Characteristics of High-Quality Career and Technical Education Teachers

A Dissertation

Presented in Partial Fulfillment of the Requirements for the

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by

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Authorization to Submit Dissertation

This dissertation of Cynthia C. Williams, submitted for the degree of Doctor of Philosophy with a major in Education and titled **"**Characteristics of High-Quality Career and Technical Education Teachers," has been reviewed in final form. Permission, as indicated by the signatures and dates given below, is now granted to submit final copies to the College of Graduate Studies for approval.

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Abstract

This study was designed to explore high-quality teacher characteristics of Career and Technical Education (CTE) teachers. It is generally acknowledged that promoting teacher quality is a key element in improving secondary education in the United States. While recent research has documented the importance of quality teaching in promoting student achievement, there is a lack of consensus on the characteristics of good teachers because identification of good teaching practices are often dependent on student learning outcomes.

The purpose of the study was to explore and inventory the characteristics of Idaho's high-quality CTE teachers (i.e. knowledge and skills, beliefs, and practice) without using student learning outcomes as a measure. The survey was distributed to 770 postsecondary teachers in the State of Idaho with a response rate of 44.8%. Significant results from the study indicated Idaho's CTE teachers have strong self-efficacy, a growth mindset, and believe that having a mentor was related to their success as a teacher. The inventory of teacher characteristics formed the CTE-CTI Framework: Characteristics of a high-quality CTE teacher which depicted education and experience, professional development, beliefs, great teacher attitudes, and related practice components. This study is considered to be generalizable. With noted revisions, the CTE-CTI can be used to inventory the characteristics of high-quality CTE teachers.

Acknowledgements

It is with great pleasure that I express my appreciation to my committee chair, Dr. John Cannon, for suggesting I research the characteristics of high-quality CTE teachers and guiding me through the discovery phase and beyond. What began as a grant application soon blossomed into a dissertation topic that provided a wonderful two-year journey of scholarly discussions. With each new path I discovered, he provided context and gave me space to explore it further as well as time for full critical thought and reflection. Dr. Cannon, I will always value your unique ability to provide timely encouragement and insightful advice.

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My acknowledgements would not be complete without declaring my deepest gratitude and appreciation to my dear friend and mentor, Dr. Susan Poch, Assistant Vice Provost, Washington State University, for her faith in me. She strongly encouraged me to apply to graduate school and provided continuous guidance along the way. Dr. Poch, I appreciate your taking the time to discuss human development theories, which played a significant role in my decision to research teacher characteristics without student success as a factor.

I would also like to thank my friend and colleague, Dr. Karen Weathermon, Director, First-Year Programs, Washington State University, for editing my dissertation and for her helpful and calm advice as the finish line approached.

And last, a big thank you to all my former and current colleagues at the University of Idaho and Washington State University. Any omissions in this brief acknowledgement does not mean I have a lack of gratitude for those who helped me along the way. I know I am truly blessed to be a part of this community.

Dedication

I am a first generation college student raised by parents who did not understand the value of a college education, much less the value of a college education for women.

> "You can't go back and change the beginning, but you can start where you are and change the ending" (Lewis, n.d.).

I dedicate my dissertation work to my family. With the unwavering love and support of my husband and children, I was able to complete my bachelor's, master's, and doctorate degrees as a part-time student while working full-time. I hope that my education journey and the richness it has brought to our lives has spirited a new legacy for our family and future generations.

To my husband John, I could not have done this without you. You listened, you knew when not to say something, and you gave me encouragement when I needed it most. To my children, Richard, Nicole, Keegan, and my daughter-in-law Lauren, please know that your faith in me as a mother and a learner kept me going in the toughest of times. I am proud that each of you chose to earn a college degree and are committed to being lifelong learners. To my grandchildren, Ethan and Chase, and those yet to be born, always remember that a quality education is earned and the ability to seek out and comprehend applicable knowledge is priceless.

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CHAPTER 1

Introduction

This quantitative study explored characteristics of high-quality career and technical education (CTE) teachers. Whether or not a student persists to graduation can be significantly influenced by teacher characteristics (e.g., knowledge, beliefs, and practice). Prior research on the relationship between teacher qualifications, teacher effectiveness, and student achievement confirmed that teachers were the most important factor affecting student learning and continued education (Barrett & Toma, 2013; Buddin & Zamarro, 2009; Hanushek, 2011). As such, the documentation of a quality teacher was derived from student success measures and factors related to good teaching practice (Darling-Hammond, 2000). Yet, a high number of high school graduates are still not prepared to enter college or lack the knowledge and skills needed to begin a career (Rothman, 2012).

In 2016, approximately 63% of Idaho CTE students chose to attend college compared to 47% of all Idaho students (State of Idaho, 2016). This may indicate that CTE programs and teachers had a positive effect on student success as measured by graduation, college readiness, and career decisions. Although Idaho's high school graduation rate was 78.9% compared to the national average of 83.2%, 98% of Idaho's CTE high school students graduated and 94% entered the workforce or continued on to postsecondary education (State of Idaho, 2016). Collectively, CTE teachers across the state impacted over 82,000 students enrolled in seven program areas (Table 1). Yet, measuring good teaching practice, high school graduation rates, employability, and college enrollment does little in the way of understanding the teacher characteristics of a high-quality CTE teacher.

Table 1.1

2016 State of Idaho CTE Enrollment by Program Area

CTE Program Area	Student Enrollment
Agriculture & Natural Resources	12,761
Business Management & Marketing	27,617
Engineering & Technology	12,905
Family and Consumer Sciences	15,116
Health Sciences	5,860
Individualized Occupational Training	1,197
Skilled & Technical Sciences	7,236
Total course enrollment	82,692

Adapted from State of Idaho, Career and Technical Education Division (2016)

How students perceive education and the environment in which they learn new knowledge and develop skills affect student decision-making and success (Plank, DeLuca, & Estacian, 2008). Parental influence also plays a significant role in college and career decision-making (Cannon & Broyles, 2006; Esters & Bowen, 2005; Kotrlik & Harrison, 1989). If parents believe CTE programs prepare students with college and career-ready skills, then the son or daughter may engage in CTE courses and activities. However, Hemmelman (2010) reported that many parents and some educators believed that a four-year degree was the only career path leading to a satisfying life. Because of misconceptions of parents and others, students may perceive CTE strictly as a vocational track or as taking attention away from

college preparatory classes. Consequently, some students may not pursue learning opportunities beneficial for career exploration and preparation. Additionally, if low-performing students are shifted to CTE courses, then both the teacher and the student may view CTE as a remedial track (Rose, 2012). Lower performing students are more likely to drop out of school as a result of the negative status associated with taking CTE courses (Plank et al., 2008).

Plank et al. (2008) investigated the relationship between students dropping out of high school and enrollment in CTE courses. Findings suggested students were retained to graduation if students connected knowledge with careers and technical applications by retaining connections to "academically focus teachers and educationally engaged peers" (Plank et al., 2008, p. 360). Teachers, in general, have a facilitative role in student learning and focus on intelligence-oriented education where students learn how to learn (Joyce, Weil, & Calhoun, 2004). Yet, intelligence-oriented education is viewed as the precursor for college readiness and is often perceived as more valuable (Plank et al., 2008). However high school graduation, grades, and socioeconomic standing also affect a student's choice to pursue education beyond high school. In essence, schools focusing on intellectual development as a measure of student success may be sending mixed messages about the value of CTE. In addition, utilizing CTE courses as an alternative path for low-performing students rather than as a "move on" path for all students has a direct impact on student retention (Plank et al., 2008).

Because Idaho's CTE students graduate at a higher rate than the state average, exploring the perceptions of Idaho's CTE teachers' beliefs about student learning is important for understanding the characteristics of Idaho's CTE high-quality teachers.

Background of Study

History of Vocational Education Segregation

Since their inception in the early 20th century, vocational programs have strived to bring democracy to education by providing access for the working class. While it was not uncommon for children of the working class to quit secondary school to take on family support needs (Gordon, 2014). Industry was demanding skilled labor to support mass production of goods and the general education curriculum was not meeting employer needs. According to Scott (2014), "For most Americans, what was needed was a more practical curriculum that would prepare them for work" (p. 214).

The industrial revolution created an opportunity for leaders and supporters of public education to introduce job skills into the general curriculum (Gordon, 2014). As early as 1890, Booker T. Washington, an African American educator and leader, advocated industrial education as a means for former slaves to learn employable skills to affirm their societal status. W E. B. DuBois, founder of the National Association for the Advancement of Colored People (NAACP), later advocated for integrated education to protect the social and political rights of the African American community (Scott, 2014). He believed segregated education, specifically for African Americans, compromised their struggle for equality.

Other prominent leaders and educational philosophers, specifically Charles Prosser and John Dewey, advocated for "hands-on" experiential learning environments for students. However, they differed in their approach and beliefs about educating the working class. Dewey (1916) promoted an educational system in which all students were taught to acquire practical knowledge, apply academic content, and examine occupational and societal values. Dewey argued against a dual education system that would segregate children based on

economic social standing. He believed well-to-do students in this system would receive a liberal arts and general academic education, while poorer students would have no choice but to serve as labor for industry without opportunities for advancement (Gordon, 2014).

Prosser's (1939) educational philosophy, on the other hand, supported a dual education system where vocational education would provide students the skills demanded by industry, including on-the-job training. As such, Prosser advocated specific vocational subject areas be taught by teachers working in industry so students could learn on-the-job while developing the necessary knowledge and skills (Gordon, 2014). Prosser's approach was popular with both industry and the working class because it addressed the workforce shortage by providing an immediate path to employment. Using his influence, Prosser lobbied for the passage of the Smith-Hughes Act. Enacted by Congress and signed by the President Woodrow Wilson in 1917, Smith-Hughes was the first federal vocational education legislation (Gordon, 2014; Scott, 2014). States receiving federal funds from Smith-Hughes were required to segregate vocational education from other parts of the comprehensive high school curriculum,

> The Smith-Hughes Act tended to promote a segregated curriculum, with agriculture, homemaking, and trade and industrial education segments separated from not only academic programs, but from all other vocational programs as well. The impact of this separation has been felt through subsequent decades in the development of separate training programs, separate teacher organizations, and separate student organizations (Gordon, 2014, p. 105).

Federal funding, mandated by Smith-Hughes, supported secondary vocational programs in order to provide learning opportunities to students by preparing them for entry into the workforce immediately after graduation (Scott, 2014). As a result, educators tended to target students for enrollment in vocational education programs who were low performing or those who could not afford to attend college (Oakes, 1985; Rosenbaum, 1978). Through subsequent decades, parents rejected vocational education because of the belief that this path would deprive their children of future education and career opportunities (Leighbody, 1972). Thus began the stigma that vocational education was an alternative path to a job, versus a career, for those who could not afford college or were not capable of college-level learning (Scott, 2014). The segregation of academic teachers and CTE teachers also served to reinforce the stigma that an academic education had more value (Plank et al., 2008).

Career and Technical Education

Since 1971, legislation to fund and improve technical education has continued to shape the future of CTE programs. The Carl D. Perkins Vocational and Technical Education Act was passed by Congress and signed by President Ronald Reagan in 1984. The first reauthorization of Perkins was signed by President George H. W. Bush in 1990. President Bill Clinton signed the second reauthorization in 1998. The most recent reauthorization came in 2006 and was signed into law by President George W. Bush as the Carl D. Perkins Career and Technical Education Improvement Act known as Perkins IV. This latest federal legislation renamed vocational education as career and technical education. Perkins IV raised expectations for students participating in CTE by holding them to specific, valid, and reliable accountability standards. It also required academic and CTE courses be integrated to improve student learning. States were assigned the task of developing effective methods to improve

programs and measure student progress and success (Gordon, 2014). Specifically, Perkins IV stated:

> The purpose of this Act is to develop more fully the academic and career and technical skills of secondary education students and postsecondary education students who elect to enroll in career and technical education programs, by—
>
> (1) building on the efforts of States and localities to develop challenging academic and technical standards and to assist students in meeting such standards, including preparation for high skill, high wage, or high demand occupations in current or emerging professions;
>
> (2) promoting the development of services and activities that integrate rigorous and challenging academic and career and technical instruction, and that link secondary education and postsecondary education for participating career and technical education students;
>
> (3) increasing State and local flexibility in providing services and activities designed to develop, implement, and improve career and technical education, including tech prep education;
>
> (4) conducting and disseminating national research and disseminating information on best practices that improve career and technical education programs, services, and activities;
>
> (5) providing technical assistance that—
>
> (A) promotes leadership, initial preparation, and professional development at the State and local levels; and

> (B) improves the quality of career and technical education teachers, faculty, administrators, and counselors;
> (6) supporting partnerships among secondary schools, postsecondary institutions, baccalaureate degree granting institutions, area career and technical education schools, local workforce investment boards, business and industry, and intermediaries; and
> (7) providing individuals with opportunities throughout their lifetimes to develop, in conjunction with other education and training programs, the knowledge and skills needed to keep the United States competitive (Carl D. Perkins Act of 2006, S1).

Common Core Standards

As states began to integrate academic and CTE curricula, concerns were raised by the National Governors Association that students were not adequately prepared with the knowledge and skills to enter a highly competitive global workforce (Kober & Rentmer, 2011). It became apparent that each state was establishing different standards and accountability measures for integration and student engagement (Asunda, Finnell, & Berry, 2015). In 2010, 45 states, the District of Columbia and the U.S. Virgin Islands adopted the Common Core State Standards (CCSS) for grades K-12 with the goal to improve student learning outcomes (Kober & Rentner, 2012).

The purpose of the CCSS initiative was to establish consistency in learning from state to state and to ensure college and career readiness for all students (CCSS, 2017; Reese, 2011). The strategy included integrating core subjects within the CTE curriculum, thus preparing

students with authentic experiences and work-related skills instead of content coverage or exam performance. Integrated CTE courses provide work-based learning opportunities that provide career-ready skills, keep students in school, and provide a pathway to postsecondary education (Stone & Lewis, 2012). However, studies on the implementation of the Common Core Standards revealed some CTE teachers' may not be effective at integration due to a lack of understanding of how their teaching skills and practices should change (Asunda et al., 2015; Kober & Rentmer, 2012).

Problem Statement

It is generally acknowledged that promoting teacher quality is a key element in improving secondary education in the United States (Ronfeldt et al., 2013; Danielson, 2007). In 2016, 238 secondary CTE teachers were employed in the state of Idaho and by 2024, Idaho will employ 260 secondary CTE teachers including six replacement hires per year (U.S. Department of Labor, 2016; Idaho Department of Labor, 2016). An increase in Idaho CTE teachers with minimal teacher turnover suggests a majority of Idaho CTE teachers will remain in the profession and continue to have a positive effect on student success. However, the identification of high-quality CTE teachers to fill future vacancies may be more problematic. While recent research has documented the importance of quality teaching in promoting student achievement, there is a lack of consensus on the characteristics of good teachers (Wiswall, 2013; Heller et al., 2012). The high-quality teacher characteristics that most impact student educational outcomes are not clearly understood.

Purpose of the Study

The purpose of this study was to explore and inventory the characteristics of Idaho's high-quality CTE teachers. Because Idaho's CTE students graduate at a higher rate than the state average, Idaho's CTE teachers may be viewed as high-quality teachers meeting student learning outcomes. Thus, exploring the knowledge and skills, beliefs, and practices of all Idaho CTE teachers is a necessary step that supports the identification of high-quality CTE teacher characteristics. Specific objectives that guided the study:

1. Identify teacher demographic characteristics of Idaho CTE teachers.
2. Explore the relationships between CTE teacher characteristics, quality teachers, and good teaching practice; and
3. Establish an inventory of high-quality teaching practices of Idaho CTE teachers.

Justification

Idaho CTE teachers play a prominent role in improving student educational outcomes. State statistics show that Idaho CTE students graduate at a higher rate than non-CTE students and are more likely to continue on to postsecondary education (Idaho, 2016). The success of Idaho CTE students suggests that Idaho's CTE teachers have embraced the challenges of student learning and engagement and may have a greater influence on student success long term. However, the use of graduation rates and college enrollments as a measure of teacher quality is insufficient for understanding the teacher knowledge, beliefs, and practices of high-quality CTE teachers.

Increasing Idaho graduation rates and creating pathways to support educational advancement beyond the 12th grade continues to be a high priority for the state (Idaho State Board of Education, 2018). Identifying Idaho's high-quality CTE teacher characteristics will

be useful in recruiting new teachers and to educators as they continue to adopt new approaches to improve student educational outcomes. University teacher preparation programs will also benefit by distinguishing the teacher characteristics that support the potential of great teachers.

