_Career_Field * Career_Field	Pillai's Trace	1.903	.885	160.000	156.000	.778
	Wilks' Lambda	.068	.880	160.000	146.210	.785
	Hotelling's Trace	4.027	.868	160.000	138.000	.806
	Roy's Largest Root	1.538	1.500[c]	40.000	39.000	.104

a. Design: Intercept + Time_In_Associated_Career_Field + Career_Field + Time_In_Associated_Career_Field * Career_Field

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Post Hoc Tests

Time_In_Associated_Career_Field

Multiple Comparisons

Scheffe

Dependent Variable	(I) Time In Associated Career Field	(J) Time In Associated Career Field	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Grading Factors	0-5	6-10	-4.3661	3.00617	.905	-15.6356	6.9035
		11-15	-6.6786	3.00617	.559	-17.9481	4.5910
		16-20	-9.0338	2.89329	.166	-19.8802	1.8126
		21-25	-8.2970	2.89329	.251	-19.1434	2.5494
		26-30	-3.9286	3.50958	.972	-17.0853	9.2282
		31+	-6.2619	4.00822	.870	-21.2880	8.7642
	6-10	0-5	4.3661	3.00617	.905	-6.9035	15.6356
		11-15	-2.3125	2.90423	.995	-13.1999	8.5749
		16-20	-4.6678	2.78723	.828	-15.1166	5.7810
		21-25	-3.9309	2.78723	.916	-14.3797	6.5179
		26-30	.4375	3.42267	1.000	-12.3934	13.2684
		31+	-1.8958	3.93235	1.000	-16.6375	12.8458
	11-15	0-5	6.6786	3.00617	.559	-4.5910	17.9481
		6-10	2.3125	2.90423	.995	-8.5749	13.1999
		16-20	-2.3553	2.78723	.994	-12.8041	8.0935
		21-25	-1.6184	2.78723	.999	-12.0672	8.8304

		26-30	2.7500	3.42267	.995	-10.0809	15.5809
		31+	.4167	3.93235	1.000	-14.3250	15.1583
	16-20	0-5	9.0338	2.89329	.166	-1.8126	19.8802
		6-10	4.6678	2.78723	.828	-5.7810	15.1166
		11-15	2.3553	2.78723	.994	-8.0935	12.8041
		21-25	.7368	2.66511	1.000	-9.2541	10.7278
		26-30	5.1053	3.32397	.879	-7.3557	17.5662
		31+	2.7719	3.84675	.997	-11.6488	17.1927
	21-25	0-5	8.2970	2.89329	.251	-2.5494	19.1434
		6-10	3.9309	2.78723	.916	-6.5179	14.3797
		11-15	1.6184	2.78723	.999	-8.8304	12.0672
		16-20	-.7368	2.66511	1.000	-10.7278	9.2541
		26-30	4.3684	3.32397	.939	-8.0925	16.8294
		31+	2.0351	3.84675	1.000	-12.3856	16.4558
	26-30	0-5	3.9286	3.50958	.972	-9.2282	17.0853
		6-10	-.4375	3.42267	1.000	-13.2684	12.3934
		11-15	-2.7500	3.42267	.995	-15.5809	10.0809
		16-20	-5.1053	3.32397	.879	-17.5662	7.3557
		21-25	-4.3684	3.32397	.939	-16.8294	8.0925
		31+	-2.3333	4.32937	.999	-18.5633	13.8967
	31+	0-5	6.2619	4.00822	.870	-8.7642	21.2880
		6-10	1.8958	3.93235	1.000	-12.8458	16.6375
		11-15	-.4167	3.93235	1.000	-15.1583	14.3250
		16-20	-2.7719	3.84675	.997	-17.1927	11.6488

		21-25	-2.0351	3.84675	1.000	-16.4558	12.3856
		26-30	2.3333	4.32937	.999	-13.8967	18.5633
Types Of Assessments	0-5	6-10	-6.8929	3.62330	.726	-20.4759	6.6902
		11-15	-3.6429	3.62330	.984	-17.2259	9.9402
		16-20	-4.9850	3.48726	.911	-18.0580	8.0881
		21-25	-2.1429	3.48726	.999	-15.2159	10.9302
		26-30	-1.4762	4.23006	1.000	-17.3339	14.3815
		31+	-2.1429	4.83107	1.000	-20.2536	15.9679
	6-10	0-5	6.8929	3.62330	.726	-6.6902	20.4759
		11-15	3.2500	3.50044	.989	-9.8725	16.3725
		16-20	1.9079	3.35943	.999	-10.6860	14.5017
		21-25	4.7500	3.35943	.915	-7.8439	17.3439
		26-30	5.4167	4.12531	.939	-10.0483	20.8817
		31+	4.7500	4.73962	.984	-13.0179	22.5179
	11-15	0-5	3.6429	3.62330	.984	-9.9402	17.2259
		6-10	-3.2500	3.50044	.989	-16.3725	9.8725
		16-20	-1.3421	3.35943	1.000	-13.9360	11.2517
		21-25	1.5000	3.35943	1.000	-11.0939	14.0939
		26-30	2.1667	4.12531	1.000	-13.2983	17.6317
		31+	1.5000	4.73962	1.000	-16.2679	19.2679
	16-20	0-5	4.9850	3.48726	.911	-8.0881	18.0580
		6-10	-1.9079	3.35943	.999	-14.5017	10.6860

		11-15	1.3421	3.35943	1.000	-11.2517	13.9360
		21-25	2.8421	3.21223	.992	-9.1999	14.8841
		26-30	3.5088	4.00635	.992	-11.5103	18.5278
		31+	2.8421	4.63645	.999	-14.5391	20.2233
	21-25	0-5	2.1429	3.48726	.999	-10.9302	15.2159
		6-10	-4.7500	3.35943	.915	-17.3439	7.8439
		11-15	-1.5000	3.35943	1.000	-14.0939	11.0939
		16-20	-2.8421	3.21223	.992	-14.8841	9.1999
		26-30	.6667	4.00635	1.000	-14.3524	15.6857
		31+	.0000	4.63645	1.000	-17.3812	17.3812
	26-30	0-5	1.4762	4.23006	1.000	-14.3815	17.3339
		6-10	-5.4167	4.12531	.939	-20.8817	10.0483
		11-15	-2.1667	4.12531	1.000	-17.6317	13.2983
		16-20	-3.5088	4.00635	.992	-18.5278	11.5103
		21-25	-.6667	4.00635	1.000	-15.6857	14.3524
		31+	-.6667	5.21815	1.000	-20.2285	18.8952
	31+	0-5	2.1429	4.83107	1.000	-15.9679	20.2536
		6-10	-4.7500	4.73962	.984	-22.5179	13.0179
		11-15	-1.5000	4.73962	1.000	-19.2679	16.2679
		16-20	-2.8421	4.63645	.999	-20.2233	14.5391

		21-25	.0000	4.63645	1.000	-17.3812	17.3812
		26-30	.6667	5.21815	1.000	-18.8952	20.2285
Cognitive Level Of Assessments	0-5	6-10	-3.2054	1.64112	.701	-9.3576	2.9469
		11-15	-1.3304	1.64112	.995	-7.4826	4.8219
		16-20	-1.6955	1.57950	.977	-7.6167	4.2258
		21-25	-1.5902	1.57950	.984	-7.5115	4.3310
		26-30	-.6429	1.91594	1.000	-7.8254	6.5397
		31+	-2.1429	2.18816	.986	-10.3459	6.0601
	6-10	0-5	3.2054	1.64112	.701	-2.9469	9.3576
		11-15	1.8750	1.58547	.963	-4.0686	7.8186
		16-20	1.5099	1.52160	.985	-4.1943	7.2141
		21-25	1.6151	1.52160	.979	-4.0891	7.3193
		26-30	2.5625	1.86850	.926	-4.4421	9.5671
		31+	1.0625	2.14674	1.000	-6.9852	9.1102
	11-15	0-5	1.3304	1.64112	.995	-4.8219	7.4826
		6-10	-1.8750	1.58547	.963	-7.8186	4.0686
		16-20	-.3651	1.52160	1.000	-6.0693	5.3391
		21-25	-.2599	1.52160	1.000	-5.9641	5.4443
		26-30	.6875	1.86850	1.000	-6.3171	7.6921
		31+	-.8125	2.14674	1.000	-8.8602	7.2352
	16-20	0-5	1.6955	1.57950	.977	-4.2258	7.6167
		6-10	-1.5099	1.52160	.985	-7.2141	4.1943
		11-15	.3651	1.52160	1.000	-5.3391	6.0693
		21-25	.1053	1.45493	1.000	-5.3490	5.5595
		26-30	1.0526	1.81462	.999	-5.7500	7.8553
		31+	-.4474	2.10001	1.000	-8.3199	7.4252
	21-25	0-5	1.5902	1.57950	.984	-4.3310	7.5115
		6-10	-1.6151	1.52160	.979	-7.3193	4.0891
		11-15	.2599	1.52160	1.000	-5.4443	5.9641
		16-20	-.1053	1.45493	1.000	-5.5595	5.3490
		26-30	.9474	1.81462	1.000	-5.8553	7.7500
		31+	-.5526	2.10001	1.000	-8.4252	7.3199
	26-30	0-5	.6429	1.91594	1.000	-6.5397	7.8254
		6-10	-2.5625	1.86850	.926	-9.5671	4.4421
		11-15	-.6875	1.86850	1.000	-7.6921	6.3171