Theoretical/Conceptual Framework

The theoretical and conceptual frameworks supporting this study used Danielson's (2007) framework for professional teaching practices and the 2017 National Board for Professional Teaching Standards (NBPTS) to understand what good teachers should do and the components for good teaching practice. An in-depth discussion of the theoretical and conceptual frameworks can be found in the literature review.

Danielson's (2007) teaching framework is grounded in the constructivist approach, suggested good teachers consistently demonstrate proficient or distinguished levels of performance in four domain areas:

1. planning and preparation;
2. classroom environment;
3. instruction; and
4. professional responsibilities.

Good teaching requires teachers to design activities and assignments where students learn to problem solve and construct knowledge (Danielson, 2007). In addition, Danielson's (2007) teaching framework has been correlated with state and national teaching standards, and it serves as a guide in developing teacher assessments and formal performance evaluation instruments (Danielson, 2013; Idaho Department of Education, 2011). The Council for the Accreditation of Educator Preparation (CAEP) standards for beginner teacher competencies

are similar to the Danielson's framework allowing educators and administrators to assess basic level of performance expectations for pre- and in-service teachers (Danielson, 2013; CAEP, 2018).

The conceptual framework for this study expands on the National Board for Professional Teaching Standards (NBPTS) to include demographic constructs influencing teacher practices of high-quality CTE teachers. The NBPTS identifies quality teachers by assessing and certifying teachers demonstrating high and rigorous standards related to what a quality teacher should know as well as demonstrate good teaching practices. Prior research studies revealed that students learn more from a National Board Certified Teacher (NBCT) than students taught by a non-NBCT (NPBTS, 2017; Berliner, 2001).

Limitations

The researcher recognizes that a limitation of the study is that conclusions from the study can only be inferred to CTE teachers and students in the state of Idaho.

Definitions

Academic Integration—including academic content and skills, such as math and writing, as part of the career-technical program of study.

Alternative pathways—use of nontraditional pathways to bring experienced industry professionals into a teacher certification program.

Career Technical Education (CTE)—formerly vocational education. Career and technical skills are the focus of the curriculum that is experientially based to demonstrate how education relates to the workplace and life.

Integration—a curriculum development approach that makes academic course work relevant to work. This may involve teachers across disciplines teaching related concepts concurrently, using occupational themes.

Mindset – a belief in one's capacity to learn.

Student Success Outcomes – measured by high school graduation and college enrollment rates.

Teacher Characteristics – demographics, knowledge and skills, beliefs, and practice of career and technical education teachers.

Teacher Practice(s) – what a teacher knows and does in the classroom (NBPTS, 2017; Danielson 2007). Collective teacher practices are referred to as teacher practice.

Vocational Education – Former name for Career and Technical Education.

Organization of the Study

Chapter 1 includes the introduction, background of vocational education segregation and career and technical education, importance of the study, problem statement, purpose and objectives of the study, definition of terms, limitations of the study, and organization of the study.

Chapter 2 provides an in-depth discussion of the theoretical and conceptual frameworks used to guide this study, and a review of the literature relevant to this study in the areas of teacher preparation, professional development, teacher self-efficacy, and teacher practices.

Chapter 3 provides of description of the methodology for this study. This chapter explains the design of the study, population surveyed, the instrument, and the methods and procedures used to collect and analyze data for this study.

Chapter 4 reports the data and findings, and Chapter 5 presents the discussion of significant findings, conclusions, implications, and recommendations, generalizability of the study, and future research opportunities.

Summary

CTE has transitioned from a segregated education program to one that is integrated into the academic curriculum. However, some of the stigmas associated with vocational education continue to plague CTE programs. Idaho CTE programs and teachers have embraced the challenges of improving student learning and engagement which is substantiated by the higher graduation rates for CTE students. However measuring teacher quality using student success outcomes obscures the description of good teaching and quality teachers. Exploring the characteristics of Idaho's CTE teachers independent of student educational outcomes will assist in identifying high-quality CTE teacher characteristics.

CHAPTER 2

Review of Literature

The purpose of this study was to explore and inventory the characteristics of Idaho's high-quality CTE teachers. Because Idaho's CTE students graduate at a higher rate than the state average, Idaho's CTE teachers may be viewed as high-quality teachers meeting student learning outcomes. Thus, exploring the knowledge and skills, beliefs, and practices of all Idaho CTE teachers is a necessary step that supports the identification of high-quality CTE teacher characteristics. Specific objectives that guided the study:

1. Identify teacher demographic characteristics of Idaho CTE teachers.
2. Explore the relationships between CTE teacher characteristics, quality teachers, and good teaching practice.
3. Establish an inventory of high-quality teaching practices of Idaho CTE teachers.

The review of literature provides an in-depth discussion of the theoretical and conceptual frameworks used to guide this study and a synthesis of pertinent literature disseminating research related to teaching characteristics. This study builds upon Danielson's (2007) framework for professional teaching practices. The NBPTS (2014 & 2017) guidelines for high quality teaching provided the conceptual lens for determining CTE teacher characteristics. The review of literature includes relevant research related to general teacher knowledge, teacher beliefs, and teacher practice as well as relevant studies on CTE teacher characteristics. The review of research on teacher characteristics within a particular state focused on CTE certification, professional development, self-efficacy, motivation, and student learning. National studies were concentrated on CTE teacher educator programs using a postsecondary perspective which was useful in identifying teacher preparation characteristics

(Fletcher, Gordon, Asunda, & Zirkle, 2015; Adams, 2010; Bishop-Clark et al., 2010; Retallick & Miller, 2010).

Theoretical Framework

The theoretical framework supporting this study used Danielson's (2007) framework for professional teaching to understand what good teachers should do and the components for good teaching practice. Danielson's teaching framework is grounded by research that seeks to identify principles of effective practice and classroom organization. Danielson (2007) suggested the definition of good teaching was based on a teacher's ability to design activities and assignments where students learn to problem solve and construct knowledge. In addition, a teacher must exhibit a high level of knowledge of content and pedagogy and possess the ability to translate this knowledge into practice to improve student learning and engagement. Danielson's framework conceptualized quality teaching by outlining teacher responsibilities in relation to student learning. The theoretical research supporting these principles was derived from prior studies on student cognition and student engagement (Whitaker, 2004; Skowron, 2001; Jackson & Davis, 2000; Rhem, 1999; Jones, 1992; Shulman, 1987).

Danielson's (2007) teaching framework, grounded in the constructivist approach, suggested a good teacher consistently demonstrates proficient or distinguished levels of performance in four domain areas:

1. Planning and Preparation: describes how a teacher organizes content that students learn including instructional design.

    1a. Demonstrating Knowledge of Content and Pedagogy

    1b. Demonstrating Knowledge of Students

    1c. Setting Instructional Outcomes

1d. Demonstrating Knowledge of Resources

1e. Designing Coherent Instruction

1f. Designing Student Assessments

2. Classroom Environment: focuses on a teacher's skill in promoting learning including the management of a classroom culture where students feel comfortable and can concentrate on learning.

    2a. Creating an Environment of Respect and Rapport

    2b. Establishing a Culture for Learning

    2c. Managing Classroom Procedures

    2d. Managing Student Behavior

    2e. Organizing Physical Space

3. Instruction: Concentrates on student engagement as a key component of all instructional activities.

    3a. Communicating with Students

    3b. Using Questioning and Discussion Techniques

    3c. Engaging Students in Learning

    3d. Using Assessment in Instruction

    3e. Demonstrating Flexibility and Responsiveness

4. Professional Responsibilities: Encompasses a teacher's commitment to high ethical and professional standards to improve practice.

    4a. Reflecting on Teaching

    4b. Maintaining Accurate Records

    4c. Communicating with Families

4d. Participating in the Professional Community

4e. Growing and Developing Professionally

4f. Showing Professionalism

The descriptive elements related to expected performance within each component provides a uniform evaluation rubric for educational leaders while teachers may assess their own teaching practice in relation to performance expectations (Table 2). Danielson (2007) suggested, "It is virtually impossible for teachers to read clear statements of what teachers do, and how those actions appear when they are done well, and not engage in the thought process of finding themselves in the descriptors" (p. 6).

Table 2.2

Descriptive Element Depicting Teacher Performance for Performance Levels

Element	Unsatisfactory	Basic	Proficient	Distinguished
Enhancement of content knowledge and pedagogical skill	Teacher engages in no professional development activities to enhance knowledge or skill.	Teacher participates in professional activities to a limited extent when they are convenient.	Teacher seeks out opportunities for professional development to enhance content knowledge and pedagogical skill.	Teacher seeks out opportunities for professional development and makes a systematic effort to conduct action research.

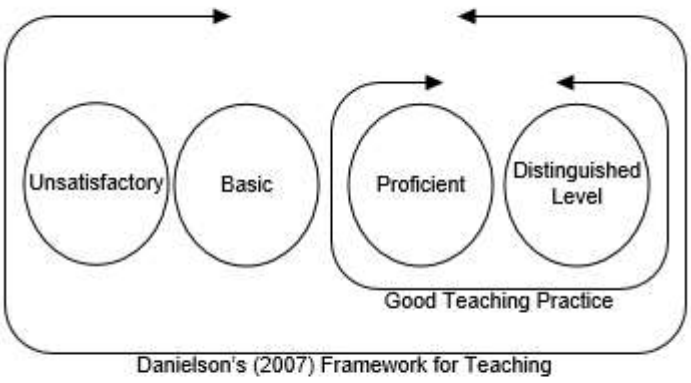
Note: Sample from Domain 4: Professional Responsibilities, Component 4e. Growing and developing professionally.

Danielson's (2007) teaching framework has been correlated with state and national teaching standards, and it serves as a guide in developing teacher assessments and formal performance evaluation instruments (Danielson, 2013; Idaho Department of Education, 2011).

The Council for the Accreditation of Educator Preparation (CAEP) standards for beginner teacher competencies are similar to the Danielson's framework allowing educators and administrators to assess basic level of performance expectations for pre- and in-service teachers (Danielson, 2013; CAEP, 2018).

Danielson's (2007) teaching framework uses four levels of performance measures: unsatisfactory, basic, proficient, and distinguished. Good teaching is identified by proficient or distinguished performance level ratings across all four domains (Figure 2.1).

Figure 2.1 Teacher Performance Levels



Danielson's (2007) Framework for Teaching

Figure 2.1 depicts the performance levels principals and teachers use to evaluate teacher performance. Performance levels are based on what a teacher should know and do in the classroom, student learning, and engagement.

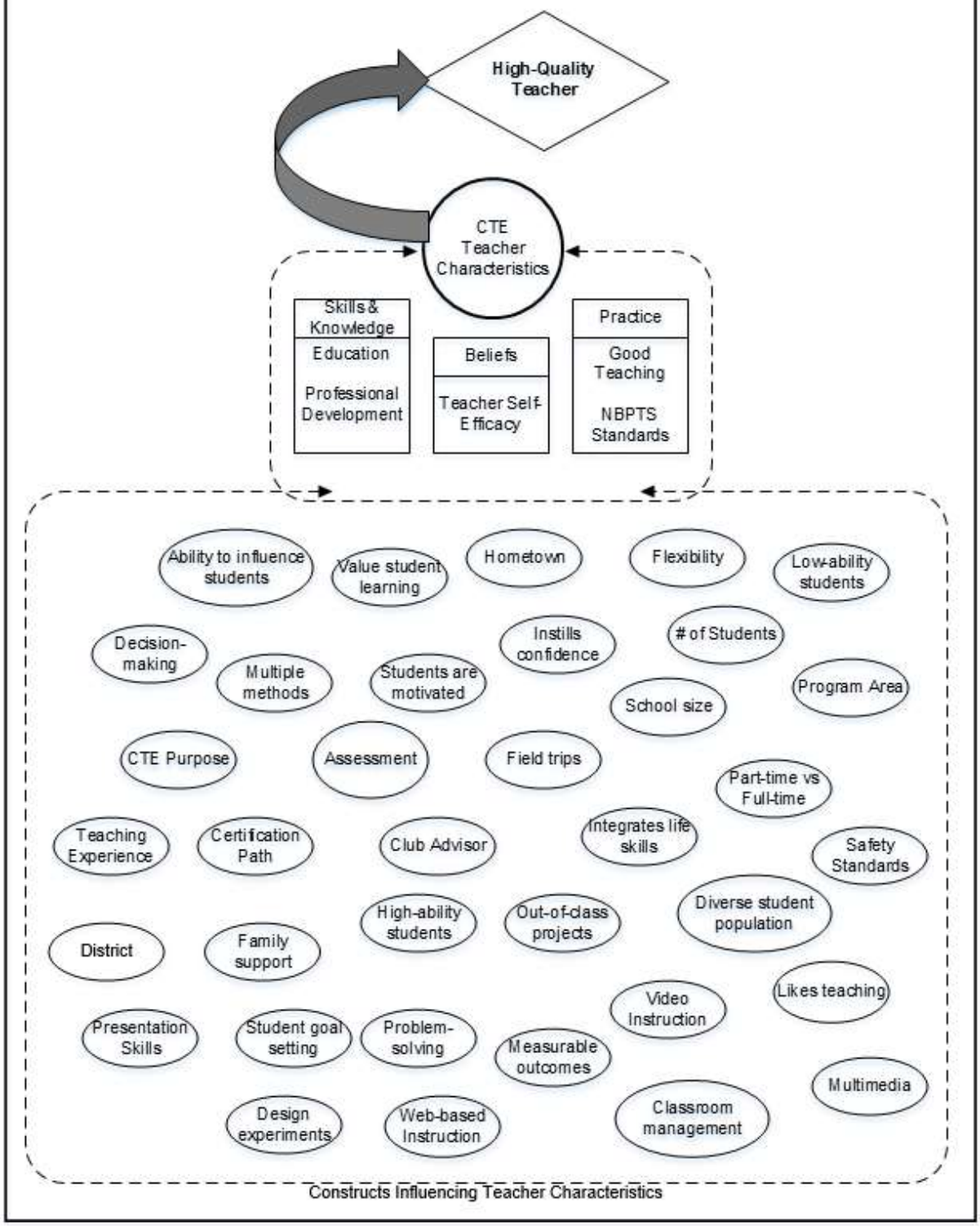
However, the definition of good teaching viewed from a teacher performance perspective may vary depending on student learning needs, the subject, or even grade level. Berliner (2001) suggested that good teaching was not the same as successful teaching. Good teaching measures the tasks of teaching and established norms for professional behavior.

Successful teaching is measured by the intended student outcomes related to student success such as graduate rates. Hence, a good teacher may not be a successful teacher, but a successful teacher must be a good teacher to achieve student success outcomes. Danielson's framework has value in identifying good teachers with good teaching practices, but it is not designed to identify the complex characteristics of a successful or high-quality teacher.

Conceptual Framework

The conceptual framework for this study expands the National Board for Professional Teaching Standards (NBPTS) to include demographic constructs (Figure 2.2). The constructs that influence a teacher's knowledge and skill, beliefs, and practice provided an in-depth view of high-quality CTE teacher characteristics.

Figure 2.2 Conceptual Framework for Characteristics of a High-Quality CTE Teacher



In 1987, in response to reports indicating a decline in rigorous learning opportunities for students and a lack of quality teacher in the United States, the National Board for Professional Teaching Standards (NBPTS) was established (NBPTS, 2017). The mission of the NBPTS is to:

> [e]stablish high and rigorous standards for what accomplished teachers should know and be able to do, to develop and operate a voluntary national system to assess and certify teachers who meet those standards, and to advance related education reforms—all with the purpose of improving student learning (Baratz-Snowden, 1990, p. 19).

The NBPTS offers a voluntary national teaching credential signifying the accomplishment of a high level of professional teaching in 25 certificate areas including CTE. The NBPTS teacher standards are classified as performance based because they describe quality teacher practices compared to listing the courses teachers must take to be licensed (Darling-Hammond, 2013). The shift from licensing to demonstrating a high quality practice acknowledges teaching as a complex profession requiring teachers to gain experience and advanced training so they are adept in meeting various students' instructional needs. National Board certification includes five core propositions all teachers must demonstrate (Figure 2.3):

Proposition 1: Teachers Are Committed to Students and Their Learning

Proposition 2: Teachers Know the Subjects They Teach and How to Teach Those Subjects to Students

Proposition 3: Teachers Are Responsible for Managing and Monitoring Student Learning

Proposition 4: Teachers Think Systematically About Their Practice and Learn from Experience

Proposition 5: Teachers Are Members of Learning Communities

Figure 2.3 Architecture of Accomplished Teaching

The Architecture of Accomplished Teaching provides a view of how the use of the Five Core Propositions and the standards that are developed from them result in student learning. As depicted in the Architecture of Accomplished Teaching illustration, shown below, one strand represents teaching practice as grounded in the Five Core Propositions, while the other strand represents the teacher's impact on students and their learning.