		16-20	-1.0526	1.81462	.999	-7.8553	5.7500
		21-25	-.9474	1.81462	1.000	-7.7500	5.8553
		31+	-1.5000	2.36349	.999	-10.3603	7.3603
	31+	0-5	2.1429	2.18816	.986	-6.0601	10.3459
		6-10	-1.0625	2.14674	1.000	-9.1102	6.9852
		11-15	.8125	2.14674	1.000	-7.2352	8.8602
		16-20	.4474	2.10001	1.000	-7.4252	8.3199
		21-25	.5526	2.10001	1.000	-7.3199	8.4252
		26-30	1.5000	2.36349	.999	-7.3603	10.3603
Average Time Weekly Teaching Competency Score	0-5	6-10	.4196	1.07145	1.000	-3.5970	4.4363
		11-15	1.2946	1.07145	.959	-2.7220	5.3113
		16-20	-.8271	1.03122	.995	-4.6929	3.0388
		21-25	.1203	1.03122	1.000	-3.7456	3.9862
		26-30	.1905	1.25088	1.000	-4.4988	4.8798
		31+	.3571	1.42860	1.000	-4.9984	5.7127
	6-10	0-5	-.4196	1.07145	1.000	-4.4363	3.5970
		11-15	.8750	1.03512	.993	-3.0055	4.7555
		16-20	-1.2467	.99342	.951	-4.9709	2.4774
		21-25	-.2993	.99342	1.000	-4.0235	3.4248
		26-30	-.2292	1.21990	1.000	-4.8023	4.3440
		31+	-.0625	1.40156	1.000	-5.3167	5.1917
	11-15	0-5	-1.2946	1.07145	.959	-5.3113	2.7220
		6-10	-.8750	1.03512	.993	-4.7555	3.0055
		16-20	-2.1217	.99342	.605	-5.8459	1.6024
		21-25	-1.1743	.99342	.963	-4.8985	2.5498
		26-30	-1.1042	1.21990	.991	-5.6773	3.4690
		31+	-.9375	1.40156	.998	-6.1917	4.3167
	16-20	0-5	.8271	1.03122	.995	-3.0388	4.6929
		6-10	1.2467	.99342	.951	-2.4774	4.9709
		11-15	2.1217	.99342	.605	-1.6024	5.8459
		21-25	.9474	.94989	.984	-2.6136	4.5083
		26-30	1.0175	1.18472	.993	-3.4238	5.4588
		31+	1.1842	1.37105	.993	-3.9556	6.3240
	21-25	0-5	-.1203	1.03122	1.000	-3.9862	3.7456
		6-10	.2993	.99342	1.000	-3.4248	4.0235
		11-15	1.1743	.99342	.963	-2.5498	4.8985
		16-20	-.9474	.94989	.984	-4.5083	2.6136

		26-30	.0702	1.18472	1.000	-4.3711	4.5115
		31+	.2368	1.37105	1.000	-4.9030	5.3766
	26-30	0-5	-.1905	1.25088	1.000	-4.8798	4.4988
		6-10	.2292	1.21990	1.000	-4.3440	4.8023
		11-15	1.1042	1.21990	.991	-3.4690	5.6773
		16-20	-1.0175	1.18472	.993	-5.4588	3.4238
		21-25	-.0702	1.18472	1.000	-4.5115	4.3711
		31+	.1667	1.54307	1.000	-5.6180	5.9513
	31+	0-5	-.3571	1.42860	1.000	-5.7127	4.9984
		6-10	.0625	1.40156	1.000	-5.1917	5.3167
		11-15	.9375	1.40156	.998	-4.3167	6.1917
		16-20	-1.1842	1.37105	.993	-6.3240	3.9556
		21-25	-.2368	1.37105	1.000	-5.3766	4.9030
		26-30	-.1667	1.54307	1.000	-5.9513	5.6180

Based on observed means.

The error term is Mean Square(Error) = 8.572.

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
Grading Factors	Based on Mean	4.485	24	39	<.001
	Based on Median	1.487	24	39	.132
	Based on Median and with adjusted df	1.487	24	9.683	.265
	Based on trimmed mean	4.132	24	39	<.001
Types Of Assessments	Based on Mean	3.341	24	39	<.001
	Based on Median	1.530	24	39	.116
	Based on Median and with adjusted df	1.530	24	10.763	.237
	Based on trimmed mean	3.087	24	39	<.001
Cognitive Level Of Assessments	Based on Mean	8.564	24	39	<.001
	Based on Median	2.508	24	39	.005
	Based on Median and with adjusted df	2.508	24	5.799	.132
	Based on trimmed mean	7.923	24	39	<.001
	Based on Mean	6.119	24	39	<.001
	Based on Median	2.675	24	39	.003

Average Time Weekly Teaching Competency Score	Based on Median and with adjusted df	2.675	24	13.882	.030
	Based on trimmed mean	5.909	24	39	<.001

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Time_In_Associated_Career_Field + Career_Field + Time_In_Associated_Career_Field * Career_Field

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Grading Factors	4341.770[a]	59	73.589	1.091	.392
	Types Of Assessments	3686.387[b]	59	62.481	.637	.942
	Cognitive Level Of Assessments	735.898[c]	59	12.473	.620	.952
	Average Time Weekly Teaching Competency Score	551.357[d]	59	9.345	1.090	.392
Intercept	Grading Factors	117306.238	1	117306.238	1738.476	<.001
	Types Of Assessments	115492.617	1	115492.617	1178.198	<.001
	Cognitive Level Of Assessments	19976.368	1	19976.368	993.363	<.001
	Average Time Weekly Teaching Competency Score	15175.447	1	15175.447	1770.393	<.001
Time In Associated Career Field	Grading Factors	581.959	6	96.993	1.437	.225
	Types Of Assessments	339.813	6	56.636	.578	.746
	Cognitive Level Of Assessments	72.418	6	12.070	.600	.728
	Average Time Weekly Teaching Competency Score	54.771	6	9.129	1.065	.400
Career Field	Grading Factors	1898.350	13	146.027	2.164	.032

	Types Of Assessments	976.997	13	75.154	.767	.688
	Cognitive Level Of Assessments	226.502	13	17.423	.866	.592
	Average Time Weekly Teaching Competency Score	173.529	13	13.348	1.557	.141
Time In Associated Career Field * Career Field	Grading Factors	1246.534	40	31.163	.462	.992
	Types Of Assessments	2269.244	40	56.731	.579	.955
	Cognitive Level Of Assessments	428.243	40	10.706	.532	.975
	Average Time Weekly Teaching Competency Score	351.134	40	8.778	1.024	.471
Error	Grading Factors	2631.583	39	67.476		
	Types Of Assessments	3822.967	39	98.025		
	Cognitive Level Of Assessments	784.283	39	20.110		
	Average Time Weekly Teaching Competency Score	334.300	39	8.572		
Total	Grading Factors	172737.000	99			
	Types Of Assessments	175490.000	99			
	Cognitive Level Of Assessments	29826.000	99			
	Average Time Weekly Teaching Competency Score	22211.000	99			
Corrected Total	Grading Factors	6973.354	98			
	Types Of Assessments	7509.354	98			
	Cognitive Level Of Assessments	1520.182	98			
	Average Time Weekly Teaching Competency Score	885.657	98			

a. R Squared = .623 (Adjusted R Squared = .052)
b. R Squared = .491 (Adjusted R Squared = -.279)
c. R Squared = .484 (Adjusted R Squared = -.296)
d. R Squared = .623 (Adjusted R Squared = .052)

Box's Test of Equality of Covariance Matrices[a]

Box's M	181.891
F	1.281
df1	100
df2	2879.595
Sig.	.033

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.
a. Design: Intercept + Career_Field

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.981	1074.562[b]	4.000	82.000	<.001
	Wilks' Lambda	.019	1074.562[b]	4.000	82.000	<.001
	Hotelling's Trace	52.418	1074.562[b]	4.000	82.000	<.001
	Roy's Largest Root	52.418	1074.562[b]	4.000	82.000	<.001
Career_ Field	Pillai's Trace	.793	1.618	52.000	340.000	.007
	Wilks' Lambda	.389	1.697	52.000	319.696	.003
	Hotelling's Trace	1.149	1.779	52.000	322.000	.002
	Roy's Largest Root	.699	4.571[c]	13.000	85.000	<.001

a. Design: Intercept + Career_Field

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Levene's Test of Equality of Error Variances[a]

		Levene Statistic	df1	df2	Sig.
Grading Factors	Based on Mean	1.498	13	85	.135
	Based on Median	1.066	13	85	.399
	Based on Median and with adjusted df	1.066	13	47.656	.409
	Based on trimmed mean	1.361	13	85	.196
Types Of Assessments	Based on Mean	1.419	13	85	.168
	Based on Median	1.133	13	85	.344
	Based on Median and with adjusted df	1.133	13	62.283	.350
	Based on trimmed mean	1.388	13	85	.182
Cognitive Level Of Assessments	Based on Mean	1.625	13	85	.094
	Based on Median	1.266	13	85	.250
	Based on Median and with adjusted df	1.266	13	40.056	.273
	Based on trimmed mean	1.536	13	85	.121

Average Time Weekly Teaching Competency Score	Based on Mean	.652	13	85	.803
	Based on Median	.456	13	85	.943
	Based on Median and with adjusted df	.456	13	65.805	.941
	Based on trimmed mean	.656	13	85	.799

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Career_Field

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Grading Factors	2500.943[a]	13	192.380	3.656	<.001
	Types Of Assessments	1061.638[b]	13	81.664	1.077	.390
	Cognitive Level of Assessments	243.199[c]	13	18.708	1.245	.263
	Average Time Weekly Teaching Competency Score	140.691[d]	13	10.822	1.235	.270
Intercept	Grading Factors	141989.720	1	141989.720	2698.573	<.001
	Types Of Assessments	144358.815	1	144358.815	1903.077	<.001
	Cognitive Level of Assessments	24280.677	1	24280.677	1616.199	<.001
	Average Time Weekly Teaching Competency Score	18657.619	1	18657.619	2128.821	<.001
Career Field	Grading Factors	2500.943	13	192.380	3.656	<.001
	Types Of Assessments	1061.638	13	81.664	1.077	.390
	Cognitive Level of Assessments	243.199	13	18.708	1.245	.263
	Average Time Weekly Teaching Competency Score	140.691	13	10.822	1.235	.270
Error	Grading Factors	4472.410	85	52.617		
	Types Of Assessments	6447.716	85	75.855		

	Cognitive Level of Assessments	1276.983	85	15.023		
	Average Time Weekly Teaching Competency Score	744.965	85	8.764		
Total	Grading Factors	172737.000	99			
	Types Of Assessments	175490.000	99			
	Cognitive Level of Assessments	29826.000	99			
	Average Time Weekly Teaching Competency Score	22211.000	99			
Corrected Total	Grading Factors	6973.354	98			
	Types Of Assessments	7509.354	98			
	Cognitive Level of Assessments	1520.182	98			
	Average Time Weekly Teaching Competency Score	885.657	98			

a. R Squared = .359 (Adjusted R Squared = .261)
b. R Squared = .141 (Adjusted R Squared = .010)
c. R Squared = .160 (Adjusted R Squared = .032)
d. R Squared = .159 (Adjusted R Squared = .030)