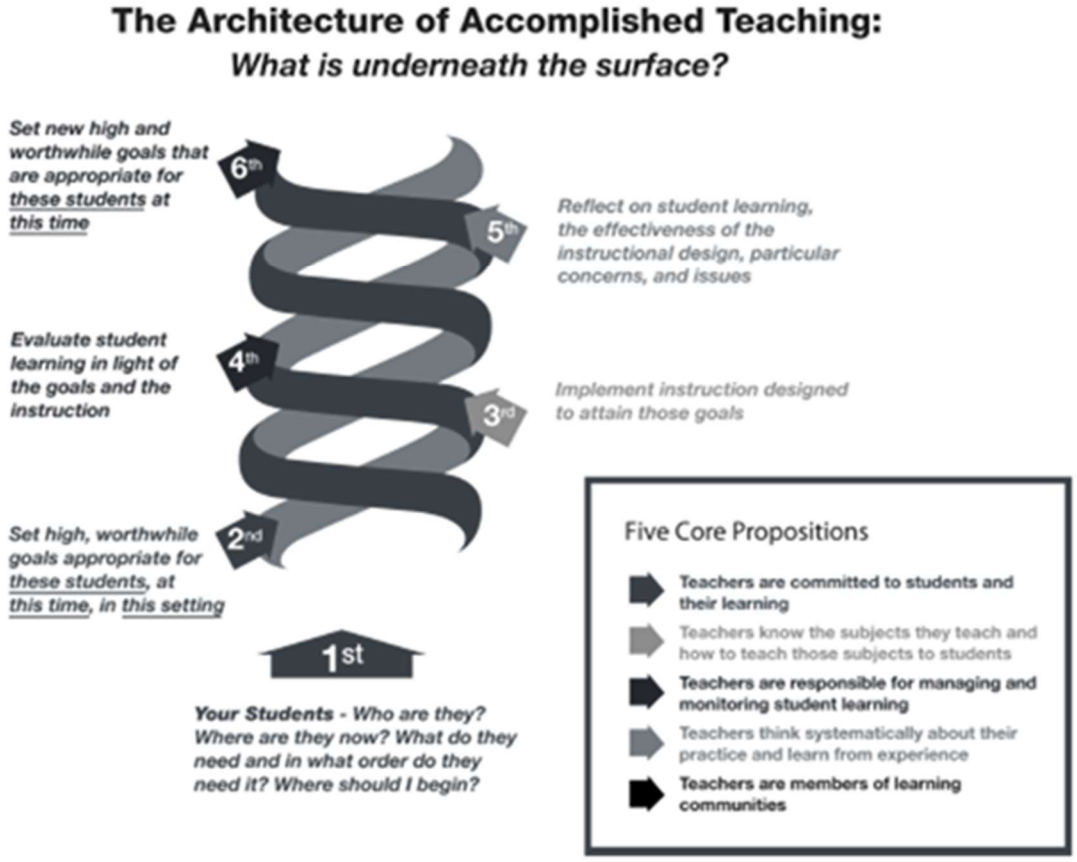


Figure 2.3 obtained from NBPTS (2017).

The certification of a highly qualified teacher is measured by what a teacher knows and can demonstrate as good teaching practices using standards specific to the content field (NBPTS, 2017). The NBPT standards for CTE were established in 1997 and revised in 2014 into eight specialty areas to accommodate the diverse industries represented by career and technical education:

Standard I: Knowledge of Students

Accomplished teachers have a rich, holistic understanding of who their students are as learners and individuals. They value their students' various learning styles and stages of development, and they create learning environments that differentiate instruction to meet the diverse needs of all students.

Standard II: Responding to Diversity

Accomplished teachers create learning environments characterized by fairness, equity, and a respect for diversity. They use inclusive teaching practices and advocate to ensure that all students receive a quality career and technical education.

Standard III: Knowledge of Content

Accomplished teachers utilize their technical and professional knowledge as well as their interdisciplinary and pedagogical skills to develop curricular objectives, design instruction, promote student learning, and facilitate student success within industry.

Standard IV: Learning Environments and Instructional Practices

Accomplished teachers design contextualized learning environments that foster critical thinking, creativity, leadership, teamwork, and communication skills while training students for postsecondary education and careers.

Standard V. Assessment

Accomplished teachers design and implement a variety of valid and reliable assessments that allow students to provide an authentic demonstration of their knowledge and skills and help them establish goals to guide their technical and professional development.

Standard VI. Postsecondary Readiness

Accomplished teachers facilitate career exploration and promote the acquisition of knowledge and skills so students can make informed career decisions that match their interests and aptitudes with the needs, expectations, and requirements of industry.

Standard VII. Program Design and Management

Accomplished teachers design and promote quality programs aligned with industry demands. They manage materials and resources to enrich their programs and sustain meaningful educational experiences for their students.

Standard VIII. Partnerships and Collaborations

Accomplished teachers collaborate with family, education, industry, and community partners to create challenging real world opportunities and support networks that help students plan, develop, and achieve their career goals.

In 2018, accomplished CTE teachers were defined as teachers holding a bachelor's degree if their state required one for their current certification (NBPTS, 2018). Additional requirements included at least three years of successful teaching experience in K-12, and holding a valid state teaching license. However, not all teachers pursue certification. To encourage NBPT certification, some states offer incentive funding to cover certification costs and a salary increase upon certification (Harris & Sass, 2011). Bonus pay for NBPTS

certification has also been used as an incentive for teachers working in high-poverty schools (Cowen & Goldhaber, 2015).

Certification requirements include a knowledge assessment test and three portfolio entries demonstrating good teaching practices. For the assessment of content knowledge, candidates must respond to six computer-based exercises pertaining to the teacher's area of expertise (NBPTS, 2017). Portfolio components may require a teacher to videotape classroom instruction techniques/interactions as well as submit student work and instructional goals. Portfolios are reviewed by trained assessors and rated according to the demonstrated level of good teaching practices. Levels of performance are rated as "little or no", "limited", "clear", and "clear, consistent, and convincing". Certification is granted for teachers demonstrating good teaching practices. NBPT defines a good teaching practice when teachers receive at least a clear rating on all assessments (see Figure 2.4).

Figure 2.4 . NBPT Certification Ratings

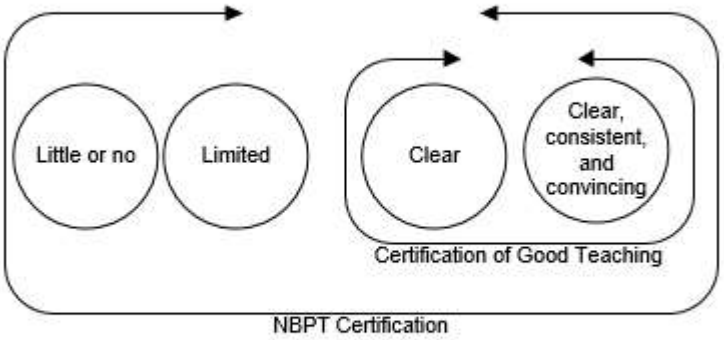


Figure 2.4 depicts the ratings used to score the knowledge assessment test and three portfolios exhibiting teaching practices submitted by high-quality teacher candidates.

NBPTS Teacher Effectiveness

NBPT certification has been studied from various perspectives using student achievement gains as an indicator of effectiveness. Multiple state studies indicated that student scores were higher for students taught by a National Board Certified Teacher (NBCT) compared to a non-NBCT (Chingos & Peterson, 2011; Clotfelter, Ladd & Vigdor, 2007; Goldhaber & Anthony, 2007; Cavaluzzo, 2004; Vandevoort, Amrein-Beardsley & Berliner, 2004). Most NBCT studies noted that minority and low-performing students had the greatest gains when taught by a NBCT. Other studies revealed mixed results in finding significant differences in effectiveness between NBCTs and non-NBCTs (Salvador & Baxter, 2010; Hass & Sass, 2009).

Harris and Sass (2009) examined the efficacy of NBPTS certification and the impact of Florida's National Board Certified Teachers (NBCTs) on student math and reading test scores. Four years of data (2001-2004) on teachers and students test scores in grades 3-10 were retrieved from the state education database. Over 6,300 teachers were identified as a NBCT and 2,700 of these teachers were chosen for the study based on the timing of their certification. By selecting teachers who received certification in 2004, the comparison of a non-NBCT in 2003 becoming a NBCT in 2004 provided an opportunity to study student achievement gains during the process of certification. Unfortunately, the findings did not support pre-certification differences or improved teacher effectiveness for newly certified NBCTs. Harris and Sass (2009) noted, "Although there is great potential for improving student outcomes by identifying superior teachers and offering differential rewards, we find relatively little support for NBPTS certification as a signal of teacher effectiveness in Florida" (Harris & Sass, p. 77). Further, no significant changes in student achievement were noted

between non-NBCTs and NBCTs in reading and math which may be related to similarities in teacher preparation and experience prior to certification. Harris and Sass suggested, “On average, teachers who at some point become NBPTS certified are more experienced and are more likely to have earned an advanced degree than their peers who do not obtain NBPTS certification” (Harris & Sass, p. 64).

Harris and Sass (2009) also compared the results to prior studies to determine why Florida were not experiencing student achievement gains similar to those reported by other states with high numbers of NBCTs. Harris and Sass (2009) proposed that student achievement differences may be related to unmeasured differences in the types of teachers who were choosing to attempt NBPTS certification, differences in state achievement tests, as well as differences in policy.

Salvador and Baxter (2010) explored the impact of different NBCT certification types aligned with North Carolina’s End of Grade (EOG) and End of Course (EOC) tests for grades 4-8 from 1998-2009. In 2007, North Carolina had 14,211 NBCTs, the highest in the country. The relationship between certification and teacher effectiveness was examined with a sample of 1,056 NBCTs from one North Carolina school district. Based on certified year, NBCTs were categorized into three-year cohorts and were evaluated the year before they sought NBCT certification, during the certification process, and after certification (Salvador & Baxter, 2010).

Findings suggested that National Board Certified Teachers (NBCT) were significantly more effective than non-NBCTs in Algebra II, Biology, Civics and Economics, Chemistry, and Geometry. No differences were found in English I and Algebra I. Salvador and Baxter (2010) posed several explanations for these mixed findings. First, “Since NBCTs generally

teach higher performing students than non-NBCTs, not being able to effectively control for prior achievement may inflate estimates of their effectiveness" (p. 1). Second, differences in teaching effectiveness for courses may be also be attributed to differences in knowledge of subject matter for NBCTs and non-NBCTs. As Harris and Sass (2009) noted, NBCTs tend to have more experience and education than non-NBCTs. Third, Salvador and Baxter (2010) noted the lack of differences in English I and Algebra I may be associated with factors that are not enhanced by National Board Certification, such as classroom management techniques or with the ability to engage students. Research conducted on teacher effectiveness before, during, and after earning National Board Certification did not reveal significant differences between NBCTs and non-NBCTs. Sample size was noted as being a potential factor. The findings supported prior research indicating that while National Board Certification may identify highly qualified teachers in terms of education and experience, but it does not necessarily improve teaching effectiveness or student achievement (Harris & Sass, 2009).

A multiyear study in Washington State revealed NBPT certified teachers have more success in improving student learning than non-certified teachers (Cowen & Goldhaber, 2015). In 2012, Washington had the 15th largest population of K-12 public school students in the United States and ranked fourth in the number of NBCTs with 6,739. The study sought to determine teacher effectiveness by assessment type and pass rates on the first certification attempt. Washington has a 60% first-time pass rate and an 83% three-year pass rate. The study compared 12,309 teachers at the elementary level including; successful applicants, unsuccessful applicants, and teachers who did not apply for certification. The researchers concluded from their findings that the relationship between a teacher's performance score on the NBPTS assessments corresponded to about 3-5 weeks of student learning gains for each

0.04-0.05 of standard deviation. Hence, teachers in the top 40% of the NBPTS assessment score distribution produced greater student learning gains than those in the bottom 60%. Based on the findings of this study, Cowen and Goldhaber (2015) stated that performance on the National Board assessments can predict student achievement with variations in results depending on assessment type and pass rates.

Evaluating teacher performance and assessing good teaching practices are important for improving student learning and engagement. However, understanding the teacher characteristics influencing good teaching practices requires an in-depth view of teacher perspectives and beliefs independent of student achievement.

Teacher Knowledge

Teacher Preparation

Certification requirements for a CTE teacher vary from state to state. According to the U.S. Department of Labor (2016), CTE teachers must have work experience in the subject they teach and a state-issued certification or license, which may require a bachelor's degree. Yet, research on the characteristics of CTE teacher preparation programs revealed a decline in both student enrollment and programs, increased certification requirements, and uncertainties related to CTE teachers being adequately prepared for curriculum integration (Fletcher & Gordon, 2017; Bruening, Scanlon, Hodes, Dhital, Shao, & Liu, 2001; Lynch 1990). Variances in CTE teacher certifications may be contributing to perceptions of CTE teacher preparedness. Fletcher and Zirkle (2010) reported that trade, industrial, and health occupations programs have alternate pathways to teacher certification/licensure, which included credit for work experience. The career clusters of agricultural, business and marketing, and family consumer sciences certifications follow traditional certification paths through a formal teacher

preparation program in the content area that leads to a bachelor's or master's degree (Zirkle, Fletcher, Sander, & Briggs, 2010; Fletcher & Zirkle, 2010; Zirkle, Martin, & McCaslin, 2007).

Fletcher and Gordon (2017) examined the status of CTE undergraduate and graduate programs in higher education institutions to determine enrollments based on program areas, teacher certification/licensure, and degree level. Findings suggested student enrollment in teacher preparation programs were declining despite the growing need for K-12 CTE teachers. Due to the low enrollments in program areas, some CTE content areas have been merged into one larger program to improve sustainability. Fletcher and Gordon (2017) suggested this survival strategy may also be a factor for CTE student and teacher recruitment in postsecondary programs. Student certification/licensure and degree levels revealed that students attending public land grant institutions were more likely to seek alternative teacher certification, while undergraduate and graduate students at private colleges tended to seek traditional teacher certification.

Many states have attempted to attract students to teaching by offering alternative certification programs (Boyd, Goldhaber, Lankford, & Wyckoff, 2007). However, the No Child Left Behind Act (NCLB, 2001) mandated every state prepare and recruit high-quality teachers to ensure every student was receiving a quality education. The federal legislation considered new teachers highly qualified if they received state certification and demonstrated content knowledge of the material they teach, either by passing a subject-area exam or by having an undergraduate major in that subject, or both (NCLB, 2001). In the state of Idaho, both certified teachers and experienced industry professionals can obtain a CTE endorsement to teach secondary CTE courses. Requirements include completing six CTE credit hours or a

combination of credit hours, in-service hours, and industry work experience. Although certified teachers are required to have a bachelor's degree, experienced industry professionals can obtain CTE certification based on credit hours, in-service hours, and industry work experience.

In 2015, the NCLB Act was replaced by the Every Student Succeeds Act (ESSA) to focus on preparing all students for success in college and career included the preparation of highly-qualified teachers (U.S. Department of Education, 2017). In 2017, the U.S. Department of Education amended the ESSA redacting the requirement that every student be taught by a highly qualified teacher. As such, state accountability measures no longer require student outcomes be tied to teacher performance:

> Because each State Education Agency (SEA) must only provide the statutory description based on school level data, many of the additional data requirements are not required, including the requirements to calculate, report, and address differences in the educator equity rates at the student-level (U.S. Department of Education, 2017).

Regardless of legislative perceptions of the importance of high-quality teachers, prior research on the correlations between teacher preparation and student success have yet to conclude a marked difference between traditional or alternative certified teachers (Ronfeldt, Reininger, & Kwok, 2013; Boyd et al., 2007). Exploring teacher characteristics in relation to certification paths and experience is important in understanding the teacher preparation and school preferences associated with high-quality CTE teachers.

Professional Development

According to Layfield and Dobbins (2002), the certification path of a teacher can be used as a predictor of professional development needs. Professional development has been defined as teacher learning that included changes in the knowledge, beliefs, and attitudes of teachers leading to the acquisition of new skills, new concepts, and new processes related to the work of teaching (Fishman, Marx, Best, & Tal, 2003). As such, meeting the professional development needs of a diverse group of teachers creates a conundrum for most educational leaders. For example, alternatively certified teachers may have basic professional learning needs in content areas while traditionally certified teachers may need help with integrating advanced scientific principles into curricula (Roberts & Dyer, 2004). When viewing the needs of CTE teachers; Cannon, Tenuto, and Kitchel (2013) reported that a CTE teacher's professional responsibilities extend beyond the classroom suggesting tailored in-service trainings were needed. Most CTE teachers and educational leaders surveyed in this study were responsible for the entire program including developing engaging learning activities in the classroom and laboratory, program budgeting, occupational analysis and curriculum development, supervising career and technical organizations (CTSOs), developing a recruitment and public relations plan, and other associated CTE activities (Cannon, Tenuto, & Kitchel, 2013). As a result, the professional development needs of CTE teachers are unique.