Post Hoc Tests

Career Field

Multiple Comparisons

Scheffe

Dependent Variable	(I) Career Field	(J) Career Field	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Grading Factors	Agricultural and Environmental Systems	Arts and Communication	10.2000	4.24735	.949	-10.5564	30.9564
		Business and Administrative Services	11.2500	4.54652	.935	-10.9684	33.4684
		Construction Technologies	1.2222	3.65554	1.000	-16.6421	19.0865
		Education and Training	-6.8000	4.24735	.999	-27.5564	13.9564
		Engineering and Science Technologies	-2.4000	4.24735	1.000	-23.1564	18.3564
		Health Science	.2143	3.35782	1.000	-16.1951	16.6237
		Hospitality and Tourism	-6.2500	4.54652	1.000	-28.4684	15.9684
		Human Services	-.4286	3.87728	1.000	-19.3765	18.5194
		Information Technology	7.5000	3.57468	.984	-9.9691	24.9691

	Law and Public Safety	2.7500	4.54652	1.000	-19.4684	24.9684
	Manufacturing	1.6000	3.57468	1.000	-15.8691	19.0691
	Marketing	4.8333	4.03560	1.000	-14.8883	24.5550
	Transportation Systems	-6.6667	3.65554	.996	-24.5309	11.1976
Arts and Communication	Agricultural and Environmental Systems	-10.2000	4.24735	.949	-30.9564	10.5564
	Business and Administrative Services	1.0500	4.86595	1.000	-22.7295	24.8295
	Construction Technologies	-8.9778	4.04594	.973	-28.7499	10.7944
	Education and Training	-17.0000	4.58766	.408	-39.4195	5.4195
	Engineering and Science Technologies	-12.6000	4.58766	.864	-35.0195	9.8195
	Health Science	-9.9857	3.77911	.895	-28.4539	8.4824
	Hospitality and Tourism	-16.4500	4.86595	.577	-40.2295	7.3295
	Human Services	-10.6286	4.24735	.929	-31.3850	10.1278

		Information Technology	-2.7000	3.97303	1.000	-22.1159	16.7159
		Law and Public Safety	-7.4500	4.86595	.999	-31.2295	16.3295
		Manufacturing	-8.6000	3.97303	.978	-28.0159	10.8159
		Marketing	-5.3667	4.39235	1.000	-26.8317	16.0984
		Transportation Systems	-16.8667	4.04594	.208	-36.6388	2.9055
	Business and Administrative Services	Agricultural and Environmental Systems	-11.2500	4.54652	.935	-33.4684	10.9684
		Arts and Communication	-1.0500	4.86595	1.000	-24.8295	22.7295
		Construction Technologies	-10.0278	4.35895	.964	-31.3296	11.2740
		Education and Training	-18.0500	4.86595	.406	-41.8295	5.7295
		Engineering and Science Technologies	-13.6500	4.86595	.843	-37.4295	10.1295
		Health Science	-11.0357	4.11248	.883	-31.1330	9.0616
		Hospitality and Tourism	-17.5000	5.12916	.561	-42.5658	7.5658

		Human Services	-11.6786	4.54652	.914	-33.8970	10.5398
		Information Technology	-3.7500	4.29136	1.000	-24.7215	17.2215
		Law and Public Safety	-8.5000	5.12916	.998	-33.5658	16.5658
		Manufacturing	-9.6500	4.29136	.970	-30.6215	11.3215
		Marketing	-6.4167	4.68226	1.000	-29.2985	16.4651
		Transportation Systems	-17.9167	4.35895	.229	-39.2185	3.3851
	Construction Technologies	Agricultural and Environmental Systems	-1.2222	3.65554	1.000	-19.0865	16.6421
		Arts and Communication	8.9778	4.04594	.973	-10.7944	28.7499
		Business and Administrative Services	10.0278	4.35895	.964	-11.2740	31.3296
		Education and Training	-8.0222	4.04594	.990	-27.7944	11.7499
		Engineering and Science Technologies	-3.6222	4.04594	1.000	-23.3944	16.1499
		Health Science	-1.0079	3.09913	1.000	-16.1531	14.1372

		Hospitality and Tourism	-7.4722	4.35895	.998	-28.7740	13.8296
		Human Services	-1.6508	3.65554	1.000	-19.5151	16.2135
		Information Technology	6.2778	3.33286	.994	-10.0096	22.5652
		Law and Public Safety	1.5278	4.35895	1.000	-19.7740	22.8296
		Manufacturing	.3778	3.33286	1.000	-15.9096	16.6652
		Marketing	3.6111	3.82305	1.000	-15.0718	22.2940
		Transportation Systems	-7.8889	3.41944	.963	-24.5994	8.8216
	Education and Training	Agricultural and Environmental Systems	6.8000	4.24735	.999	-13.9564	27.5564
		Arts and Communication	17.0000	4.58766	.408	-5.4195	39.4195
		Business and Administrative Services	18.0500	4.86595	.406	-5.7295	41.8295
		Construction Technologies	8.0222	4.04594	.990	-11.7499	27.7944
		Engineering and Science Technologies	4.4000	4.58766	1.000	-18.0195	26.8195

		Health Science	7.0143	3.77911	.995	-11.4539	25.4824
		Hospitality and Tourism	.5500	4.86595	1.000	-23.2295	24.3295
		Human Services	6.3714	4.24735	.999	-14.3850	27.1278
		Information Technology	14.3000	3.97303	.462	-5.1159	33.7159
		Law and Public Safety	9.5500	4.86595	.991	-14.2295	33.3295
		Manufacturing	8.4000	3.97303	.982	-11.0159	27.8159
		Marketing	11.6333	4.39235	.893	-9.8317	33.0984
		Transportation Systems	.1333	4.04594	1.000	-19.6388	19.9055
	Engineering and Science Technologies	Agricultural and Environmental Systems	2.4000	4.24735	1.000	-18.3564	23.1564
		Arts and Communication	12.6000	4.58766	.864	-9.8195	35.0195
		Business and Administrative Services	13.6500	4.86595	.843	-10.1295	37.4295
		Construction Technologies	3.6222	4.04594	1.000	-16.1499	23.3944
		Education and Training	-4.4000	4.58766	1.000	-26.8195	18.0195

		Health Science	2.6143	3.77911	1.000	-15.8539	21.0824
		Hospitality and Tourism	-3.8500	4.86595	1.000	-27.6295	19.9295
		Human Services	1.9714	4.24735	1.000	-18.7850	22.7278
		Information Technology	9.9000	3.97303	.932	-9.5159	29.3159
		Law and Public Safety	5.1500	4.86595	1.000	-18.6295	28.9295
		Manufacturing	4.0000	3.97303	1.000	-15.4159	23.4159
		Marketing	7.2333	4.39235	.998	-14.2317	28.6984
		Transportation Systems	-4.2667	4.04594	1.000	-24.0388	15.5055
	Health Science	Agricultural and Environmental Systems	-.2143	3.35782	1.000	-16.6237	16.1951
		Arts and Communication	9.9857	3.77911	.895	-8.4824	28.4539
		Business and Administrative Services	11.0357	4.11248	.883	-9.0616	31.1330
		Construction Technologies	1.0079	3.09913	1.000	-14.1372	16.1531
		Education and Training	-7.0143	3.77911	.995	-25.4824	11.4539

		Engineering and Science Technologies	-2.6143	3.77911	1.000	-21.0824	15.8539
		Hospitality and Tourism	-6.4643	4.11248	.999	-26.5616	13.6330
		Human Services	-.6429	3.35782	1.000	-17.0522	15.7665
		Information Technology	7.2857	3.00333	.944	-7.3913	21.9627
		Law and Public Safety	2.5357	4.11248	1.000	-17.5616	22.6330
		Manufacturing	1.3857	3.00333	1.000	-13.2913	16.0627
		Marketing	4.6190	3.53946	1.000	-12.6780	21.9161
		Transportation Systems	-6.8810	3.09913	.973	-22.0261	8.2642
	Hospitality and Tourism	Agricultural and Environmental Systems	6.2500	4.54652	1.000	-15.9684	28.4684
		Arts and Communication	16.4500	4.86595	.577	-7.3295	40.2295
		Business and Administrative Services	17.5000	5.12916	.561	-7.5658	42.5658
		Construction Technologies	7.4722	4.35895	.998	-13.8296	28.7740
		Education and Training	-.5500	4.86595	1.000	-24.3295	23.2295

		Engineering and Science Technologies	3.8500	4.86595	1.000	-19.9295	27.6295
		Health Science	6.4643	4.11248	.999	-13.6330	26.5616
		Human Services	5.8214	4.54652	1.000	-16.3970	28.0398
		Information Technology	13.7500	4.29136	.669	-7.2215	34.7215
		Law and Public Safety	9.0000	5.12916	.997	-16.0658	34.0658
		Manufacturing	7.8500	4.29136	.996	-13.1215	28.8215
		Marketing	11.0833	4.68226	.954	-11.7985	33.9651
		Transportation Systems	-.4167	4.35895	1.000	-21.7185	20.8851
	Human Services	Agricultural and Environmental Systems	.4286	3.87728	1.000	-18.5194	19.3765
		Arts and Communication	10.6286	4.24735	.929	-10.1278	31.3850
		Business and Administrative Services	11.6786	4.54652	.914	-10.5398	33.8970
		Construction Technologies	1.6508	3.65554	1.000	-16.2135	19.5151
		Education and Training	-6.3714	4.24735	.999	-27.1278	14.3850

		Engineering and Science Technologies	-1.9714	4.24735	1.000	-22.7278	18.7850
		Health Science	.6429	3.35782	1.000	-15.7665	17.0522
		Hospitality and Tourism	-5.8214	4.54652	1.000	-28.0398	16.3970
		Information Technology	7.9286	3.57468	.973	-9.5406	25.3977
		Law and Public Safety	3.1786	4.54652	1.000	-19.0398	25.3970
		Manufacturing	2.0286	3.57468	1.000	-15.4406	19.4977
		Marketing	5.2619	4.03560	1.000	-14.4597	24.9835
		Transportation Systems	-6.2381	3.65554	.998	-24.1024	11.6262
	Information Technology	Agricultural and Environmental Systems	-7.5000	3.57468	.984	-24.9691	9.9691
		Arts and Communication	2.7000	3.97303	1.000	-16.7159	22.1159
		Business and Administrative Services	3.7500	4.29136	1.000	-17.2215	24.7215
		Construction Technologies	-6.2778	3.33286	.994	-22.5652	10.0096
		Education and Training	-14.3000	3.97303	.462	-33.7159	5.1159

		Engineering and Science Technologies	-9.9000	3.97303	.932	-29.3159	9.5159
		Health Science	-7.2857	3.00333	.944	-21.9627	7.3913
		Hospitality and Tourism	-13.7500	4.29136	.669	-34.7215	7.2215
		Human Services	-7.9286	3.57468	.973	-25.3977	9.5406
		Law and Public Safety	-4.7500	4.29136	1.000	-25.7215	16.2215
		Manufacturing	-5.9000	3.24397	.996	-21.7530	9.9530
		Marketing	-2.6667	3.74581	1.000	-20.9721	15.6388
		Transportation Systems	-14.1667	3.33286	.181	-30.4541	2.1207
	Law and Public Safety	Agricultural and Environmental Systems	-2.7500	4.54652	1.000	-24.9684	19.4684
		Arts and Communication	7.4500	4.86595	.999	-16.3295	31.2295
		Business and Administrative Services	8.5000	5.12916	.998	-16.5658	33.5658
		Construction Technologies	-1.5278	4.35895	1.000	-22.8296	19.7740

		Education and Training	-9.5500	4.86595	.991	-33.3295	14.2295
		Engineering and Science Technologies	-5.1500	4.86595	1.000	-28.9295	18.6295
		Health Science	-2.5357	4.11248	1.000	-22.6330	17.5616
		Hospitality and Tourism	-9.0000	5.12916	.997	-34.0658	16.0658
		Human Services	-3.1786	4.54652	1.000	-25.3970	19.0398
		Information Technology	4.7500	4.29136	1.000	-16.2215	25.7215
		Manufacturing	-1.1500	4.29136	1.000	-22.1215	19.8215
		Marketing	2.0833	4.68226	1.000	-20.7985	24.9651
		Transportation Systems	-9.4167	4.35895	.979	-30.7185	11.8851
	Manufacturing	Agricultural and Environmental Systems	-1.6000	3.57468	1.000	-19.0691	15.8691
		Arts and Communication	8.6000	3.97303	.978	-10.8159	28.0159
		Business and Administrative Services	9.6500	4.29136	.970	-11.3215	30.6215

		Construction Technologies	-.3778	3.33286	1.000	-16.6652	15.9096
		Education and Training	-8.4000	3.97303	.982	-27.8159	11.0159
		Engineering and Science Technologies	-4.0000	3.97303	1.000	-23.4159	15.4159
		Health Science	-1.3857	3.00333	1.000	-16.0627	13.2913
		Hospitality and Tourism	-7.8500	4.29136	.996	-28.8215	13.1215
		Human Services	-2.0286	3.57468	1.000	-19.4977	15.4406
		Information Technology	5.9000	3.24397	.996	-9.9530	21.7530
		Law and Public Safety	1.1500	4.29136	1.000	-19.8215	22.1215
		Marketing	3.2333	3.74581	1.000	-15.0721	21.5388
		Transportation Systems	-8.2667	3.33286	.934	-24.5541	8.0207
	Marketing	Agricultural and Environmental Systems	-4.8333	4.03560	1.000	-24.5550	14.8883
		Arts and Communication	5.3667	4.39235	1.000	-16.0984	26.8317
		Business and Administrative Services	6.4167	4.68226	1.000	-16.4651	29.2985

		Construction Technologies	-3.6111	3.82305	1.000	-22.2940	15.0718
		Education and Training	-11.6333	4.39235	.893	-33.0984	9.8317
		Engineering and Science Technologies	-7.2333	4.39235	.998	-28.6984	14.2317
		Health Science	-4.6190	3.53946	1.000	-21.9161	12.6780
		Hospitality and Tourism	-11.0833	4.68226	.954	-33.9651	11.7985
		Human Services	-5.2619	4.03560	1.000	-24.9835	14.4597
		Information Technology	2.6667	3.74581	1.000	-15.6388	20.9721
		Law and Public Safety	-2.0833	4.68226	1.000	-24.9651	20.7985
		Manufacturing	-3.2333	3.74581	1.000	-21.5388	15.0721
		Transportation Systems	-11.5000	3.82305	.762	-30.1829	7.1829
	Transportation Systems	Agricultural and Environmental Systems	6.6667	3.65554	.996	-11.1976	24.5309
		Arts and Communication	16.8667	4.04594	.208	-2.9055	36.6388

		Business and Administrative Services	17.9167	4.35895	.229	-3.3851	39.2185
		Construction Technologies	7.8889	3.41944	.963	-8.8216	24.5994
		Education and Training	-.1333	4.04594	1.000	-19.9055	19.6388
		Engineering and Science Technologies	4.2667	4.04594	1.000	-15.5055	24.0388
		Health Science	6.8810	3.09913	.973	-8.2642	22.0261
		Hospitality and Tourism	.4167	4.35895	1.000	-20.8851	21.7185
		Human Services	6.2381	3.65554	.998	-11.6262	24.1024
		Information Technology	14.1667	3.33286	.181	-2.1207	30.4541
		Law and Public Safety	9.4167	4.35895	.979	-11.8851	30.7185
		Manufacturing	8.2667	3.33286	.934	-8.0207	24.5541
		Marketing	11.5000	3.82305	.762	-7.1829	30.1829
Types Of Assessments	Agricultural and Environmental Systems	Arts and Communication	10.6000	5.09976	.985	-14.3221	35.5221
		Business and Administrative Services	3.0000	5.45897	1.000	-23.6775	29.6775
		Construction Technologies	4.4444	4.38918	1.000	-17.0051	25.8940

	Education and Training	1.4000	5.09976	1.000	-23.5221	26.3221
	Engineering and Science Technologies	-.4000	5.09976	1.000	-25.3221	24.5221
	Health Science	1.8571	4.03172	1.000	-17.8455	21.5598
	Hospitality and Tourism	-1.7500	5.45897	1.000	-28.4275	24.9275
	Human Services	-1.1429	4.65543	1.000	-23.8935	21.6078
	Information Technology	1.3000	4.29209	1.000	-19.6751	22.2751
	Law and Public Safety	1.2500	5.45897	1.000	-25.4275	27.9275
	Manufacturing	.0000	4.29209	1.000	-20.9751	20.9751
	Marketing	-5.1667	4.84552	1.000	-28.8463	18.5130
	Transportation Systems	-3.1111	4.38918	1.000	-24.5606	18.3384
Arts and Communication	Agricultural and Environmental Systems	-10.6000	5.09976	.985	-35.5221	14.3221
	Business and Administrative Services	-7.6000	5.84251	1.000	-36.1519	20.9519

	Construction Technologies	-6.1556	4.85793	1.000	-29.8958	17.5847
	Education and Training	-9.2000	5.50837	.998	-36.1189	17.7189
	Engineering and Science Technologies	-11.0000	5.50837	.990	-37.9189	15.9189
	Health Science	-8.7429	4.53755	.993	-30.9175	13.4317
	Hospitality and Tourism	-12.3500	5.84251	.982	-40.9019	16.2019
	Human Services	-11.7429	5.09976	.963	-36.6650	13.1792
	Information Technology	-9.3000	4.77039	.992	-32.6125	14.0125
	Law and Public Safety	-9.3500	5.84251	.999	-37.9019	19.2019
	Manufacturing	-10.6000	4.77039	.973	-33.9125	12.7125
	Marketing	-15.7667	5.27387	.770	-41.5396	10.0063
	Transportation Systems	-13.7111	4.85793	.837	-37.4514	10.0292
Business and Administrative Services	Agricultural and Environmental Systems	-3.0000	5.45897	1.000	-29.6775	23.6775

	Arts and Communication	7.6000	5.84251	1.000	-20.9519	36.1519
	Construction Technologies	1.4444	5.23376	1.000	-24.1325	27.0214
	Education and Training	-1.6000	5.84251	1.000	-30.1519	26.9519
	Engineering and Science Technologies	-3.4000	5.84251	1.000	-31.9519	25.1519
	Health Science	-1.1429	4.93783	1.000	-25.2736	22.9879
	Hospitality and Tourism	-4.7500	6.15855	1.000	-34.8463	25.3463
	Human Services	-4.1429	5.45897	1.000	-30.8204	22.5347
	Information Technology	-1.7000	5.15261	1.000	-26.8804	23.4804
	Law and Public Safety	-1.7500	6.15855	1.000	-31.8463	28.3463
	Manufacturing	-3.0000	5.15261	1.000	-28.1804	22.1804
	Marketing	-8.1667	5.62196	1.000	-35.6407	19.3074
	Transportation Systems	-6.1111	5.23376	1.000	-31.6880	19.4658

Construction Technologies	Agricultural and Environmental Systems	-4.4444	4.38918	1.000	-25.8940	17.0051
	Arts and Communication	6.1556	4.85793	1.000	-17.5847	29.8958
	Business and Administrative Services	-1.4444	5.23376	1.000	-27.0214	24.1325
	Education and Training	-3.0444	4.85793	1.000	-26.7847	20.6958
	Engineering and Science Technologies	-4.8444	4.85793	1.000	-28.5847	18.8958
	Health Science	-2.5873	3.72111	1.000	-20.7720	15.5974
	Hospitality and Tourism	-6.1944	5.23376	1.000	-31.7714	19.3825
	Human Services	-5.5873	4.38918	1.000	-27.0368	15.8622
	Information Technology	-3.1444	4.00174	1.000	-22.7006	16.4117
	Law and Public Safety	-3.1944	5.23376	1.000	-28.7714	22.3825
	Manufacturing	-4.4444	4.00174	1.000	-24.0006	15.1117
	Marketing	-9.6111	4.59031	.984	-32.0436	12.8213

		Transportation Systems	-7.5556	4.10570	.995	-27.6198	12.5086
	Education and Training	Agricultural and Environmental Systems	-1.4000	5.09976	1.000	-26.3221	23.5221
		Arts and Communication	9.2000	5.50837	.998	-17.7189	36.1189
		Business and Administrative Services	1.6000	5.84251	1.000	-26.9519	30.1519
		Construction Technologies	3.0444	4.85793	1.000	-20.6958	26.7847
		Engineering and Science Technologies	-1.8000	5.50837	1.000	-28.7189	25.1189
		Health Science	.4571	4.53755	1.000	-21.7175	22.6317
		Hospitality and Tourism	-3.1500	5.84251	1.000	-31.7019	25.4019
		Human Services	-2.5429	5.09976	1.000	-27.4650	22.3792
		Information Technology	-.1000	4.77039	1.000	-23.4125	23.2125
		Law and Public Safety	-.1500	5.84251	1.000	-28.7019	28.4019
		Manufacturing	-1.4000	4.77039	1.000	-24.7125	21.9125