A study conducted on Idaho CTE teachers' perceptions of professional development needs indicated motivating students to learn and teaching students to think critically and creatively were a top priority (Cannon, Kitchel, & Duncan, 2012). Cannon, Tenuto, and Kitchel (2013) also investigated the professional development needs of CTE teachers as perceived by Idaho secondary principals. Again, the top two professional development needs

reported were motivating students to learn and teaching students to think critically and creatively. Both studies reported the use of digital tools and software as being less of a priority. However, other studies reported differences in CTE teacher professional development perceptions based on content areas. Agricultural education, technology education, and business education teachers' rated student motivation and critical and creative thinking skills higher than grant writing and funding opportunities (Cannon, Kitchel, Duncan & Arnett, 2011; Kitchel et al., 2009; Duncan, Ricketts, Peake & Uesseler, 2006). Conversely, family and consumer sciences, trades and industrial, business and marketing teachers rank grant writing and funding opportunities as the highest professional development need (Kitchel, Cannon, & Duncan, 2009).

As teachers grow professionally and gain experience, their beliefs and practices change in response to the environment in which they teach and learn (Stone & Lewis, 2012; Danielson, 2007). Although certification and experience may initially assist in determining professional development needs, teacher beliefs and practices may provide a deeper understanding of critical learning needs of high-quality teachers.

Teacher Beliefs

Teacher self-efficacy can be understood as the belief a teacher holds about self-ability regarding instruction and student engagement (Bandura, 1977). Generally, successful experiences increase self-efficacy beliefs such as motivation, while experiences of failure may lower a teacher's motivation to teach. Low self-efficacy is often associated with teacher attrition and burn out, which translates to negative effects on student educational outcomes (O'Neill & Stephenson, 2011). Other studies on teacher self-efficacy concluded that teacher beliefs were most malleable early on in a teacher's career. The development of mastery skills

such as motivation to teach and instructional methods may develop and solidify as a teacher's self-efficacy beliefs within the first three years of teaching (Klassen & Durksen, 2014; Tschannen-Moran & Hoy, 2007; Hoy & Spero, 2005).

Teacher Self-Efficacy

Teacher efficacy beliefs (i.e., teacher self-efficacy) can be defined as a teacher's beliefs and perceptions about their ability to teach students with varying needs and qualifications (Klassen & Durksen, 2014; Tschannen-Moran et al., 2007) and bring about desired student engagement and learning outcomes (Bandura, 1997). Research on teacher self-efficacy began in the 1970s with the intent of linking student achievement to a teacher's practice and beliefs. The certainty teachers have about their capability to help students succeed in the classroom was one of the key motivation beliefs influencing student learning (Klassen, Tze, Betts, & Gordon, 2011). Teacher efficacy beliefs may also be different because of certification, experience, and the learning environment. The study of teacher self-efficacy is complex because self-efficacy can vary from task to task and is also influenced by the subject matter (Bandura, 1986). How researchers define self-efficacy may vary because teacher self-efficacy is also context specific (Tschannen-Moran & Hoy, 2007; Bandura, 1997).

Some previous studies have shown teacher interest and subject knowledge may predict teaching efficacy beliefs (Ekstam, Korhonen, Linnanmaki, & Aunio, 2017; Long & Hoy, 2006). However, studies focusing on subject knowledge and efficacy beliefs have not controlled for the possible confounding effects of other teacher characteristics. In an attempt to understand the impact of teacher characteristics, most studies were limited to teachers of one subject or compare teachers within the same environment or field and examined only a

few teacher characteristics or tasks (Tsouloupas, Carson, & MacGregor, 2014; Duncan, Cannon, & Kitchel, 2013; Wheatley, 2002; Emmer & Hickman, 1991). Nonetheless, measuring teacher self-efficacy requires an understanding of teachers' beliefs about current and future abilities.

Gibson and Dembo (1984) developed the Teacher Efficacy Scale (TES) to measure teacher efficacy. While the TES instrument and modified versions were widely used for studying teacher self-efficacy (Klassen et al., 2011), criticisms of the Teacher Efficacy Scale related to validity were commonly reported in the literature (Klassen et al., 2011; Tschannen-Moran & Hoy, 2001). Depending on the content or subject-matter under study, the TES consistently produces two factors that may or may not be related or are difficult to define. The first factor was Personal Teaching Efficacy (PTE) which most agree consistently measures a teacher's competence belief. The second factor, General Teaching Efficacy (GTE) was more controversial because of its universal application for potential and often unrealized outcomes.

Riggs and Enochs (1990) defined GTE as an outcome expectancy measure based on what a teacher was expected to accomplish. Tschannen-Moran and Hoy (2001) concluded the GTE measured what a teacher felt capable of delivering. However, Bandura (1997) stated the GTE measured motivation beliefs that were associated with self-efficacy rather than an expected outcomes measurement. Conceivably, assessing self-competency (knowledge and skills) and motivation in practice (beliefs) may best illustrate the attributes of teacher self-efficacy.

In response to the measurement issues with the Teacher Efficacy Scale, Bandura (1997) developed a Teacher Self-Efficacy Scale (TSES) to ascertain how teachers perceived their ability to overcome difficulties in their teaching environment. However, the TSES did

not fully represent the kinds of tasks that typically make up a teacher's professional tasks. In response to the TSES's limitations, Tschannen-Moran and Hoy (2001) adopted the TSES's measurement scale and revised the instrument into the Ohio State Teacher Efficacy Scale (OSTES) which included more relevant teacher tasks and elements of teaching. Tschannen-Moran and Hoy (2001) concluded the OSTES addressed the TSES limitations by using a broader range of teaching tasks for efficacy including instructional strategies, student engagement, and classroom management. Tschannen-Moran and Hoy (2001) suggested the OSTES continue to be acknowledged as the Teachers' Sense of Efficacy Scale (TSES) and was referred to as the TSES in subsequent studies.

A study of agricultural teachers in West Virginia sought to understand how motivation to teach was related to a teacher's experience in the classroom (Rice, LaVergne, & Gartin, 2011). Results suggested that the motivation to teach was influenced by highly motivated students, good classroom and laboratory conditions, and a sense of aiding in student success and achievement. In contrast to the reported motivational factors, Rice et al. (2011) identified demotivation factors as a lack of student motivation, student discipline problems, and the practice of guidance counselors dumping low-performing students into CTE courses. Keigher (2010) indicated that the choice to continue teaching was based on the teaching environment and the support a teacher received during the first three years of teaching. Consequently, the teacher self-efficacy, which included the motivation to teach, may also impact student learning and engagement.

Duncan et al. (2013) explored the teaching and learning self-efficacy of CTE teachers in Idaho. Early to mid-career teachers were surveyed to determine if a teacher's perception of competency in teaching and learning can be correlated to traditional or alternate teacher

certification. Differences were found in teaching problem-solving and decision-making skills between teachers who completed a traditional teacher preparation program and those who completed an alternative occupational teacher preparation program. Traditionally certified or non-certified teachers tend to focus on pedagogical theories and incorporate computer technology in teaching while certified CTE teachers tend to focus on their prior work experience with little or no use of computer technology.

Teacher Mindset

Another factor impacting teacher beliefs is whether or not a teacher believes intelligence is fixed at birth (Blackwell, Trezesniewski, & Dweck, 2007; Dweck, 2000). Dweck (2000) described mindset as a belief of whether or not one's intelligence can be changed. Teachers with a growth mindset believe intelligence can be improved or changed through effort and persistence, tend to seek challenges, demonstrate effort and rebound from mistakes (Dweck, 2007). In contrast, those who believed intelligence was fixed, tended to avoid making mistakes, believed that demonstrating effort signals low ability, and recovered poorly from setbacks (Dweck, 2007). Blackwell, Trezesniewski, and Dweck (2007) reported that a teacher's viewpoint on intelligence was conveyed to students whether intended or not.

Plaks, Stroener, Dweck, and Sherman (2001) measured teacher beliefs on intelligence to determine growth and fixed mindset characteristics. Results indicated a teacher with a growth mindset was open to change and believed students could also change their intelligence. Whether a teacher had a growth or fixed mindset also affected the amount of instructional support a teacher offered to students. Teachers with a fixed mindset were less likely to increase instructional support. Rattan, Good and Dweck (2012) explored the potential impacts of mindset using Comfort Theory as an indicator of a fixed mindset. When a

student demonstrated difficulty, teachers with a growth mindset recognized a student's ability to learn and sought new teaching practices to engage students in learning. Teachers with a fixed mindset recognized the same student as a low-achiever and consoled the student for his or her lack of aptitude, which in turn served to demotivate student learning. Hence, the mindset of the teacher may influence a teacher's ability to recognize the importance of adapting teaching methods to meet student needs (Plaks et al., 2001; Blackwell et al., 2007; Rattan, Good & Dweck, 2012).

Teacher self-efficacy and teacher practice are often studied together because how strongly a teacher perceives his or her abilities affects the development of good teaching practices. Understanding self-efficacy in relation to teacher practice and other teacher characteristics provides an in-depth view of complementary beliefs and teacher practices possessed by high-quality CTE teachers.

Teacher Practice

Identifying the best practices leading to quality teaching is a complex task because of the difficulty in evaluating teacher practices independent of student learning. Prior studies used teacher quality, good teaching, teaching effectiveness, and teacher practices interchangeably with student achievement as a measure of success (Wiswall, 2013; Hanushek, 2011; Clotfelter, Ladd, & Vigdor, 2007; Darling-Hammond, 2000). In addition, student achievement, good teaching, good teachers, and teaching characteristics were intertwined with studies on teacher preparation (Ronfeldt et al., 2013; Hollins, 2011; Boyd et al., 2007) and professional development (Heller et al., 2012; Wallace, 2009; Fishman et al., 2003). Further, some studies examined the relationship between professional development and teacher practice, or the relationship between teacher practice and student achievement with few

studies examining all three (Harris & Sass, 2011). As such, research defining best teaching practices can be illusive when correlating one or two teacher characteristics to student outcomes. According to NBPTS (2018), teachers meeting the highest standards in the profession of teaching have demonstrated NBPTS's five core propositions:

1. Teachers are committed to students and their learning.
2. Teachers know the subjects they teacher and how to teach those subjects to students.
3. Teachers are responsible for managing and monitoring student learning.
4. Teachers think systematically about their practice and learn from experience.
5. Teachers are members of learning communities.

Quality Teaching

State and national educational organizations have created specific learning standards such as the common core standards to ensure that teacher practices meet the needs of students. While the standards set grade-specific goals, they do not define how the standards should be taught or which materials should be used to support students (CCSS, 2017). Undoubtedly, the profession of teaching has a history of professional autonomy where teachers are expected to devise their own methods drawing from their training and experience to meet the established goals (Danielson, 2007). Yet, teacher credentials and experience alone do not explain the multiple variations that encompass teacher quality (Cowan & Goldhaber, 2015).

Summary

Prior research supported quality teaching as a necessary component for effective student learning and engagement. Performance ratings used to determine good teaching practices and quality teachers were based on what a teacher knows and does in the classroom

using student learning as an indicator of quality. Further, studies aimed at determining variations among good teachers have mixed results because student achievement was viewed as a dependent characteristic of quality teachers. Consequently, prior studies on teacher knowledge and skills, beliefs, and practices have limited value for understanding the characteristics of and among high-quality teachers. To explore and inventory the teacher characteristics of a high-quality teacher, a study of Idaho CTE high-quality teacher characteristics independent of student success measures is warranted.

CHAPTER 3

Methodology

The methodology for this study included the purpose and description of the study, selection of the population, the instrument and survey methods employed, and the data analysis chosen to explore the characteristics of high-quality Idaho CTE teachers.

The purpose of this study was to explore and inventory the characteristics of Idaho's high-quality CTE teachers. Because Idaho's CTE students graduate at a higher rate than the state average, Idaho's CTE teachers may be viewed as high-quality teachers meeting student learning outcomes. Thus, exploring the knowledge and skills, beliefs, and practices of all Idaho CTE teachers is a necessary step that supports the identification of high-quality CTE teacher characteristics. Specific objectives that guided the study:

1. Identify teacher demographic characteristics of Idaho CTE teachers.
2. Explore the relationships between CTE teacher characteristics, quality teachers, and good teaching practice; and
3. Establish an inventory of high-quality teaching practices of Idaho CTE teachers.

This chapter includes a description of the study, description of the instrument, the methods used for data collection, and data analysis.

Description of Study

All Idaho secondary CTE teachers certified to teach CTE courses were surveyed to explore and inventory the teacher characteristics of high-quality CTE teachers. Although understanding why CTE students graduate at a higher rate than non-CTE students was posed as a justification for the study, it was determined that a comparison of teacher characteristic data to student success measures was outside the scope of this study. This study focused on

identifying high-quality characteristics of Idaho's CTE teachers independent of student success outcomes.

A quantitative research design guided the study. Creswell (2009) indicated that quantitative research is a means for testing objective theories by examining relationships among variables. Creswell stated, "These variables, in turn, can be measured, typically on instruments, so that numbered data can be analyzed using statistical procedures" (p. 4.).

This study used a descriptive design. Leedy and Ormrod (2001) noted that descriptive research allows the researcher to study what existed without making changes or modifications. In addition, Simon and Goes (2013) indicated a descriptive design systematically described the facts and characteristics of a given population.

Population

To establish an inventory of teacher characteristics, Idaho's CTE teacher population was chosen for survey. A population has been defined by Dillman, Smyth, and Christian (2009) as all individuals within the targeted group or unit being studied. Identification of Idaho's CTE teachers was determined by obtaining a list of teacher email addresses from the Idaho Division of CTE. As of February 2018, there were 770 certified secondary CTE teachers in the state of Idaho. The completed sample population was determined by the number of surveys returned by non-retired CTE teachers indicating the number of CTE teachers willing to be included in the study. Because the e-mail list had not been verified as whether or not a participant had retired from teaching or if the email address was valid, the number of teachers who received the survey and the number of teachers intended to be participants in the study varied from the original list of 770 certified secondary CTE teachers.

Instrument

A CTE Teacher Characteristic Inventory (CTE-TCI) containing 68 questions with 74 items was developed to identify the characteristics of Idaho CTE teachers with the ability to disaggregate teacher characteristics (e.g. knowledge, beliefs, and practices) by various constructs. According to Creswell (2009) a survey design provides quantitative descriptions of trends within a population identified by program or professional affiliation. Development of the survey was guided by the review of relevant literature for this study and a review of tailored survey design strategies (Dillman et al., 2009). Questions were crafted from previous research studies exploring teacher self-efficacy, mindset, preparation, student preferences, teacher quality, teacher locale, and professional development needs (Litchenberger, White, & DeAngelis, 2015; Gutshall, 2014; Duncan et al., 2013; Ronfeldt et al., 2013; Cannon et al., 2012; Tschannen-Moran & Hoy, 2001; Dweck, 2000).

Demographics and Knowledge

The demographic section of the CTE-TCI contained 15 closed-end questions. Participants were asked to provide information on gender, age, ethnic identity, education, NBPT certification, teaching region, length of teaching, CTE program area, years of experience, teaching continuance, school preference, school size, and employment status. Two additional items were added to determine a teacher's preference to return to their home town to teach. Lichtenberger et al. (2015) conducted a study of new teacher locale characteristics in Illinois. Findings suggested that students in some districts were more likely to enroll in college and enter the teaching profession in the same region as the high school they attended than others revealing geographical differences between regions. For this study,

home town was defined as teaching at or within 25 miles of where a teacher graduated high school.

Teacher Beliefs

Teacher beliefs were collected using two previously tested instruments (17 questions) and one question with seven items specific to the purpose of CTE courses. The first instrument, Tschannen-Moran and Hoy's (2001) Teachers' Sense of Efficacy Scale (TSES) used a 5-point Likert scale ranging from "Nothing" to "A Great Deal" to ask twelve questions related to a broad range of teaching tasks for efficacy with three consistent correlated factors: instructional strategies, student engagement, and classroom management. The TSES has been examined in multiple studies confirming reliability measures of 0.82 for engagement, 0.81 for instruction, and 0.72 for management. (Nie, Lau, & Liau, 2012; Tschannen-Moran & Hoy, 2001).