		Marketing	-6.5667	5.27387	1.000	-32.3396	19.2063
		Transportation Systems	-4.5111	4.85793	1.000	-28.2514	19.2292
	Engineering and Science Technologies	Agricultural and Environmental Systems	.4000	5.09976	1.000	-24.5221	25.3221
		Arts and Communication	11.0000	5.50837	.990	-15.9189	37.9189
		Business and Administrative Services	3.4000	5.84251	1.000	-25.1519	31.9519
		Construction Technologies	4.8444	4.85793	1.000	-18.8958	28.5847
		Education and Training	1.8000	5.50837	1.000	-25.1189	28.7189
		Health Science	2.2571	4.53755	1.000	-19.9175	24.4317
		Hospitality and Tourism	-1.3500	5.84251	1.000	-29.9019	27.2019
		Human Services	-.7429	5.09976	1.000	-25.6650	24.1792
		Information Technology	1.7000	4.77039	1.000	-21.6125	25.0125
		Law and Public Safety	1.6500	5.84251	1.000	-26.9019	30.2019

		Manufacturing	.4000	4.77039	1.000	-22.9125	23.7125
		Marketing	-4.7667	5.27387	1.000	-30.5396	21.0063
		Transportation Systems	-2.7111	4.85793	1.000	-26.4514	21.0292
	Health Science	Agricultural and Environmental Systems	-1.8571	4.03172	1.000	-21.5598	17.8455
		Arts and Communication	8.7429	4.53755	.993	-13.4317	30.9175
		Business and Administrative Services	1.1429	4.93783	1.000	-22.9879	25.2736
		Construction Technologies	2.5873	3.72111	1.000	-15.5974	20.7720
		Education and Training	-.4571	4.53755	1.000	-22.6317	21.7175
		Engineering and Science Technologies	-2.2571	4.53755	1.000	-24.4317	19.9175
		Hospitality and Tourism	-3.6071	4.93783	1.000	-27.7379	20.5236
		Human Services	-3.0000	4.03172	1.000	-22.7026	16.7026
		Information Technology	-.5571	3.60608	1.000	-18.1797	17.0654

	Law and Public Safety	-.6071	4.93783	1.000	-24.7379	23.5236
	Manufacturing	-1.8571	3.60608	1.000	-19.4797	15.7654
	Marketing	-7.0238	4.24980	.998	-27.7922	13.7446
	Transportation Systems	-4.9683	3.72111	1.000	-23.1530	13.2165
Hospitality and Tourism	Agricultural and Environmental Systems	1.7500	5.45897	1.000	-24.9275	28.4275
	Arts and Communication	12.3500	5.84251	.982	-16.2019	40.9019
	Business and Administrative Services	4.7500	6.15855	1.000	-25.3463	34.8463
	Construction Technologies	6.1944	5.23376	1.000	-19.3825	31.7714
	Education and Training	3.1500	5.84251	1.000	-25.4019	31.7019
	Engineering and Science Technologies	1.3500	5.84251	1.000	-27.2019	29.9019
	Health Science	3.6071	4.93783	1.000	-20.5236	27.7379
	Human Services	.6071	5.45897	1.000	-26.0704	27.2847

		Information Technology	3.0500	5.15261	1.000	-22.1304	28.2304
		Law and Public Safety	3.0000	6.15855	1.000	-27.0963	33.0963
		Manufacturing	1.7500	5.15261	1.000	-23.4304	26.9304
		Marketing	-3.4167	5.62196	1.000	-30.8907	24.0574
		Transportation Systems	-1.3611	5.23376	1.000	-26.9380	24.2158
	Human Services	Agricultural and Environmental Systems	1.1429	4.65543	1.000	-21.6078	23.8935
		Arts and Communication	11.7429	5.09976	.963	-13.1792	36.6650
		Business and Administrative Services	4.1429	5.45897	1.000	-22.5347	30.8204
		Construction Technologies	5.5873	4.38918	1.000	-15.8622	27.0368
		Education and Training	2.5429	5.09976	1.000	-22.3792	27.4650
		Engineering and Science Technologies	.7429	5.09976	1.000	-24.1792	25.6650
		Health Science	3.0000	4.03172	1.000	-16.7026	22.7026

	Hospitality and Tourism	-.6071	5.45897	1.000	-27.2847	26.0704
	Information Technology	2.4429	4.29209	1.000	-18.5322	23.4179
	Law and Public Safety	2.3929	5.45897	1.000	-24.2847	29.0704
	Manufacturing	1.1429	4.29209	1.000	-19.8322	22.1179
	Marketing	-4.0238	4.84552	1.000	-27.7034	19.6558
	Transportation Systems	-1.9683	4.38918	1.000	-23.4178	19.4813
Information Technology	Agricultural and Environmental Systems	-1.3000	4.29209	1.000	-22.2751	19.6751
	Arts and Communication	9.3000	4.77039	.992	-14.0125	32.6125
	Business and Administrative Services	1.7000	5.15261	1.000	-23.4804	26.8804
	Construction Technologies	3.1444	4.00174	1.000	-16.4117	22.7006
	Education and Training	.1000	4.77039	1.000	-23.2125	23.4125
	Engineering and Science Technologies	-1.7000	4.77039	1.000	-25.0125	21.6125

	Health Science	.5571	3.60608	1.000	-17.0654	18.1797
	Hospitality and Tourism	-3.0500	5.15261	1.000	-28.2304	22.1304
	Human Services	-2.4429	4.29209	1.000	-23.4179	18.5322
	Law and Public Safety	-.0500	5.15261	1.000	-25.2304	25.1304
	Manufacturing	-1.3000	3.89501	1.000	-20.3346	17.7346
	Marketing	-6.4667	4.49757	1.000	-28.4459	15.5126
	Transportation Systems	-4.4111	4.00174	1.000	-23.9673	15.1450
Law and Public Safety	Agricultural and Environmental Systems	-1.2500	5.45897	1.000	-27.9275	25.4275
	Arts and Communication	9.3500	5.84251	.999	-19.2019	37.9019
	Business and Administrative Services	1.7500	6.15855	1.000	-28.3463	31.8463
	Construction Technologies	3.1944	5.23376	1.000	-22.3825	28.7714
	Education and Training	.1500	5.84251	1.000	-28.4019	28.7019

	Engineering and Science Technologies	-1.6500	5.84251	1.000	-30.2019	26.9019
	Health Science	.6071	4.93783	1.000	-23.5236	24.7379
	Hospitality and Tourism	-3.0000	6.15855	1.000	-33.0963	27.0963
	Human Services	-2.3929	5.45897	1.000	-29.0704	24.2847
	Information Technology	.0500	5.15261	1.000	-25.1304	25.2304
	Manufacturing	-1.2500	5.15261	1.000	-26.4304	23.9304
	Marketing	-6.4167	5.62196	1.000	-33.8907	21.0574
	Transportation Systems	-4.3611	5.23376	1.000	-29.9380	21.2158
Manufacturing	Agricultural and Environmental Systems	.0000	4.29209	1.000	-20.9751	20.9751
	Arts and Communication	10.6000	4.77039	.973	-12.7125	33.9125
	Business and Administrative Services	3.0000	5.15261	1.000	-22.1804	28.1804
	Construction Technologies	4.4444	4.00174	1.000	-15.1117	24.0006

	Education and Training	1.4000	4.77039	1.000	-21.9125	24.7125
	Engineering and Science Technologies	-.4000	4.77039	1.000	-23.7125	22.9125
	Health Science	1.8571	3.60608	1.000	-15.7654	19.4797
	Hospitality and Tourism	-1.7500	5.15261	1.000	-26.9304	23.4304
	Human Services	-1.1429	4.29209	1.000	-22.1179	19.8322
	Information Technology	1.3000	3.89501	1.000	-17.7346	20.3346
	Law and Public Safety	1.2500	5.15261	1.000	-23.9304	26.4304
	Marketing	-5.1667	4.49757	1.000	-27.1459	16.8126
	Transportation Systems	-3.1111	4.00174	1.000	-22.6673	16.4450
Marketing	Agricultural and Environmental Systems	5.1667	4.84552	1.000	-18.5130	28.8463
	Arts and Communication	15.7667	5.27387	.770	-10.0063	41.5396
	Business and Administrative Services	8.1667	5.62196	1.000	-19.3074	35.6407

	Construction Technologies	9.6111	4.59031	.984	-12.8213	32.0436
	Education and Training	6.5667	5.27387	1.000	-19.2063	32.3396
	Engineering and Science Technologies	4.7667	5.27387	1.000	-21.0063	30.5396
	Health Science	7.0238	4.24980	.998	-13.7446	27.7922
	Hospitality and Tourism	3.4167	5.62196	1.000	-24.0574	30.8907
	Human Services	4.0238	4.84552	1.000	-19.6558	27.7034
	Information Technology	6.4667	4.49757	1.000	-15.5126	28.4459
	Law and Public Safety	6.4167	5.62196	1.000	-21.0574	33.8907
	Manufacturing	5.1667	4.49757	1.000	-16.8126	27.1459
	Transportation Systems	2.0556	4.59031	1.000	-20.3769	24.4880
Transportation Systems	Agricultural and Environmental Systems	3.1111	4.38918	1.000	-18.3384	24.5606
	Arts and Communication	13.7111	4.85793	.837	-10.0292	37.4514

		Business and Administrative Services	6.1111	5.23376	1.000	-19.4658	31.6880
		Construction Technologies	7.5556	4.10570	.995	-12.5086	27.6198
		Education and Training	4.5111	4.85793	1.000	-19.2292	28.2514
		Engineering and Science Technologies	2.7111	4.85793	1.000	-21.0292	26.4514
		Health Science	4.9683	3.72111	1.000	-13.2165	23.1530
		Hospitality and Tourism	1.3611	5.23376	1.000	-24.2158	26.9380
		Human Services	1.9683	4.38918	1.000	-19.4813	23.4178
		Information Technology	4.4111	4.00174	1.000	-15.1450	23.9673
		Law and Public Safety	4.3611	5.23376	1.000	-21.2158	29.9380
		Manufacturing	3.1111	4.00174	1.000	-16.4450	22.6673
		Marketing	-2.0556	4.59031	1.000	-24.4880	20.3769
Cognitive Level Of Assessments	Agricultural and Environmental Systems	Arts and Communication	3.3714	2.26955	.999	-7.7197	14.4625
		Business and Administrative Services	-.1786	2.42941	1.000	-12.0509	11.6937

	Construction Technologies	1.4603	1.95332	1.000	-8.0854	11.0060
	Education and Training	-1.4286	2.26955	1.000	-12.5197	9.6625
	Engineering and Science Technologies	.5714	2.26955	1.000	-10.5197	11.6625
	Health Science	-.2143	1.79424	1.000	-8.9826	8.5540
	Hospitality and Tourism	1.0714	2.42941	1.000	-10.8009	12.9437
	Human Services	-3.4286	2.07181	.998	-13.5533	6.6962
	Information Technology	.0714	1.91011	1.000	-9.2631	9.4060
	Law and Public Safety	-1.6786	2.42941	1.000	-13.5509	10.1937
	Manufacturing	.0714	1.91011	1.000	-9.2631	9.4060
	Marketing	-1.2619	2.15640	1.000	-11.8001	9.2762
	Transportation Systems	-2.5397	1.95332	1.000	-12.0854	7.0060
Arts and Communication	Agricultural and Environmental Systems	-3.3714	2.26955	.999	-14.4625	7.7197
	Business and Administrative Services	-3.5500	2.60010	1.000	-16.2564	9.1564
	Construction Technologies	-1.9111	2.16193	1.000	-12.4763	8.6540

	Education and Training	-4.8000	2.45139	.991	-16.7797	7.1797
	Engineering and Science Technologies	-2.8000	2.45139	1.000	-14.7797	9.1797
	Health Science	-3.5857	2.01935	.997	-13.4541	6.2827
	Hospitality and Tourism	-2.3000	2.60010	1.000	-15.0064	10.4064
	Human Services	-6.8000	2.26955	.767	-17.8911	4.2911
	Information Technology	-3.3000	2.12297	.999	-13.6748	7.0748
	Law and Public Safety	-5.0500	2.60010	.992	-17.7564	7.6564
	Manufacturing	-3.3000	2.12297	.999	-13.6748	7.0748
	Marketing	-4.6333	2.34703	.991	-16.1031	6.8364
	Transportation Systems	-5.9111	2.16193	.868	-16.4763	4.6540
Business and Administrative Services	Agricultural and Environmental Systems	.1786	2.42941	1.000	-11.6937	12.0509
	Arts and Communication	3.5500	2.60010	1.000	-9.1564	16.2564
	Construction Technologies	1.6389	2.32918	1.000	-9.7436	13.0214

	Education and Training	-1.2500	2.60010	1.000	-13.9564	11.4564
	Engineering and Science Technologies	.7500	2.60010	1.000	-11.9564	13.4564
	Health Science	-.0357	2.19748	1.000	-10.7746	10.7032
	Hospitality and Tourism	1.2500	2.74074	1.000	-12.1438	14.6438
	Human Services	-3.2500	2.42941	1.000	-15.1223	8.6223
	Information Technology	.2500	2.29307	1.000	-10.9560	11.4560
	Law and Public Safety	-1.5000	2.74074	1.000	-14.8938	11.8938
	Manufacturing	.2500	2.29307	1.000	-10.9560	11.4560
	Marketing	-1.0833	2.50194	1.000	-13.3101	11.1434
	Transportation Systems	-2.3611	2.32918	1.000	-13.7436	9.0214
Construction Technologies	Agricultural and Environmental Systems	-1.4603	1.95332	1.000	-11.0060	8.0854
	Arts and Communication	1.9111	2.16193	1.000	-8.6540	12.4763

	Business and Administrative Services	-1.6389	2.32918	1.000	-13.0214	9.7436
	Education and Training	-2.8889	2.16193	1.000	-13.4540	7.6763
	Engineering and Science Technologies	-.8889	2.16193	1.000	-11.4540	9.6763
	Health Science	-1.6746	1.65601	1.000	-9.7674	6.4181
	Hospitality and Tourism	-.3889	2.32918	1.000	-11.7714	10.9936
	Human Services	-4.8889	1.95332	.929	-14.4346	4.6568
	Information Technology	-1.3889	1.78090	1.000	-10.0920	7.3142
	Law and Public Safety	-3.1389	2.32918	1.000	-14.5214	8.2436
	Manufacturing	-1.3889	1.78090	1.000	-10.0920	7.3142
	Marketing	-2.7222	2.04283	1.000	-12.7053	7.2609
	Transportation Systems	-4.0000	1.82716	.976	-12.9292	4.9292
Education and Training	Agricultural and Environmental Systems	1.4286	2.26955	1.000	-9.6625	12.5197
	Arts and Communication	4.8000	2.45139	.991	-7.1797	16.7797

	Business and Administrative Services	1.2500	2.60010	1.000	-11.4564	13.9564
	Construction Technologies	2.8889	2.16193	1.000	-7.6763	13.4540
	Engineering and Science Technologies	2.0000	2.45139	1.000	-9.9797	13.9797
	Health Science	1.2143	2.01935	1.000	-8.6541	11.0827
	Hospitality and Tourism	2.5000	2.60010	1.000	-10.2064	15.2064
	Human Services	-2.0000	2.26955	1.000	-13.0911	9.0911
	Information Technology	1.5000	2.12297	1.000	-8.8748	11.8748
	Law and Public Safety	-.2500	2.60010	1.000	-12.9564	12.4564
	Manufacturing	1.5000	2.12297	1.000	-8.8748	11.8748
	Marketing	.1667	2.34703	1.000	-11.3031	11.6364
	Transportation Systems	-1.1111	2.16193	1.000	-11.6763	9.4540
Engineering and Science Technologies	Agricultural and Environmental Systems	-.5714	2.26955	1.000	-11.6625	10.5197
	Arts and Communication	2.8000	2.45139	1.000	-9.1797	14.7797
	Business and Administrative Services	-.7500	2.60010	1.000	-13.4564	11.9564

		Construction Technologies	.8889	2.16193	1.000	-9.6763	11.4540
		Education and Training	-2.0000	2.45139	1.000	-13.9797	9.9797
		Health Science	-.7857	2.01935	1.000	-10.6541	9.0827
		Hospitality and Tourism	.5000	2.60010	1.000	-12.2064	13.2064
		Human Services	-4.0000	2.26955	.997	-15.0911	7.0911
		Information Technology	-.5000	2.12297	1.000	-10.8748	9.8748
		Law and Public Safety	-2.2500	2.60010	1.000	-14.9564	10.4564
		Manufacturing	-.5000	2.12297	1.000	-10.8748	9.8748
		Marketing	-1.8333	2.34703	1.000	-13.3031	9.6364
		Transportation Systems	-3.1111	2.16193	1.000	-13.6763	7.4540
	Health Science	Agricultural and Environmental Systems	.2143	1.79424	1.000	-8.5540	8.9826
		Arts and Communication	3.5857	2.01935	.997	-6.2827	13.4541
		Business and Administrative Services	.0357	2.19748	1.000	-10.7032	10.7746

	Construction Technologies	1.6746	1.65601	1.000	-6.4181	9.7674
	Education and Training	-1.2143	2.01935	1.000	-11.0827	8.6541
	Engineering and Science Technologies	.7857	2.01935	1.000	-9.0827	10.6541
	Hospitality and Tourism	1.2857	2.19748	1.000	-9.4532	12.0246
	Human Services	-3.2143	1.79424	.996	-11.9826	5.5540
	Information Technology	.2857	1.60481	1.000	-7.5569	8.1283
	Law and Public Safety	-1.4643	2.19748	1.000	-12.2032	9.2746
	Manufacturing	.2857	1.60481	1.000	-7.5569	8.1283
	Marketing	-1.0476	1.89129	1.000	-10.2902	8.1950
	Transportation Systems	-2.3254	1.65601	1.000	-10.4181	5.7674
Hospitality and Tourism	Agricultural and Environmental Systems	-1.0714	2.42941	1.000	-12.9437	10.8009
	Arts and Communication	2.3000	2.60010	1.000	-10.4064	15.0064
	Business and Administrative Services	-1.2500	2.74074	1.000	-14.6438	12.1438
	Construction Technologies	.3889	2.32918	1.000	-10.9936	11.7714

		Education and Training	-2.5000	2.60010	1.000	-15.2064	10.2064
		Engineering and Science Technologies	-.5000	2.60010	1.000	-13.2064	12.2064
		Health Science	-1.2857	2.19748	1.000	-12.0246	9.4532
		Human Services	-4.5000	2.42941	.995	-16.3723	7.3723
		Information Technology	-1.0000	2.29307	1.000	-12.2060	10.2060
		Law and Public Safety	-2.7500	2.74074	1.000	-16.1438	10.6438
		Manufacturing	-1.0000	2.29307	1.000	-12.2060	10.2060
		Marketing	-2.3333	2.50194	1.000	-14.5601	9.8934
		Transportation Systems	-3.6111	2.32918	.999	-14.9936	7.7714
	Human Services	Agricultural and Environmental Systems	3.4286	2.07181	.998	-6.6962	13.5533
		Arts and Communication	6.8000	2.26955	.767	-4.2911	17.8911
		Business and Administrative Services	3.2500	2.42941	1.000	-8.6223	15.1223
		Construction Technologies	4.8889	1.95332	.929	-4.6568	14.4346

	Education and Training	2.0000	2.26955	1.000	-9.0911	13.0911
	Engineering and Science Technologies	4.0000	2.26955	.997	-7.0911	15.0911
	Health Science	3.2143	1.79424	.996	-5.5540	11.9826
	Hospitality and Tourism	4.5000	2.42941	.995	-7.3723	16.3723
	Information Technology	3.5000	1.91011	.995	-5.8345	12.8345
	Law and Public Safety	1.7500	2.42941	1.000	-10.1223	13.6223
	Manufacturing	3.5000	1.91011	.995	-5.8345	12.8345
	Marketing	2.1667	2.15640	1.000	-8.3715	12.7048
	Transportation Systems	.8889	1.95332	1.000	-8.6568	10.4346
Information Technology	Agricultural and Environmental Systems	-.0714	1.91011	1.000	-9.4060	9.2631
	Arts and Communication	3.3000	2.12297	.999	-7.0748	13.6748
	Business and Administrative Services	-.2500	2.29307	1.000	-11.4560	10.9560
	Construction Technologies	1.3889	1.78090	1.000	-7.3142	10.0920
	Education and Training	-1.5000	2.12297	1.000	-11.8748	8.8748
	Engineering and Science Technologies	.5000	2.12297	1.000	-9.8748	10.8748