The second instrument, Dweck's (2000) Mindset Scale Survey (MSS), was selected to collect information on a teacher's belief in one's capacity to learn. The MSS consists of three questions and has a high internal consistency (alpha ranging from .94 to .98) and a high test-retest reliability of .80. Two additional questions were added but not scored, to control for redundancy. Gutshall (2014) included the two additional questions when surveying pre-service teachers with no change in reliability of the MSS.

The final question asks participants to select statements that agree with their beliefs about the purpose of the CTE courses they teach such as "encourage students to stay in school" and "prepare students for advanced education". Seven statements were provided.

Teacher Practice

Participants were asked thirty questions regarding their practice relating to teaching methods, time spent on preparation, and professional development activities. Using a 6-point Likert scale of "strongly agree" to "strongly disagree", participants were asked ten questions with five of these questions related to students taught and five related to a teacher preference for students taught (e.g., "The majority of my students need extra help" or "I prefer to teach high ability students"). An additional ten questions collected information on teaching methods such as "in teaching I use video courses" or "I integrate life skills into the curriculum". Five questions asked for weekly hours devoted to teaching activities such as "grading" or "club advisement". The remaining five questions collected information on time spent on professional development activities for the past two years.

Content Validity

Zamanzadeh et al. (2015) defined content validity as the ability of selected items to reflect the variables of the construct as recommended by the panel of experts. Because the CTE-TCI instrument contained questions that were not validated, an expert panel was used to establish content validity. Content validity can be defined as the ability of the selected items to reflect the variables of the construct in the measure (Newman, Lim, and Pineda, 2013).

A panel of five CTE professionals with expertise in various CTE program areas evaluated the survey items pertaining to teacher practices including professional development activities. Lawshe's (1975) content validity measure was selected to develop the rating instrument and identify items with content validity. Lawshe's (1975) content validity ratio is widely used to establish and quantify content validity in educational research (Ayre & Scally, 2014). Excluding the 15 demographic questions and the 17 questions for the validated

instruments (i.e. TSES and Mindset), 51 items were presented to the expert panel to rate as essential, useful but not essential, or not necessary. Lawshe's (1975) content validity ratio (CVR) was used to determine each item's *content validity rating*.

$$CVR = \frac{n_e - (N/2)}{N/2}$$

CVR is the content validity ratio, n_e is the number of panel members indicating an item is essential, and N is the number of panel members. Lawshe (1975) suggested using a 95% confidence level to determine an accepted value of CVR. For a panel of five, the CVR value is 1.0 meaning all panel experts must rate the item as essential. Of the 51 items presented, 19 were rated as "essential" with a CVR of 1.0, 15 items received four ratings of "essential" and one rating of "useful, but not essential "with a CVR of 0.60, and the remaining 17 items received at least one "not necessary" rating with CVR's ranging from 0.2 to (-0.6).

Lawshe (1975) reported that items with a CVR of >0.50 indicate some degree of content validity is present, while a CVR score of 1.0 provides more assurance of content validity. However, Zamanzadeh et al., also recommended the researcher ensure the selected items are still reflective of and relevant to the research questions before inclusion in the survey instrument. Items were reviewed in each section of the survey to determine whether or not enough items had a CVR of at least 0.60 to achieve relevancy.

In the CTE Student Description section, only one item received a CVR of 1.0 and 2 items received a CVR of 0.60. The Student Preference section did not contain items with a 1.0 CVR and only one item achieved a 0.60 CVR. It was determined that both the *CTE Student*

Description and *Student Preference* sections did not have enough items with content validity to be included in the CTE-CTI.

The *CTE Teaching Methods* section contained sufficiently representative items with eight items receiving a 1.0 CVR. The *Out-of-Classroom Activities* section also contained sufficiently representative items with a 1.0 CVR. The *Professional Development* section contained six items related to measuring time spent on professional development activities that were then listed again to be rated as "extremely important" to "not important at all" for a total of twelve items. Only one item received a 1.0 CVR in both subsections and one item received a 1.0 CVR for the importance rating. However, professional development is considered to be a significant part of a teacher's practice and may be influenced by a teacher's belief of importance (Danielson, 2007). As such, six items, three in each category, had a CVR of 1.0 or 0.60. The remaining six items received less than a 0.6 CVR in one or both sub sections and were eliminated.

The last section on the *Purpose of CTE Courses* had a sufficient number of 1.0 CVR items. One item related to advanced education received a 0.60 CVR and was included for relevance purposes. The item was reworded for clarity.

After review, 29 items were eliminated and 4 items with a CVR of 0.60 were included resulting in 22 items remaining with significant representation and relevance to the research questions supported by the literature review. The results for content validity ratios of proposed items can be found in Table 3. Items eliminated are shaded in gray.

Table 3.1

Content Validity Ratio (CVR) of the CTE Teacher Characteristics Inventory (CTE-TCI) Proposed Items

Items	CVR
CTE Student Description	
1. The majority of my students will graduate high school	0.6
2. The majority of my students are female	-0.2
3. The majority of my students are male	-0.2
4. The majority of my students are usually on task	0.6
5. The majority of my students usually need to be motivated	1.0
6. The majority of my students need extra help	-0.6
Student Preference	
7. I prefer to teach a racially diverse population	-0.2
8. I prefer to teach high ability students	-0.2
9. I prefer to teach English language learners	-0.2
10. I prefer to teach low-achieving students	-0.2
11. I prefer to teach motivated students	0.6
CTE Teaching Methods	
12. Use multimedia equipment	1.0
13. Use video courses	0.2

Table 3.1 Continued

Content Validity Ratio (CVR) of the CTE Teacher Characteristics Inventory (CTE-TCI) Proposed Items

Items	CVR
14. Use web-based instruction	0.2
15. Teach safety standards	1
16. Teach problem-solving skills	1
Out-of-classroom Activities	
17. Teach decision-making skills	1
18. Teach presentation skills	0.2
19. Integrate life skills into the curriculum	0.6
20. Motivate students to learn	1
21. Teach using experiments	0.2
22. Establish measurable outcomes	1
23. Work individually with students to develop their personal goals	0.6
24. Involve students in collaborative inquiry	0.6
25. Assess student learning	1
26. Assess student performance	1
27. Class preparation	1
28. Grading	1
29. Club advisement	0.6
30. Supervising out of class projects	1

Table 3.1 Continued

Content Validity Ratio (CVR) of the CTE Teacher Characteristics Inventory (CTE-TCI) Proposed Items

Items	CVR
31. Field trips	0.6
32. Visits with potential employers	1
33. Number of times you met with a mentor	0.2
34. Number of workshops attended	0.6
Professional Development Activities	
In the past two years:	
35. Number of seminars attended	0.6
36. Number of professional conferences attended	0.6
37. Number of times you collaborated with experts in your CTE field	1
38. Number of hours worked in your CTE field to gain experience?	0.6
Mentoring Activities	
39. Mentoring experiences	0.6
40. Workshops	1
41. Seminars	0.2
42. Conferences	0.2
43. CTE field collaboration	1.0
44. Working in CTE field	0.6

Table 3.1 Continued

Content Validity Ratio (CVR) of the CTE Teacher Characteristics Inventory (CTE-TCI) Proposed Items

Items	CVR
Purpose of CTE courses	
45. Encourage students to stay in school	0.2
46. Provide more hands on learning opportunities	1
47. Augment other academic courses	0.2
48. Encourage students to explore career options	1
49. Prepare students for employment after high school graduation	1
50. Prepare students for advanced education	0.6
51. Encourage students to attend college	-0.2

Eliminated items are shaded in gray.

Based on comments and recommendations made by the panel of experts, the professional development and purpose of CTE courses questions were modified. “How many times have you met with a mentor” was eliminated in favor of a new section asking six questions related to being a mentor, having a mentor, and beliefs about the impact mentoring has on one’s own teaching career. Dunbar and Kinnersley (2011) reported that mentoring relationships between teachers and educational leaders prepared teachers for leadership and improved teacher retention. White and Smith (2012) agreed that professional development

opportunities, such as mentoring, empowered teachers to prepare for the advanced roles they desired in their CTE program area.

The measurement of the purpose of CTE courses section was changed to a ranking method of 1 to 4, with 1 being the most important. A final open-ended question was added asking participants to indicate what three characteristics a CTE teacher should have to be considered a great teacher.

Electronic Survey Procedures

An electronic version of the CTE-TCI was developed using Qualtrics® software (Appendix A). A link to the survey was emailed to 771 Idaho CTE teachers on May 2, 2018. Dillman et al. reported, "Email has become the standard method for communicating in most work organizations and for many individuals" (p. 9). The first page of the Qualtrics® survey was the informed consent form. Participants could click on the "I accept" tab representing their digital agreement to participate. Respondents who clicked on the "I do not agree" tab were thanked for their time but were not advanced to the survey. A thank you letter was also sent to responders after the survey was closed. This study was approved by the University of Idaho Institutional Review Board (Appendix B).

The first survey reminder was sent to unfinished and non-responders on May 9. Unfinished and non-responders were sent a final reminder on May 16. The survey closed at midnight on May 22, 2018, with 402 teachers responding to the survey resulting in a 52.14% response rate. Five teachers opted out, 15 consented to take the survey but did not answer any questions, 28 partially completed the demographic section, and 9 exited the survey after completing the demographic section. The survey was completed by 345 teachers resulting in a 44.75% completion rate.

Data Analysis

Items considered prior to data collection were factor analysis, sample size, a factor model and estimation method, a method to determine the number of factors, and the rotation criterion. The specific research questions were:

1. What are the teacher demographic characteristics of Idaho CTE teachers?
2. What relationships exist between CTE teacher characteristics, quality teachers (NBCT), and good teaching practices?
3. What are the high-quality teaching practices of Idaho CTE teachers?

Factor Analysis

Flora and Curran (2004) reported *Confirmatory Factor Analysis* (CFA) and *Exploratory Factor Analysis* (EFA) are commonly used in social science research to identify and examine the relationship between variables. Further, Cudeck and MacCallum (2007) confirmed that both CFA and EFA have been widely used to investigate variables for instrument development. As such, a review of both proposed analyses was conducted to determine if one or both analyses are appropriate for this study.

Child (2006) indicated CFA attempts to confirm hypotheses using path analysis diagrams to represent variables, whereas EFA tries to uncover complex patterns by exploring the dataset. Schmitt (2011) reported the generally accepted purpose of EFA is to identify factors without hypothesis while CFA is primarily used to prove hypothesized models using the predetermined factors identified by EFA. Cudeck and MacCallum (2007) also confirmed the use of CFA being appropriate if the research questions are hypothesized using predetermined factors, noting that EFA may also be used to confirm CFA results. However, this study only sought to identify factors and categorize relationships to create an inventory of

high-quality CTE teacher characteristics. The researcher recognized the results of this study may serve to provide predetermined factors for future research designed to test hypotheses or theories using CFA. Since no hypotheses are posed in this study, EFA was selected for factor analysis.

XLSTAT 2018® data analysis software and Stats iQ® were used to analyze the dataset utilizing preset analysis choices that include descriptive statistics, principal factor analysis, Cronbach's Alpha, Pearson's Correlation, and Varimax rotation to identify correlations among factors. Prior studies on EFA confirm that principal factor analysis using Cronbach's Alpha and Pearson's Correlation are appropriate choices for extracting factors, selecting the number of factors to retain, and identifying correlations between factors (Schmitt, 2012; Williams et al., 2010; Cudeck & MacCallum, 2007).

Sample Size

The literature indicated a variety of recommendations to determine appropriate or adequate sample sizes of factors in an EFA. Williams et al. (2010) observed that the participant per-item ratios suggested by researchers vary from 3:1, 6:1, 10:1, 15:1, and 20:1. Some researchers have even advised against strict adherence to a rules-of-thumb approach given that the minimal sample size for an EFA is discovered after the completion of data analysis (Cabrera-Nguyen, 2010; Henson & Roberts, 2006). Dillman et al. (2009) concluded that a completed sample size for a population can be determined once participants have been screened for inclusion in the study.

Dillion (2001) provided a formula to ascertain whether or not an adequate sample of the population under study has been achieved. For a population of 771 teachers, 248 completed surveys are required to achieve a 95% confidence level with a 5% margin of error. A 3% margin of error requires a completion rate of 448 surveys. The number of surveys

returned by the intended population was 402, with 345 completing the survey. Given the total response and completed surveys both fell within the 5% margin of error, it was determined that an adequate sample had been obtained to begin data analysis.

Procedures for handling late responders, nonresponders, and nonresponse error as a threat to external validity were adopted using "Days to Respond" as a variable (Lindner, Murphy, & Briers, 2001). "Days to respond" were coded as a continuous variable and used as an independent variable. Lindner, Murphy, and Briers (2001) recommended using a minimum of 30 late responses. Thirty-one late responses were selected to determine external validity.

Summary

Establishing an inventory of Idaho CTE teacher characteristics will provide data for continued research. Overall this research will add to the body of knowledge by identifying teacher characteristics that contribute to the readiness of Idaho high school students to pursue further postsecondary educational opportunities and enter the workforce of the 21st century.

The results of this study are found in Chapter 4 and the conclusions and recommendations are found in Chapter 5.

CHAPTER 4

Findings of the Study

The findings of the study are divided by demographics and high-quality teacher characteristics. The chapter concludes with a discussion of the data supporting the generalizability of the study. Specific objectives that guided the study:

1. *Identify teacher demographic characteristics of Idaho CTE teachers.* The demographic section of the CTE-TCI has been divided into three categories: Basic, career, and school location. Demographics are summarized in Tables 4.1 – 4.4.
2. *Explore the relationships between CTE teacher characteristics, quality teachers, and good teaching practice.* The relationships between CTE teacher characteristics, quality teachers, and good teaching practices are explored in the teacher practice, teacher self-efficacy, mindset, and the professional development sections (Tables 4.5 – 4.14)
3. *Establish an inventory of high-quality teaching practices of Idaho CTE teachers.* The inventory of high-quality teaching practices of Idaho CTE teachers is compiled in Figure 5.1.

Demographic Characteristics of Idaho CTE Teachers

Basic Demographics

The basic demographics of CTE teacher characteristics included gender, age, ethnic identity, and employment status. Of the 345 teachers who responded, 173 (50.1%) were female and 172 (49.9%) were male. Less than 16% were below the age of 35 with 34.6% between the ages of 35 and 54. Those considered to be in range of retirement, age 55-74 totaled 81 (23.5%) with 11 CTE teachers (3.2%) ranging in age from 64-74. One teacher did

not respond to the question. Almost all (341) respondents indicated their ethnic identity. The majority, 330 teachers, indicated they were White (96.8%), three were Hispanic (2.1%), 1 was Asian American (0.3%), and seven indicated other (0.9%). All 345 teachers completed the employment status question with two teachers responding unemployed or retired. The majority were employed full-time (94.8%) with 4.6% employed part-time. Basic demographics are summarized by program area in Table 4 and by region in Table 7. The program area of Individualized Occupational Training was eliminated because it was not a program area identified by any respondents.

Table 4.1

Selected Basic Demographics by CTE Program Area

Category	Agriculture	Business	Engineering	Family	Health	Skilled	Total
Gender							345
Female	21	55	14	45	33	5	173
Male	40	40	34	0	7	51	172
Age							345
18-24	1	2	0	0	0	0	3
25-34	20	8	4	4	9	4	49
35-44	18	20	10	10	13	10	81
45-54	11	37	19	17	11	24	119
55-64	10	24	12	14	7	14	81
65-74	1	4	3	0	0	3	11
Employment							345
Full-time	60	93	47	38	35	54	327
Part-time	0	2	1	6	5	2	16
Unemployed	0	0	0	1	0	0	1
Retired	1	0	0	0	0	0	1

Note: Total number of responses received indicated in the total column of each category. Ethnic identity not reported by program area to maintain respondent confidentiality.

Career Demographics

The total number of teachers in each CTE program area was indicated by respondents as 95 in Business and Marketing, 61 in Agriculture and Natural Resources, 56 in Skilled and Technical Sciences, 48 in Engineering and Technology, 45 in Family and Consumer Sciences and 40 in Health Sciences. A summary of CTE career demographics by program area can be found in Table 4.2 and by region in Table 4.4.

Of 343 responses received for CTE certification, (27%) indicated they had an industry-based certification to teach CTE courses. The majority certified with a bachelor's degree (37.9%) or a master's degree (35.6%). The highest degree or postsecondary certifications earned by the 345 CTE teachers responding indicated 45.2% had a bachelor's degree, 40% had a master's degree, 7.5% had an industry certification, 3.8% had an associate's degree, 2% had an educational specialist degree, and 1.4% had a doctorate degree. The question related to degree year was discarded due to a validation error which prevented valid data entry. Thirty-eight teachers indicated they had received NBPT certification

Of the 343 teachers indicated the number of years they have been teaching CTE courses: more than 20 years (24.2%); more than 10 years (27.4%); more than 5 years, but less than 10 years (17.5%); more than 3 years, but less than 5 years (15.7%); more than one year, but less than 3 years (13.4%), and less than one year (1.7%).

When asked "how many more years do you plan to teach in your CTE program area", of the 341 teachers responding, 133 (39%) indicated they planned to teach until retirement. The remaining teachers indicated they planned to teach as follows: 11 years of more (31 or 9.1%); 6-10 years (73 or 21.4%); 3-5 years (62 or 18.2%); 1-2 years (22 or 6.5%); and 20 (5.9%) indicated less than one year.

Table 4.2

Career Demographics by CTE Program Area

Category	Agriculture	Business	Engineering	Family	Health	Skilled	Total
CTE Cert.							343
Bachelor's	37	36	13	28	8	8	130
Industry	10	5	15	3	20	38	91
Master's	14	53	20	13	12	10	122
Highest Degree							345
Bachelor's	431	32	20	29	16	16	156
Master's	170	57	24	14	13	13	138
Industry	0	0	1	2	5	18	26
Associate's	0	0	1	0	6	6	13
Ed Specialist	0	5	0	0	0	2	7
Doctorate	1	1	2	0	0	1	5
NBPT Cert.	9	9	2	7	6	5	38
CTE Courses							343
<1 year	0	20	1	0	2	1	6
≥1 year<3	7	10	6	6	11	6	46
≥3 years<5	11	11	8	4	8	12	54
≥5 years<10	13	12	6	11	5	13	60
≥10 years<20	15	34	10	9	12	14	94
≥20 years	15	25	17	15	2	9	83
Cont. w/Prog							341
0-1 year	3	5	5	2	2	3	20
1-2 years	4	6	5	2	0	5	22
3-5 years	16	14	5	11	8	8	62
6-10 years	5	24	10	12	10	12	73
>11 years	1	0	0	0	0	0	1
Until retired	29	37	17	11	16	23	133

Note: Total number of responses received indicated in the total column of each category

School Location Demographics

The state of Idaho's K-12 school districts are identified within six regions (Figure 4.1). Because some school districts have lower student populations and fewer CTE programs, data was analyzed by region to maintain the confidentiality of CTE teachers responding to the survey.

Figure 4.1 State of Idaho Regions

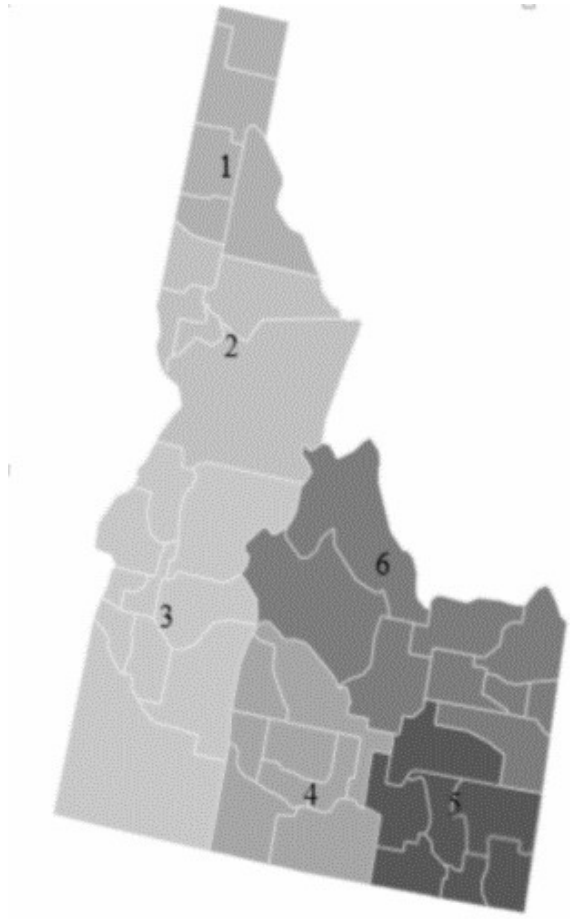


Figure 4.1 provides a visual view of Idaho's six regions containing K-12 schools. (State of Idaho, 2017)

Of the 342 CTE teachers responding to the question on region, 132 (38.6%) teach in Region 3, followed by 62 (18.1%) in Region 4, with Regions 1, 5, and 6 being equal (39/11.45), and Region 2 with 31 CTE teachers (9.1%). Of the 334 teachers responding to the

question on length of anticipated service in their current district, only 106 (31.5%) plan to teach in their current school district until retirement; 33 (9.8%) plan to teach 11 or more years; 67(19.9%) plan to teach 6-10 years; 66 (19.6%) plan to teach 3-5 years; 39(11.6%) plan to teach 1-2 years; and 26 (7.7%) plan to teach less than one year in their current school district.

The high school student population where a CTE teacher teaches exceeded 500 for 190 CTE teachers (55.4%); 65 (19%) of CTE teachers indicated the student population to be more than 250 students, but less than 500; and 88 (25.7%) of CTE teachers reported their high school has a student population of less than 250 students. Two CTE teachers did not respond to the question.

The number of miles between the high school from which a CTE teacher graduated and the high school in which he or she teaches received 344 responses with 199 teachers (57.8%) reporting they work more than 60 miles from where they attended high school. In contrast, only 46 (13.4%) indicated they teach at the same high school from which they graduated with 68 (19.8%) indicating they were within 25 miles. The remaining teachers reported teaching at a high school more than 25 miles away with 12 (3.5%) at least 26 miles, but less than 40 miles; and 19 (5.5%) at least 41 miles, but less than 60 miles from their hometown high school. The majority of teachers were not teaching in the same town/city where they attended high school with 264 (77%) responding no and 79 (23%) responding yes. Two teachers did not answer this question. School location demographics are summarized in Table 4.3 by region and CTE program area in Table 4.5.

Table 4.3

School Location Demographics by Idaho Region

Demographic/ Region	1	2	3	4	5	6	Total
Gender							342
Female	17	16	66	35	19	18	171
Male	22	15	66	27	20	21	171
Continue in School District							334
0-1 year	2	2	8	6	3	4	25
1-2 years	34	4	15	7	4	6	39
3-5 years	7	4	27	12	5	9	64
6-10 years	75	7	24	9	13	7	67
>11 years	51	3	12	8	3	2	33
Until retired	14	11	45	18	10	8	106
School Population							340
<250 students	9	16	24	17	8	5	65
≥250< 500	6	6	23	13	12	14	88
≥ 500 students	24	9	85	32	17	20	187
Hometown High School							340
Teaching at	11	9	22	14	15	7	78
Not teaching at	27	22	110	48	24	31	262
Miles From							342
0 miles	6	9	8	8	9	6	46
≤ 25 miles	9	2	26	16	6	9	68
≥26 < 40 miles	2	2	6	1	0	1	12
≥ 41 < 60 miles	1	4	5	4	2	2	18
≥ 60 miles	21	14	87	33	22	21	198

Note: Total number of responses received indicated in the total column of each category.

Table 4.4

Selected Basic and Career Demographics by Idaho Region

Demographic/ Region	1	2	3	4	5	6	Total
Agriculture & Natural Resources	2	5	19	18	7	10	61
Business & Marketing	12	12	31	19	11	10	95
Engineering & Technology	9	4	24	5	1	5	48
Family & Consumer Sciences	5	4	13	8	6	7	43
Health Sciences	1	3	26	4	5	1	40
Skilled & Technical Sciences	10	3	19	8	9	6	55
Employment							342
Full-time	39	29	125	61	35	36	325
Part-time	0	2	6	1	4	2	15
CTE Certification							340
Bachelor's	15	10	34	28	16	25	128
Industry	9	5	45	16	11	5	91
Master's	15	16	53	16	12	9	121
NBPT Cert.	2	2	16	8	6	3	37

Note: Total number of responses received indicated in the total column and/or column header of each category

Table 4.5

Selected School Location Demographics by CTE Program Area

Demographic	Agriculture	Business	Engineering	Family	Health	Skilled	Total
Continue in School District							337
0-1 year	5	7	6	3	2	6	25
1-2 years	11	7	7	4	4	7	39
3-5 years	5	10	5	5	3	5	64
6-10 years	12	19	7	11	10	11	67
>11 years	9	20	7	13	8	13	33
Until retired	19	31	16	7	12	7	106
Home Town High School							343
Teaching at	8	17	11	16	12	15	79
Not teaching at	53	77	37	29	28	40	264

Note: Total number of responses received indicated in the total column of each category.

High-Quality Teacher Characteristics

Data was collected on teacher practices including teaching methods, preparation, and professional development. Additional data was collected on teacher beliefs about ability and learning using the Teacher Self-Efficacy Scale (TSES) and the Mindset Scale Survey (MSS). Two additional questions gathered teachers' beliefs on the purpose of CTE and what characteristics a CTE teacher should possess to be considered a great teacher.

Teaching Practices

A factor analysis was conducted on teaching practice responses to identify correlations between teacher practices (Table 4.6). With an average mean of 0.949, it is apparent that most teachers indicated they used all teaching practices resulting in each teaching practice correlating with at least two other teaching practices. However, the teaching practice items lack internal consistency with a Cronbach's Alpha score of 0.568.

To determine how teachers spend their time each week, teachers were asked to average how many hours they spend on class preparation, grading, supervising out-of-class projects, working with student organizations, and visits with potential employers. Only 272 (79%) of teachers surveyed responded to these questions. The total average hours spent by program and a total average by question is depicted in Table 4.7.

A factor analysis of average hours spent per week revealed a Cronbach Alpha score of 0.604, which is considered to be questionable for determining internal consistency. Grading had a negative correlation to the other four items indicating it may not be a factor related to average teacher hours spent each week.

Table 4.6

Teacher Practices by CTE Program Area

Items	Agriculture	Business	Engineering	Family	Health	Skilled	Total
Use multimedia equipment	5	7	6	3	2	6	25
Teach safety standards	11	7	7	4	4	7	39
Teach problem-solving skills	5	10	5	5	3	5	64
Teach decision-making skills	12	19	7	11	10	11	67
Assess student learning	9	20	7	13	8	13	33
Motivate students to learn	19	31	16	7	12	7	106
Establish measureable outcomes							343
Assess student performance	8	17	11	16	12	15	79

Note: Total number of responses received indicated in the total column of each category.

Table 4.7

Teaching Practices: Average Hours Spent Per Week

Practice	Agriculture	Business	Engineering	Family	Health	Skilled	Ave/ Total
Class Preparation	7.6	7.87	8.62	13.05	7.45	8.5	8.47
Grading	4.42	6.13	4.27	6.53	6.18	4.03	5.16
Supervising out-of-class projects	5	3.81	3.65	3.58	5	4.6	4.31
Working with CTE student organizations	9.16	6.23	3.77	5.16	5.5	2.67	5.66
Visits with potential employers	1.53	1.47	1.73	2.11	1.91	2.42	1.81
Responses	56	73	38	32	30	43	272

Professional Development Activities

Questions pertaining to professional development activities included collaborating with CTE experts, attending workshops, working in industry to gain experience, evaluating the importance of professional development activities, and being a mentor. In addition, the survey included a question on the impact of mentoring on a teacher's career.

Less than half of the CTE teachers (194) indicated they had worked in industry to gain experience in the past two years. On average, these teachers worked approximately 68 times over a two-year period (Table 4.8).

CTE teachers were then asked to rank the importance of professional development activities (Table 4.9). Of the 341 teachers responding, 54.8% ranked "collaborating with experts in your CTE program area" as being the most important professional development activity. Overall, "workshops" was ranked as the second most important professional development activity followed by "working in your CTE program area". No significant differences were noted between CTE program areas.

Table 4.8

Professional Development Activities: Number of Times Participated

Item by CTE Program Area	Agriculture	Business	Engineering	Family	Health	Skilled	Total
In the past two years, how many times did you:							
Collaborate with experts in your CTE program area?	13.4	11.5	12.6	10.2	13.7	13.2	12.3
Responses	58	83	37	42	35	51	306
Attend a workshop	9.33	7.46	7.43	6.77	5.89	5.33	7.17
Responses	46	50	27	30	28	40	221
Worked in industry to gain experience in CTE program area.	11.2	3.8	8.9	5.4	19.4	15.1	10.4
Responses	46	50	28	30	31	42	227

Note: Total number of responses received indicated in the Number of CTE Teachers in each item.

Table 4.9

Importance of Professional Development Activities – Ranked #1

By CTE Program Area	Agriculture	Business	Engineering	Family	Health	Skilled	Total
Collaborate with experts in your CTE program area	31	50	27	30	19	30	187
Workshops	15	25	5	9	8	13	75
Working in your CTE program area (not teaching)	14	16	13	6	15	16	80

Mentoring

Overall, 341 of the teachers who responded to the questions on mentoring, 251 (73.6%) indicated they currently have a mentor and 187 (54.2%) indicated they have served as a mentor (Table 4.10). When asked four questions related to the influence mentoring has had on their own professional development, 305 teachers responded (88.4%). Of these 305 teachers, 58.7% strongly agreed or agreed that because a colleague served as their mentor they were a more successful teacher, 43.9% have remained in teaching, 47.2% sought out professional development activities, and 48.8% set career goals. Conversely, 9.8% strongly disagreed or disagreed that having a mentor was related to their being a more successful teacher, their choice to remain in teaching (16.7%), influenced them to seek out professional

development activities (13.1%), or to set goals (13.1%). Teachers who responded neither disagreed nor agreed to mentoring influence questions accounted for 36.6% of overall responses. The overall Cronbach Alpha score was 0.899 indicating the mentoring influence questions have a relatively high internal consistency and are considered to be a reliable measure.

Table 4.10

Professional Development: Mentoring

Category	Agriculture	Business	Engineering	Family	Health	Skilled	Total
Has a mentor	48	73	34	40	21	35	251
Served as a mentor	37	56	24	24	21	25	187
Mentoring Influence: Because a colleague served as my mentor (Strongly Agree to Somewhat Agree)							
I am a more successful teacher	42	55	26	19	28	29	179
I have remained in teaching	30	36	18	10	30	20	134
I seek out professional development activities	33	39	18	16	21	17	144
I set career goals	30	41	19	15	24	23	152

Teacher Self-Efficacy

The Teacher Self Efficacy Scale (TSES) posed twelve questions related to teacher beliefs about their practice and influence over student learning. Responses reveal that the majority of Idaho CTE teachers believe they have a positive influence inside and outside the classroom (Table 4.11) With an average of 342 teachers responding to the twelve questions, over 84% of Idaho CTE teachers indicate they can do "A great deal" or "Quite a bit" to influence student learning through the use of effective classroom management and instructional strategies.

The TSES was scored as instructed by Tschannen-Moran and Hoy (2001) to determine validity for its use within the CTE-TCI instrument. Using the four factors of the TSES, the data was analyzed to determine the mean, standard deviation, and Cronbach's Alpha score (Table 4.12). Overall, the TSES has reported a Cronbach alpha of 0.90, indicating a high level of internal consistency and reliability (Nie, Lau, & Liau, 2012; Tschannen-Moran & Hoy, 2001). When used within the CTE-TCI, the also indicated a high level of inernal consistency and reliability with a Cronbach Alpha of 0.884.