	Health Science	-.2857	1.60481	1.000	-8.1283	7.5569
	Hospitality and Tourism	1.0000	2.29307	1.000	-10.2060	12.2060
	Human Services	-3.5000	1.91011	.995	-12.8345	5.8345
	Law and Public Safety	-1.7500	2.29307	1.000	-12.9560	9.4560
	Manufacturing	.0000	1.73340	1.000	-8.4710	8.4710
	Marketing	-1.3333	2.00155	1.000	-11.1148	8.4481
	Transportation Systems	-2.6111	1.78090	1.000	-11.3142	6.0920
Law and Public Safety	Agricultural and Environmental Systems	1.6786	2.42941	1.000	-10.1937	13.5509
	Arts and Communication	5.0500	2.60010	.992	-7.6564	17.7564
	Business and Administrative Services	1.5000	2.74074	1.000	-11.8938	14.8938
	Construction Technologies	3.1389	2.32918	1.000	-8.2436	14.5214
	Education and Training	.2500	2.60010	1.000	-12.4564	12.9564
	Engineering and Science Technologies	2.2500	2.60010	1.000	-10.4564	14.9564
	Health Science	1.4643	2.19748	1.000	-9.2746	12.2032

	Hospitality and Tourism	2.7500	2.74074	1.000	-10.6438	16.1438
	Human Services	-1.7500	2.42941	1.000	-13.6223	10.1223
	Information Technology	1.7500	2.29307	1.000	-9.4560	12.9560
	Manufacturing	1.7500	2.29307	1.000	-9.4560	12.9560
	Marketing	.4167	2.50194	1.000	-11.8101	12.6434
	Transportation Systems	-.8611	2.32918	1.000	-12.2436	10.5214
Manufacturing	Agricultural and Environmental Systems	-.0714	1.91011	1.000	-9.4060	9.2631
	Arts and Communication	3.3000	2.12297	.999	-7.0748	13.6748
	Business and Administrative Services	-.2500	2.29307	1.000	-11.4560	10.9560
	Construction Technologies	1.3889	1.78090	1.000	-7.3142	10.0920
	Education and Training	-1.5000	2.12297	1.000	-11.8748	8.8748
	Engineering and Science Technologies	.5000	2.12297	1.000	-9.8748	10.8748
	Health Science	-.2857	1.60481	1.000	-8.1283	7.5569
	Hospitality and Tourism	1.0000	2.29307	1.000	-10.2060	12.2060

	Human Services	-3.5000	1.91011	.995	-12.8345	5.8345
	Information Technology	.0000	1.73340	1.000	-8.4710	8.4710
	Law and Public Safety	-1.7500	2.29307	1.000	-12.9560	9.4560
	Marketing	-1.3333	2.00155	1.000	-11.1148	8.4481
	Transportation Systems	-2.6111	1.78090	1.000	-11.3142	6.0920
Marketing	Agricultural and Environmental Systems	1.2619	2.15640	1.000	-9.2762	11.8001
	Arts and Communication	4.6333	2.34703	.991	-6.8364	16.1031
	Business and Administrative Services	1.0833	2.50194	1.000	-11.1434	13.3101
	Construction Technologies	2.7222	2.04283	1.000	-7.2609	12.7053
	Education and Training	-.1667	2.34703	1.000	-11.6364	11.3031
	Engineering and Science Technologies	1.8333	2.34703	1.000	-9.6364	13.3031
	Health Science	1.0476	1.89129	1.000	-8.1950	10.2902
	Hospitality and Tourism	2.3333	2.50194	1.000	-9.8934	14.5601
	Human Services	-2.1667	2.15640	1.000	-12.7048	8.3715

		Information Technology	1.3333	2.00155	1.000	-8.4481	11.1148
		Law and Public Safety	-.4167	2.50194	1.000	-12.6434	11.8101
		Manufacturing	1.3333	2.00155	1.000	-8.4481	11.1148
		Transportation Systems	-1.2778	2.04283	1.000	-11.2609	8.7053
	Transportation Systems	Agricultural and Environmental Systems	2.5397	1.95332	1.000	-7.0060	12.0854
		Arts and Communication	5.9111	2.16193	.868	-4.6540	16.4763
		Business and Administrative Services	2.3611	2.32918	1.000	-9.0214	13.7436
		Construction Technologies	4.0000	1.82716	.976	-4.9292	12.9292
		Education and Training	1.1111	2.16193	1.000	-9.4540	11.6763
		Engineering and Science Technologies	3.1111	2.16193	1.000	-7.4540	13.6763
		Health Science	2.3254	1.65601	1.000	-5.7674	10.4181
		Hospitality and Tourism	3.6111	2.32918	.999	-7.7714	14.9936
		Human Services	-.8889	1.95332	1.000	-10.4346	8.6568
		Information Technology	2.6111	1.78090	1.000	-6.0920	11.3142
		Law and Public Safety	.8611	2.32918	1.000	-10.5214	12.2436

		Manufacturing	2.6111	1.78090	1.000	-6.0920	11.3142
		Marketing	1.2778	2.04283	1.000	-8.7053	11.2609
Average Time Weekly Teaching Competency Score	Agricultural and Environmental Systems	Arts and Communication	1.1714	1.73347	1.000	-7.2999	9.6427
		Business and Administrative Services	1.8214	1.85556	1.000	-7.2465	10.8894
		Construction Technologies	1.2381	1.49193	1.000	-6.0528	8.5290
		Education and Training	-2.0286	1.73347	1.000	-10.4999	6.4427
		Engineering and Science Technologies	.1714	1.73347	1.000	-8.2999	8.6427
		Health Science	-.4286	1.37042	1.000	-7.1257	6.2686
		Hospitality and Tourism	-2.1786	1.85556	1.000	-11.2465	6.8894
		Human Services	-1.1429	1.58243	1.000	-8.8761	6.5903
		Information Technology	1.4714	1.45893	1.000	-5.6582	8.6011
		Law and Public Safety	-2.4286	1.85556	1.000	-11.4965	6.6394
		Manufacturing	-.2286	1.45893	1.000	-7.3582	6.9011
		Marketing	.5714	1.64705	1.000	-7.4775	8.6204
		Transportation Systems	-.9841	1.49193	1.000	-8.2751	6.3068

	Arts and Communication	Agricultural and Environmental Systems	-1.1714	1.73347	1.000	-9.6427	7.2999
		Business and Administrative Services	.6500	1.98593	1.000	-9.0551	10.3551
		Construction Technologies	.0667	1.65126	1.000	-8.0029	8.1362
		Education and Training	-3.2000	1.87236	.998	-12.3500	5.9500
		Engineering and Science Technologies	-1.0000	1.87236	1.000	-10.1500	8.1500
		Health Science	-1.6000	1.54236	1.000	-9.1374	5.9374
		Hospitality and Tourism	-3.3500	1.98593	.998	-13.0551	6.3551
		Human Services	-2.3143	1.73347	1.000	-10.7856	6.1570
		Information Technology	.3000	1.62151	1.000	-7.6242	8.2242
		Law and Public Safety	-3.6000	1.98593	.996	-13.3051	6.1051
		Manufacturing	-1.4000	1.62151	1.000	-9.3242	6.5242
		Marketing	-.6000	1.79264	1.000	-9.3605	8.1605
		Transportation Systems	-2.1556	1.65126	1.000	-10.2251	5.9140
	Business and Administrative Services	Agricultural and Environmental Systems	-1.8214	1.85556	1.000	-10.8894	7.2465

		Arts and Communication	-.6500	1.98593	1.000	-10.3551	9.0551
		Construction Technologies	-.5833	1.77901	1.000	-9.2772	8.1105
		Education and Training	-3.8500	1.98593	.992	-13.5551	5.8551
		Engineering and Science Technologies	-1.6500	1.98593	1.000	-11.3551	8.0551
		Health Science	-2.2500	1.67842	1.000	-10.4523	5.9523
		Hospitality and Tourism	-4.0000	2.09336	.993	-14.2301	6.2301
		Human Services	-2.9643	1.85556	.999	-12.0323	6.1037
		Information Technology	-.3500	1.75143	1.000	-8.9091	8.2091
		Law and Public Safety	-4.2500	2.09336	.988	-14.4801	5.9801
		Manufacturing	-2.0500	1.75143	1.000	-10.6091	6.5091
		Marketing	-1.2500	1.91097	1.000	-10.5887	8.0887
		Transportation Systems	-2.8056	1.77901	.999	-11.4994	5.8883
	Construction Technologies	Agricultural and Environmental Systems	-1.2381	1.49193	1.000	-8.5290	6.0528

		Arts and Communication	-.0667	1.65126	1.000	-8.1362	8.0029
		Business and Administrative Services	.5833	1.77901	1.000	-8.1105	9.2772
		Education and Training	-3.2667	1.65126	.990	-11.3362	4.8029
		Engineering and Science Technologies	-1.0667	1.65126	1.000	-9.1362	7.0029
		Health Science	-1.6667	1.26484	1.000	-7.8479	4.5145
		Hospitality and Tourism	-3.4167	1.77901	.993	-12.1105	5.2772
		Human Services	-2.3810	1.49193	.999	-9.6719	4.9100
		Information Technology	.2333	1.36024	1.000	-6.4140	6.8807
		Law and Public Safety	-3.6667	1.77901	.986	-12.3605	5.0272
		Manufacturing	-1.4667	1.36024	1.000	-8.1140	5.1807
		Marketing	-.6667	1.56030	1.000	-8.2917	6.9584
		Transportation Systems	-2.2222	1.39557	.999	-9.0423	4.5978
	Education and Training	Agricultural and Environmental Systems	2.0286	1.73347	1.000	-6.4427	10.4999
		Arts and Communication	3.2000	1.87236	.998	-5.9500	12.3500