Table 4.11

Teacher Beliefs about Practice and Influence Over Student Learning

Question	A great deal	Quite a bit	More than a little	A little	Nothing	Total responses
1. How much can you do to control disruptive behavior?	176 (51.25%)	134 (39%)	24 (7%)	9 (2.6%)	1 (0.3%)	344
2. How much can you do to motivate students who low interest in school work?	165 (48.5%)	79 (23.25%)	67 (19.7%)	27 (7.9%)	2 (0.6%)	340
3. How much can you do to get students to believe they can do well in school?	182 (53.1%)	93 (27.1%)	56 (16.3%)	12 (3.5%)	0	343
4. How much can you do to help your students value learning?	172 (50.4%)	88 (25.8%)	64 (18.8%)	17 (5%)	0	341
5. To what extent can you craft good questions for your students?	173 (50.6%)	131 (38.3%)	30 (8.8%)	8 (2.3%)	0	342
6. How much can you do to get students to follow classroom rules?	159 (46.5%)	155 (45.3%)	24 (7%)	4 (1.25%)	0	342

Table 4.11 Continued

Teacher Beliefs about Practice and Influence Over Student Learning - TSES

Question	A great deal	Quite a bit	More than a little	A little	Nothing	Total responses
7. How much can you do to calm a student who is disruptive or noisy	176 (51.8%)	122 (35.9%)	33 (9.7%)	8 (2.4%)	1 (0.3%)	340
8. How well can you establish a classroom management system with each group of students?	156 (45.6%)	155 (45.3%)	25 (7.3%)	6 (1.8%)	0	342
9. How much can you use a variety of assessment strategies?	156 (45.6%)	138 (40.4%)	41 (12%)	7 (2%)	0	342
10. To what extent can you provide an alternate explanation or example when students are confused?	164 (48%)	157 (45.9%)	20 (5.8%)	1 (0.3%)	0	342
11. How much can you assist families in helping their children do well in school?	155 (45.5%)	92 (27%)	47 (13.8%)	40 (11.7%)	7 (2.1%)	341
12. How well can you implement alternative strategies in your classroom?	177 (51.6%)	104 (30.3%)	55 (16%)	7 (2%)	0	343

Table 4.12

Teacher Beliefs about Practice and Influence Over Student Learning – TSES vs. CTE-TCI Results

	TSES			CTE-TCI		
Factor & Questions	Mean	SD	α	Mean	SD	α
Factor 1: Efficacy for instructional strategies	7.3	1.2	0.86	7.46	1.19	0.80
How much can you use a variety of assessment strategies?						
To what extent can you provide an alternate explanation or example when students are confused?						
To what extent can you craft good questions for your students?						
How well can you implement alternative strategies in your classroom?						
Factor 2: Efficacy for classroom management	6.7	1.2	0.86	7.54	1.16	0.78
How much can you do to control disruptive behavior?						
How much can you do to get students to follow classroom rules?						
How much can you do to calm a student who is disruptive or noisy?						
How well can you establish a classroom management system with each group of students?						
Factor 3: Efficacy for student engagement	7.2	1.2	0.81	6.69	1.34	0.73
How much can you do to get students to believe they can do well in school?						
How much can you do to help your students value learning?						
How much can you do to motivate students who low interest in school work?						
How much can you assist families in helping their children do well in school?						

Mind Set

Scoring the MSS required the items be reverse scored with the most malleable mindset receiving a score of 6 and the most fixed mindset receiving a score of 1 (Dweck & Henderson, 1989). The average score of the three MSS questions indicated a teacher's belief in one's capacity to learn. A score of 1-3 indicated a fixed mindset, a score of 3.1 – 3.9 indicated neutrality, and a score of 4 -6 indicated a teacher has a growth mindset. The Cronbach Alpha score of 0.893 is consistent with the stated high test-retest reliability of 0.80 (Dweck, 2000).

Of the 338 teachers responding to the Mindset Scale Survey (MSS), 78.4% indicated a growth mindset, 6.8% were neutral, and 14.8% indicated a fixed mindset. Engineering teachers scored the highest growth mindset (87.23%) while Agriculture teachers scored the lowest growth mindset (73.33%). No significant differences were found by gender. Of the 338 teachers responding, 133 females and 132 males indicated a growth mindset, 12 females and 11 males indicated neutrality, and 23 females and 27 indicated a fixed mindset. Table 4.13 depicts teacher mindsets by program, age, CTE certification, and NBPTS certification.

Table 4.13

Teacher Mindset by Selected Demographics

Category	Growth	Neutral	Fixed	Total
CTE Program Area:				
Agriculture	44	3	13	60
Business	70	8	15	93
Engineering	41	3	3	47
Family	37	3	5	45
Health	31	1	7	39
Skilled	42	5	7	54
Age Group:				
18-24	3	0	0	3
29-34	39	3	7	49
35-44	60	5	15	80
45-54	92	9	16	117
55-64	63	3	11	77
65-74	7	3	1	11
CTE Certification				
Bachelor's Degree	101	11	15	127
Industry	70	3	15	88
Master's Degree	92	9	20	121
NBPT Certification	28	4	6	38

Purpose of CTE Courses

Teachers were asked to rank the purpose of CTE courses from 1 - 4 in order of importance with "1" being the most important. Overall, CTE teachers rated "preparing students for employment after high school graduation" as being the most important purpose of CTE courses (32.6%) followed by "providing more hands-on learning opportunities" (29.4%), "encouraging students to explore career options" (25.9%), and "preparing students to continue their education after high school graduation (trade school, community college, apprenticeship, etc.)" (25.3%).

With the exception of health sciences, CTE teachers by program area agreed with "preparing students for employment after high school graduation" as being most important. Health Sciences teachers rated "preparing students to continue their education after high school graduation" as most important. Engineering and technology teachers rated "preparing students for employment" and "preparing students for continued education" as equally important. And, family and consumer sciences teachers ranked "preparing for employment" and "providing hands-on learning opportunities" for students as equally important.

The last question of the CTE-TCI survey asked teachers to "list three characteristics a CTE teacher should have to be considered a great teacher". Responses were combined and coded revealing five related themes: education and experience, professional development, high-quality practices, beliefs, and teacher attitudes influencing teacher practice. As a result of this one open-ended question, a new belief subcategory of teacher attitudes supporting great teacher practices was discovered (Table 4.14).

Table 4.14

Three Characteristics of a Great Teacher

Categorized into Five Themes
1. Education/Experience Advanced education, diverse knowledge base, experience in program area, master of a trade, continued industry involvement, technical skills, understands business and industry trends, and active in the community.
2. Professional Development Identifies new skill sets, seeks patents/publications opportunities, stays current with workplace needs, sets goals, involved with professional mentoring, active in professional organizations, and lifelong learner.
3. High-quality Practices Engages in student learning, establishes measurable outcomes, conducts learning assessments, likes teaching, learning, students and CTE program area, practices diverse teaching methods to improve student learning, good rapport with students/parents, holds students accountable, links knowledge with life situations, connected to business/industry, role model and mentor for students, and understands adolescent development.
4. Beliefs Believes all students have the ability to learn, has confidence in teaching abilities, has a desire to learn and improve, growth mindset
5. Teacher Attitudes Accommodating, adaptable, ambitious, authoritative, calm, charismatic, creative, dependable, desire to impact lives, determined, diligent, disciplined, empathetic, encouraging, energetic, engaging, ethical, flexible, has grit, humble, inspiring, innovative, kind, loyal, open-minded, motivated, motivational, passionate, personable, perseverant, progressive, resolve, respectful, tenacity, thoughtful, and understanding.

Generalization of Study

To ascertain whether or not the results of the study contained a nonresponse error affecting external validity, questions of interest from the CTE-CTI instrument were selected from the demographics, beliefs, and professional development sections. Linder Murphy, and Briers (2001) reported that the external validity could be tested using primary variables of interest and recommended using a minimum of 30 late responses. Thirty-one late responses were identified to determine if nonresponse error exists.

The responses from the 31 late responders were compared to 314 early responders using questions posed about gender; Idaho region; mindset; and mentoring activities influencing practice. An additional four questions related to self-efficacy for instructional strategies were also included to compare Cronbach alpha scores for reliability.

Demographics

No significant differences were found between genders of early and late responders. All Idaho regions for late responders maintained adequate gender representation as well as representation within each region (Table 4.15). It was noted that no health sciences teachers were represented in the late responders group; but given no significant differences were found by program overall; the CTE program area was not selected as a demographic variable of interest.

Table 4.15

Demographics: Response Comparison of Late and Early Responders

Category	Early	Late	Total
Gender			
Female	159	14	173
Male	155	17	172
Idaho Regions			342
Region 1	34	5	39
Region 2	29	2	31
Region 3	122	10	132
Region 4:	55	7	62
Region 5	35	4	39
Region 6	36	3	39

Teacher Beliefs

No significant differences were found with teacher beliefs between early and late responders. Over 90% of late responders had a growth mindset which is consistent with early responders' results. Teacher self-efficacy for instructional strategies indicated Cronbach alpha scores of 0.793 and 0.79 respectively for both early and late responders, which is comparable to the overall Cronbach alpha score of 0.80. (Table 4.16).

Table 4.16

Teacher Beliefs: Response Comparison of Late and Early Responders

Category	Early	Late	Total
Mindset			
Growth	237	28	265
Neutral	21	2	23
Fixed	50	0	50
Self-efficacy for instructional strategies	0.793 α	0.79 α	0.80 α

Professional Development

No significant differences were found for questions related to “has a mentor” or “served as a mentor”. The majority of early responders and late responders “strongly agree” to “somewhat agree” to the statement “because a colleague served as my mentor: I am a more successful teacher” with no significant differences among other mentoring activities.

Table 4.17

Mentoring: Response Comparison of Late and Early Responders

Mentoring	Early	Late	Total
Has a mentor	231	20	251
Served as a mentor	159	18	187
Mentoring Influence: Because a colleague served as my mentor (Strongly Agree to Somewhat Agree)			
I am a more successful teacher	160	19	179
I have remained in teaching	121	13	134
I seek out professional development activities	130	14	144
I set career goals	137	15	152

Note: Teacher responses to mentoring influence questions: 305 for early responders and 28 for late responders.

CTE-CTI Instrument Validity

This study is considered to be generalizable. Results of the comparison of responses and validity scores between early and late responders indicated a nonresponse error was not present. With noted revisions in Chapter 5, the CTE-CTI has external validity and can be generalized to other CTE teacher populations.

CHAPTER 5

Discussion, Conclusions, Implications, and Recommendations

In this final chapter, the Discussion of Findings section includes significant results; relationships, and recommendations grouped by demographics; teacher practice; teacher beliefs, and professional development. The Conclusions section provides a discussion of the inventory of high-quality teacher characteristics and the *CTE-CTI Framework: Characteristics of a High-Quality CTE Teacher*. The Specific Recommendations section includes suggested revisions to the CTE-TCI instrument to improve data analysis and reliability and a brief discussion of future research opportunities.

The purpose of this study was to explore and inventory the characteristics of Idaho's high-quality CTE teachers. Specific objectives that guided the study:

1. Identify teacher demographic characteristics of Idaho CTE teachers.
2. Explore the relationships between CTE teacher characteristics, quality teachers, and good teaching practice.
3. Establish an inventory of high-quality teaching practices of Idaho CTE teachers.

Discussion of Findings

Demographics

The basic demographics of Idaho CTE teachers indicated that gender was distributed equally with varied gender populations within in each CTE program area. The majority of business management and marketing, health sciences, and family and consumer sciences CTE courses were taught by female teachers, while agriculture and natural resources, engineering and technology, and skilled and technical sciences CTE courses were predominantly taught by male teachers. The distribution was not surprising when considering the CTE fields of study

taught by male teachers are STEM fields. It is acknowledged that this study did not explore gender equity as a factor, nonetheless, it is an important difference to note for future studies using gender as a factor affecting student and teacher recruitment.

The age of CTE teachers indicated there may be a decline in Idaho teachers entering CTE fields. There were 81 teachers aged 55-64 and 11 teachers aged 65-74 with only 52 teachers in the beginning years of their CTE career. Nearly all of these teachers were employed so it appeared there will likely be a CTE teacher shortage in the near future. According to both state and federal labor reports, Idaho only employs 238 high school CTE teachers with a projected increase to 260 teachers by 2024 (U.S. Department of Labor, 2016; Idaho Department of Labor, 2016). However, the list of certified CTE secondary teachers provided by the Idaho Department of Career and Technical Education contained 770 teachers; with 345 responding to the survey and 327 indicating they are employed full-time. This discrepancy in reporting needs further investigation to analyze teacher attrition trends.

Additionally, some of the career demographic data did suggest there may be an issue with retaining CTE teachers in the future. Fewer teachers plan to continue teaching within their program area than those planning to teach until retirement. More than half indicated they plan to discontinue within the next ten years, with nearly 59% of these teachers planning to discontinue teaching CTE courses in their program area within 5 years. Clearly, the recruitment and retention of CTE teachers in the state of Idaho needs further study to determine the cause of attrition and to provide recommendations to improve recruitment and retention of Idaho CTE teachers.

Overall, CTE teacher certification paths did not reveal any significant differences between teachers with an industry or bachelor's certification. Although prior research studies

have been mixed on the importance of certification for predicting teacher performance and professional development needs (Roberts & Dyer, 2004; Fishman et al., 2003; Layfield and Dobbins, 2002), this study was intended neither to prove nor to disprove prior research. The findings simply served to provide demographic characteristics of Idaho CTE teachers focused on identifying and creating an inventory of Idaho's high-quality CTE teacher characteristics.

Understanding where teachers teach and if there is a tendency to return to their home communities provided some insight into teacher characteristics and potential teacher preferences. The majority of teachers were teaching at least 60 miles from where they attended high school and at high schools with at least 500 students. Those teaching within 25 miles or at their home town high school were more likely to be teaching at a school with a lower student population. However, it is noted that available teaching location preferences may not always be an option (Lichtenberger et al., 2015). Future studies including high school locations within regions with population data may provide a more accurate view of the potential vacancies to support the preference of teachers to return to their home communities.

Teacher Practice

Identifying high-quality teacher practices proved to be an elusive task that may be more suited for individual evaluation using a comprehensive framework (Danielson, 2007). The practices of a CTE teacher are complex and in a state of constant change as the CTE teacher adapts to meet student learning needs as well as maintain connections to industry. Additionally, Idaho CTE teachers were actively involved in student-centered CTE activities outside the classroom that contribute to the effectiveness of their teaching practice, which indicated that a CTE teacher's practice was generally multifaceted (Cannon et al., 2013). However, obtaining information using a predetermined list of teaching methods; media

preferences, and teaching activities related to good teaching practice cannot adequately expound the teaching practice of a CTE high-quality teacher. The unacceptable reliability scores for the teacher practice questions revealed the difficulty in capturing the essence of teacher practice to understand what good teachers should do and the components for good teaching (NBPTS, 2017; Danielson, 2007). However, exploring the factors related to teacher beliefs assisted with defining the elements of high-quality CTE teacher practice.

Teacher Beliefs

The teacher self-efficacy and mindset instruments revealed that the majority of Idaho CTE teachers believed all students have the ability to learn and were confident in their own ability to be a positive influence over student learning both inside and outside the classroom. They also possessed a growth mindset indicating they were more likely to adopt innovative techniques to facilitate student learning (Dweck, 2007). This finding supported prior research revealing CTE teachers view motivating students to think critically and creatively as a top priority (Cannon et al., 2012). More than half of Idaho CTE teachers agreed that the purpose of CTE courses was to prepare students for employment after high school graduation and to provide hands-on learning opportunities. On average, Idaho CTE teachers spend over 5 hours per week working with CTE student organizations and at least 1.8 hours each week on visits with potential employers. These results indicated that career-readiness was a high-quality characteristic related to teacher beliefs.

Professional Development

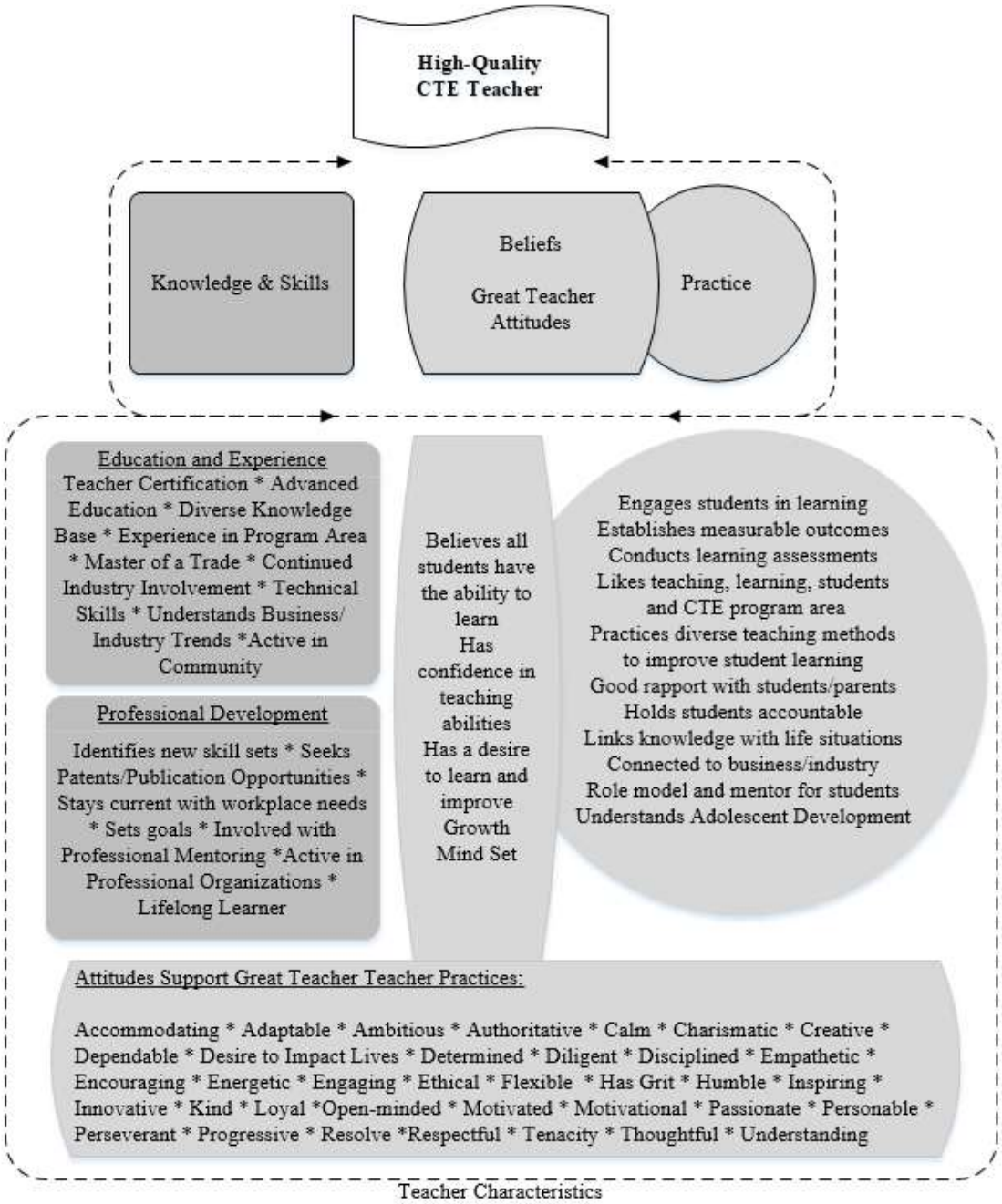
CTE teacher professional development needs were consistent with prior research indicating collaboration with industry/business experts was a top priority not only for improving teacher skills, but also to ensure teachers were preparing high school graduates to

be career-ready and to provide a pathway to postsecondary education (Stone & Lewis, 2012). The connection between professional development and the purpose of CTE courses indicated that preparing students to be career-ready after high school graduation also prepared students to continue their education. Consequently, Idaho's CTE teachers were considered to have high-quality characteristics because of their education and experience, continued professional development activities including mentoring and lifelong learning, a belief in their own teaching abilities as well as their students' abilities, and because they understand what attitude and mindset were needed to become a great teacher.