		Business and Administrative Services	3.8500	1.98593	.992	-5.8551	13.5551
		Construction Technologies	3.2667	1.65126	.990	-4.8029	11.3362
		Engineering and Science Technologies	2.2000	1.87236	1.000	-6.9500	11.3500
		Health Science	1.6000	1.54236	1.000	-5.9374	9.1374
		Hospitality and Tourism	-.1500	1.98593	1.000	-9.8551	9.5551
		Human Services	.8857	1.73347	1.000	-7.5856	9.3570
		Information Technology	3.5000	1.62151	.979	-4.4242	11.4242
		Law and Public Safety	-.4000	1.98593	1.000	-10.1051	9.3051
		Manufacturing	1.8000	1.62151	1.000	-6.1242	9.7242
		Marketing	2.6000	1.79264	1.000	-6.1605	11.3605
		Transportation Systems	1.0444	1.65126	1.000	-7.0251	9.1140
	Engineering and Science Technologies	Agricultural and Environmental Systems	-.1714	1.73347	1.000	-8.6427	8.2999
		Arts and Communication	1.0000	1.87236	1.000	-8.1500	10.1500
		Business and Administrative Services	1.6500	1.98593	1.000	-8.0551	11.3551
		Construction Technologies	1.0667	1.65126	1.000	-7.0029	9.1362

		Education and Training	-2.2000	1.87236	1.000	-11.3500	6.9500
		Health Science	-.6000	1.54236	1.000	-8.1374	6.9374
		Hospitality and Tourism	-2.3500	1.98593	1.000	-12.0551	7.3551
		Human Services	-1.3143	1.73347	1.000	-9.7856	7.1570
		Information Technology	1.3000	1.62151	1.000	-6.6242	9.2242
		Law and Public Safety	-2.6000	1.98593	1.000	-12.3051	7.1051
		Manufacturing	-.4000	1.62151	1.000	-8.3242	7.5242
		Marketing	.4000	1.79264	1.000	-8.3605	9.1605
		Transportation Systems	-1.1556	1.65126	1.000	-9.2251	6.9140
	Health Science	Agricultural and Environmental Systems	.4286	1.37042	1.000	-6.2686	7.1257
		Arts and Communication	1.6000	1.54236	1.000	-5.9374	9.1374
		Business and Administrative Services	2.2500	1.67842	1.000	-5.9523	10.4523
		Construction Technologies	1.6667	1.26484	1.000	-4.5145	7.8479
		Education and Training	-1.6000	1.54236	1.000	-9.1374	5.9374
		Engineering and Science Technologies	.6000	1.54236	1.000	-6.9374	8.1374

		Hospitality and Tourism	-1.7500	1.67842	1.000	-9.9523	6.4523
		Human Services	-.7143	1.37042	1.000	-7.4114	5.9829
		Information Technology	1.9000	1.22574	.999	-4.0901	7.8901
		Law and Public Safety	-2.0000	1.67842	1.000	-10.2023	6.2023
		Manufacturing	.2000	1.22574	1.000	-5.7901	6.1901
		Marketing	1.0000	1.44455	1.000	-6.0594	8.0594
		Transportation Systems	-.5556	1.26484	1.000	-6.7367	5.6256
	Hospitality and Tourism	Agricultural and Environmental Systems	2.1786	1.85556	1.000	-6.8894	11.2465
		Arts and Communication	3.3500	1.98593	.998	-6.3551	13.0551
		Business and Administrative Services	4.0000	2.09336	.993	-6.2301	14.2301
		Construction Technologies	3.4167	1.77901	.993	-5.2772	12.1105
		Education and Training	.1500	1.98593	1.000	-9.5551	9.8551
		Engineering and Science Technologies	2.3500	1.98593	1.000	-7.3551	12.0551
		Health Science	1.7500	1.67842	1.000	-6.4523	9.9523
		Human Services	1.0357	1.85556	1.000	-8.0323	10.1037
		Information Technology	3.6500	1.75143	.985	-4.9091	12.2091

		Law and Public Safety	-.2500	2.09336	1.000	-10.4801	9.9801
		Manufacturing	1.9500	1.75143	1.000	-6.6091	10.5091
		Marketing	2.7500	1.91097	1.000	-6.5887	12.0887
		Transportation Systems	1.1944	1.77901	1.000	-7.4994	9.8883
	Human Services	Agricultural and Environmental Systems	1.1429	1.58243	1.000	-6.5903	8.8761
		Arts and Communication	2.3143	1.73347	1.000	-6.1570	10.7856
		Business and Administrative Services	2.9643	1.85556	.999	-6.1037	12.0323
		Construction Technologies	2.3810	1.49193	.999	-4.9100	9.6719
		Education and Training	-.8857	1.73347	1.000	-9.3570	7.5856
		Engineering and Science Technologies	1.3143	1.73347	1.000	-7.1570	9.7856
		Health Science	.7143	1.37042	1.000	-5.9829	7.4114
		Hospitality and Tourism	-1.0357	1.85556	1.000	-10.1037	8.0323
		Information Technology	2.6143	1.45893	.996	-4.5154	9.7439
		Law and Public Safety	-1.2857	1.85556	1.000	-10.3537	7.7823
		Manufacturing	.9143	1.45893	1.000	-6.2154	8.0439

		Marketing	1.7143	1.64705	1.000	-6.3347	9.7633
		Transportation Systems	.1587	1.49193	1.000	-7.1322	7.4497
	Information Technology	Agricultural and Environmental Systems	-1.4714	1.45893	1.000	-8.6011	5.6582
		Arts and Communication	-.3000	1.62151	1.000	-8.2242	7.6242
		Business and Administrative Services	.3500	1.75143	1.000	-8.2091	8.9091
		Construction Technologies	-.2333	1.36024	1.000	-6.8807	6.4140
		Education and Training	-3.5000	1.62151	.979	-11.4242	4.4242
		Engineering and Science Technologies	-1.3000	1.62151	1.000	-9.2242	6.6242
		Health Science	-1.9000	1.22574	.999	-7.8901	4.0901
		Hospitality and Tourism	-3.6500	1.75143	.985	-12.2091	4.9091
		Human Services	-2.6143	1.45893	.996	-9.7439	4.5154
		Law and Public Safety	-3.9000	1.75143	.972	-12.4591	4.6591
		Manufacturing	-1.7000	1.32396	1.000	-8.1701	4.7701
		Marketing	-.9000	1.52877	1.000	-8.3710	6.5710
		Transportation Systems	-2.4556	1.36024	.996	-9.1029	4.1918

	Law and Public Safety	Agricultural and Environmental Systems	2.4286	1.85556	1.000	-6.6394	11.4965
		Arts and Communication	3.6000	1.98593	.996	-6.1051	13.3051
		Business and Administrative Services	4.2500	2.09336	.988	-5.9801	14.4801
		Construction Technologies	3.6667	1.77901	.986	-5.0272	12.3605
		Education and Training	.4000	1.98593	1.000	-9.3051	10.1051
		Engineering and Science Technologies	2.6000	1.98593	1.000	-7.1051	12.3051
		Health Science	2.0000	1.67842	1.000	-6.2023	10.2023
		Hospitality and Tourism	.2500	2.09336	1.000	-9.9801	10.4801
		Human Services	1.2857	1.85556	1.000	-7.7823	10.3537
		Information Technology	3.9000	1.75143	.972	-4.6591	12.4591
		Manufacturing	2.2000	1.75143	1.000	-6.3591	10.7591
		Marketing	3.0000	1.91097	.999	-6.3387	12.3387
		Transportation Systems	1.4444	1.77901	1.000	-7.2494	10.1383
	Manufacturing	Agricultural and Environmental Systems	.2286	1.45893	1.000	-6.9011	7.3582
		Arts and Communication	1.4000	1.62151	1.000	-6.5242	9.3242

		Business and Administrative Services	2.0500	1.75143	1.000	-6.5091	10.6091
		Construction Technologies	1.4667	1.36024	1.000	-5.1807	8.1140
		Education and Training	-1.8000	1.62151	1.000	-9.7242	6.1242
		Engineering and Science Technologies	.4000	1.62151	1.000	-7.5242	8.3242
		Health Science	-.2000	1.22574	1.000	-6.1901	5.7901
		Hospitality and Tourism	-1.9500	1.75143	1.000	-10.5091	6.6091
		Human Services	-.9143	1.45893	1.000	-8.0439	6.2154
		Information Technology	1.7000	1.32396	1.000	-4.7701	8.1701
		Law and Public Safety	-2.2000	1.75143	1.000	-10.7591	6.3591
		Marketing	.8000	1.52877	1.000	-6.6710	8.2710
		Transportation Systems	-.7556	1.36024	1.000	-7.4029	5.8918
	Marketing	Agricultural and Environmental Systems	-.5714	1.64705	1.000	-8.6204	7.4775
		Arts and Communication	.6000	1.79264	1.000	-8.1605	9.3605
		Business and Administrative Services	1.2500	1.91097	1.000	-8.0887	10.5887
		Construction Technologies	.6667	1.56030	1.000	-6.9584	8.2917

		Education and Training	-2.6000	1.79264	1.000	-11.3605	6.1605
		Engineering and Science Technologies	-.4000	1.79264	1.000	-9.1605	8.3605
		Health Science	-1.0000	1.44455	1.000	-8.0594	6.0594
		Hospitality and Tourism	-2.7500	1.91097	1.000	-12.0887	6.5887
		Human Services	-1.7143	1.64705	1.000	-9.7633	6.3347
		Information Technology	.9000	1.52877	1.000	-6.5710	8.3710
		Law and Public Safety	-3.0000	1.91097	.999	-12.3387	6.3387
		Manufacturing	-.8000	1.52877	1.000	-8.2710	6.6710
		Transportation Systems	-1.5556	1.56030	1.000	-9.1806	6.0695
	Transportation Systems	Agricultural and Environmental Systems	.9841	1.49193	1.000	-6.3068	8.2751
		Arts and Communication	2.1556	1.65126	1.000	-5.9140	10.2251
		Business and Administrative Services	2.8056	1.77901	.999	-5.8883	11.4994
		Construction Technologies	2.2222	1.39557	.999	-4.5978	9.0423
		Education and Training	-1.0444	1.65126	1.000	-9.1140	7.0251
		Engineering and Science Technologies	1.1556	1.65126	1.000	-6.9140	9.2251

	Health Science	.5556	1.26484	1.000	-5.6256	6.7367
	Hospitality and Tourism	-1.1944	1.77901	1.000	-9.8883	7.4994
	Human Services	-.1587	1.49193	1.000	-7.4497	7.1322
	Information Technology	2.4556	1.36024	.996	-4.1918	9.1029
	Law and Public Safety	-1.4444	1.77901	1.000	-10.1383	7.2494
	Manufacturing	.7556	1.36024	1.000	-5.8918	7.4029
	Marketing	1.5556	1.56030	1.000	-6.0695	9.1806

Based on observed means.
The error term is Mean Square(Error) = 8.764.