Conclusions

The possibility a CTE teacher is or potentially could be a high-quality teacher can be explored using reliable data collected in this study by examining demographics, teacher-efficacy, mindset, mentoring activities influencing practice, CTE purpose, and teacher reported characteristics of a great teacher. The relationships between CTE teacher characteristics, quality teachers, and good teaching practice established the inventory of high-quality teaching practices depicted in the CTE-TCI Framework: Characteristics of a High-Quality CTE Teacher (Figure 5.1).

Figure 5.1 CTE-TCI Framework: Characteristics of a High-Quality CTE Teacher



Overall, the knowledge and skills of Idaho's CTE teachers provide both foundation and growth opportunities to hone a high-quality teacher practice. What teachers believe and how they interact with students and potential employers influences the high-quality components of their practice (Cannon, Tenuto, & Kitchel 2013; Cannon, Kitchel, & Duncan, 2012; Stone & Lewis, 2012; Danielson, 2007). Understanding the high-quality characteristics of Idaho CTE teachers is valuable to educators and state officials for the education, recruitment, and retention of CTE teachers. The CTE-CTI Framework provides teachers and educational leaders a CTE specific teacher framework that integrates high-quality characteristics across knowledge and skills, beliefs, and practices for assessment and to guide future professional development needs and goals.

Specific Recommendations

CTE-TCI Instrument

The teacher self-efficacy, mindset, and mentoring sections are considered to be reliable as indicated by their Cronbach Alpha scores. Open-ended questions were coded into themes that provided valuable insight into CTE teacher knowledge and skills, beliefs, and practice. As a result of the one open-ended question, a new belief subcategory of great teacher attitudes influencing teacher practice was discovered.

Improvements to the study are noted as follows. During data analysis, the researcher realized the survey should be reformatted into separate questions eliminating the multiple question format within one question. Multiple question answers complicated data extraction. Improvements to specific questions were also noted based on response quality and reliability standards.

The demographic section on high school location should include the school district; high school, and whether or not a teacher is teaching at their preferred school in Idaho. Data can then be correlated with high school size to explore relationships between school size, location, teacher preferences, and length of intended employment to forecast future teacher attrition trends. The survey region map should include numbers for the regions to meet disability standards.

The teaching practices questions should be eliminated because those questions do not fully encapsulate a high-quality practice. As was the case with this study, using an open-ended question allowed teachers to provide more thoughtful and meaningful responses about high-quality teaching practices. Practice information is more valuable when teachers can provide the information directly (Danielson, 2007). Adding an open-ended question asking teachers to list the most valuable methods they use in teaching or what types of CTE out-of-class activities they use to engage students in learning may provide further insight into high-quality practices. Additionally, more in-depth information may be obtained by asking teachers to list the types of professional activities they have engaged in and the purpose of CTE courses rather than ask them to estimate hours or rank predetermined statements that may or may not be related to their experience or beliefs.

Future Research

This study provided context for additional studies on CTE great teacher attitudes influencing the high-quality components of teacher practice as well as teacher recruitment and retention trends by region and school district. After the CTE-TCI has been revised, the researcher intends to conduct further studies in other states to test reliability and explore differences and similarities of the high-quality characteristics of CTE teachers. A national

inventory of characteristics of high-quality CTE teachers may also assist with improving CTE program identity, student recruitment, and CTE program funding opportunities.

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APPENDIX A

CTE-TCI Survey

Welcome!

As a certified CTE teacher in the state of Idaho, you are invited to participate in a research study on the Characteristics of High-Quality Career and Technical Education Teachers. My name is Cynthia Williams and I am a doctoral student at the University of Idaho. This research is the basis for my doctoral dissertation.

The University of Idaho's Institutional Review Board has approved this study.

Consent

This survey was designed to collect information on demographics, knowledge, beliefs, and practices of CTE teachers. The results of this study will be useful to CTE teachers and educators in identifying the teacher characteristics that support the potential of great CTE teachers.

Your participation in this research project is completely voluntary. You may decline to participate or leave blank any questions you do not wish to answer. There are no known risks for participation beyond those encountered in every day life. Your responses will remain confidential. Data from this research is protected by secure password protocols and will be reported as a collective combined total. It should take 8-10 minutes to complete the survey.

By clicking the button below, you acknowledge that your participation in the study is voluntary, you are 18 years of age, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason.

Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

If you have questions about the project, feel free to contact me at will2188@vandals.uidaho.edu or Dr. John Cannon at johnc@uidaho.edu.

I appreciate your willingness to participate in this study.

Thank you,

Cynthia Williams

- ○ I consent, begin the study
- ○ I do not consent, I do not wish to participate

Gender

- Male
- Female

Age

- 18 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- 55 - 64
- 65 - 74
- 75 or older

Ethnic Identity

- African American
- Asian American
- Hispanic
- Native American/Alaskan
- Pacific Islander
- White
- Other

CTE Certification (Please select one)

- Industry based certification (Work/Industry/Career Experience)
- Bachelor's degree in education
- Master's degree plus certification

What is the highest degree or post-secondary certification earned:

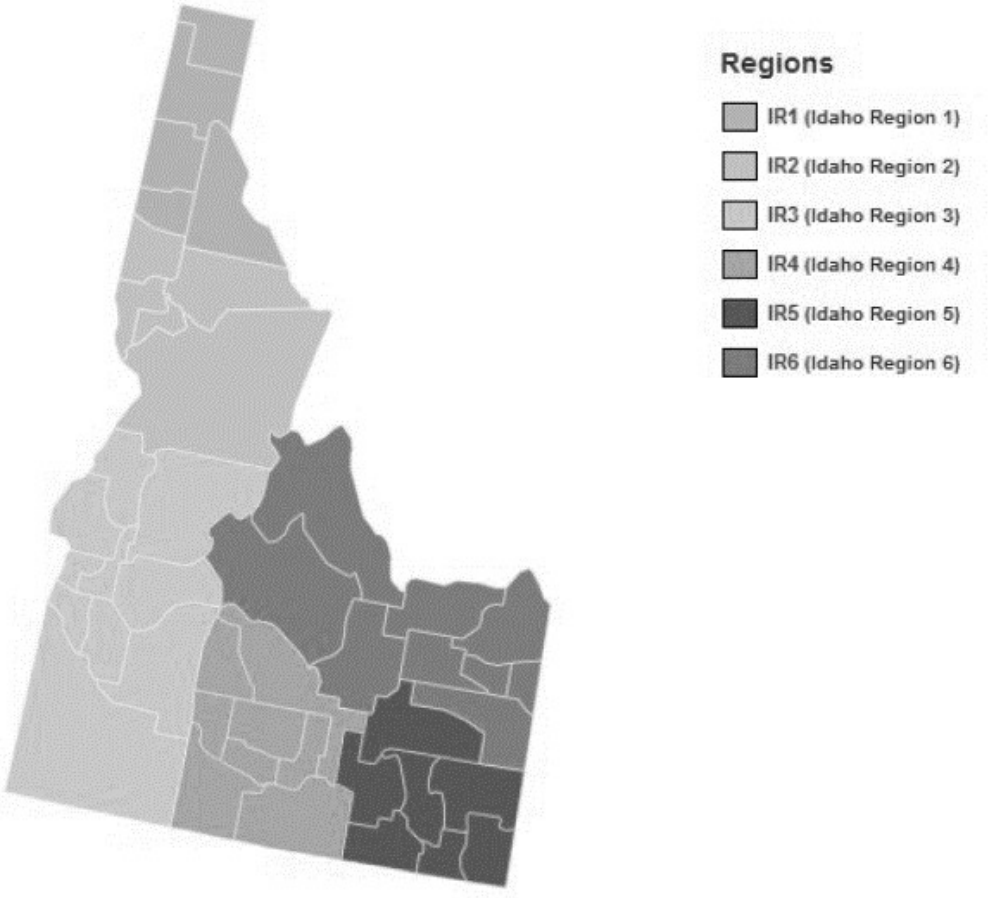
- Industry Certification
- Associate's Degree
- Bachelor's Degree
- Master's Degree
- Educational Specialist Degree
- Doctorate (PhD or EdD)

In what year did you receive your highest degree? Please enter the 4-digit year (XXXX)

Have you obtained certification from the National Board of Professional Teachers?

- Yes
- No

Please identify the Idaho Region where you currently teach CTE courses:



- ○ IR1 (Idaho Region 1)
- ○ IR2 (Idaho Region 2)
- ○ IR3 (Idaho Region 3)
- ○ IR4 (Idaho Region 4)
- ○ IR5 (Idaho Region 5)
- ○ IR6 (Idaho Region 6)

Please indicate your CTE program area:

- ○ Agriculture and Natural Resources
- ○ Business & Marketing
- ○ Engineering & Technology
- ○ Family & Consumer Sciences
- ○ Health Sciences
- ○ Skilled & Technical Sciences

How many years have you been teaching CTE courses?

- ○ Less than one year
- ○ More than one year, but less than 3 years
- ○ More than 3 years, but less than 5 years
- ○ More than 5 years, but less than 10 years
- ○ More than 10 years, but less than 20 years
- ○ More than 20 years

How many more years do you plan to teach in your CTE program area?

- ○ 0 - 1 year
- ○ 1 - 2 years
- ○ 3 - 5 years
- ○ 6 - 10 years
- ○ 11 years or more
- ○ Until retirement

How many more years do you plan to teach in your current school district?

- ○ 0 - 1 year
- ○ 1 - 2 years
- ○ 3 - 5 years
- ○ 6 - 10 years
- ○ 11 years or more
- ○ Until retirement

The total number of students in the high school where I teach has:

- ○ Less than 250 students
- ○ More than 250 students, but less than 500 students
- ○ More than 500 students

I am teaching in the same town/city where I attended high school:

- Yes
- No

The number of miles from where I graduated high school and where I currently teach is:

- 0 miles - I teach at the same high school
- Less than 25 miles
- At least 26 miles, but less than 40 miles
- At least 41 miles, but less than 60 miles
- More than 60 miles

Please indicate your employment status:

- Employed full time
- Employed part time
- Unemployed looking for work
- Unemployed not looking for work
- Retired

These questions are designed to help us gain a better understanding of the kinds of things that create difficulties for teachers in their school activities. Please indicate your opinion about each of the statements below:

	A great deal	Quite a bit	More than a little	A little	Nothing
How much can you do to control disruptive behavior in the classroom?	○	○	○	○	○
How much can you do to motivate students who show low interest in school work?	○	○	○	○	○
How much can you do to get students to believe they can do well in school?	○	○	○	○	○
How much can you do to help your students value learning?	○	○	○	○	○
To what extent can you craft good questions for your students?	○	○	○	○	○
How much can you do to get students to follow classroom rules?	○	○	○	○	○
How much can you do to calm a student who is disruptive or noisy?	○	○	○	○	○
How well can you establish a classroom management system with each group of students?	○	○	○	○	○
How much can you use a variety of assessment strategies?	○	○	○	○	○
To what extent can you provide an alternative explanation of example when students are confused?	○	○	○	○	○
How much can you assist families in helping their children do well in school?	○	○	○	○	○
How well can you implement alternative strategies in your classroom?	○	○	○	○	○

People have different ideas about intelligence and ability. Below are statements that refer to views about intelligence. Read each one carefully. There are no right or wrong answers.

	Strongly Agree	Moderately Agree	Agree slightly more than disagree	Disagree slightly more than agree	Moderately Disagree	Strongly Disagree
You have a certain amount of intelligence and you really can't do much to change it	○	○	○	○	○	○
I see strengths and weaknesses (limitations) in each individual	○	○	○	○	○	○
Your intelligence is something about you that you can't really change very much	○	○	○	○	○	○
I believe learning takes time	○	○	○	○	○	○
You can learn new things, but you can't really change your basic intelligence	○	○	○	○	○	○

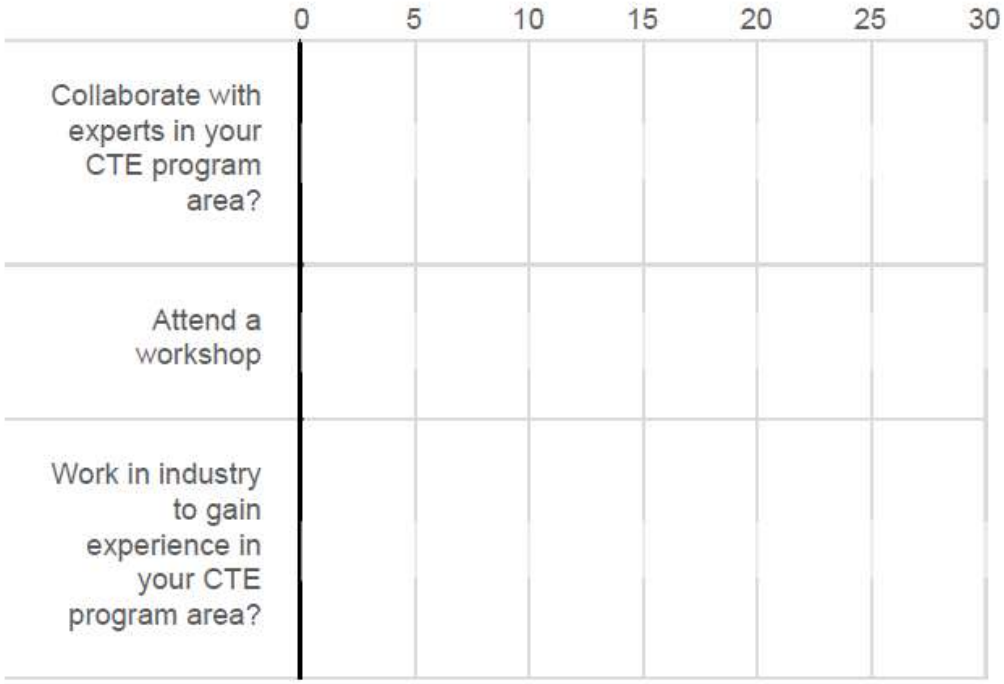
The following statements provide information on teaching practices. Please check all that apply to you.

In teaching, I?

- ☐ Use multimedia equipment
- ☐ Teach safety standards
- ☐ Teach problem-solving skills
- ☐ Teach decision-making skills
- ☐ Assess student learning
- ☐ Motivate students to learn
- ☐ Establish measurable outcomes
- ☐ Assess student performance

On average, how many hours per week do you spend on? (Click on bar and slide to indicate hours).

In the past two years, how many times did you?



Please rank from 1 to 3 the importance of following professional development activities with 1 being the most important.

- [ ] Workshops
- [ ] Opportunities to collaborate with experts in your CTE program area
- [ ] Working in your CTE program area (not teaching)

Do you have a mentor?

- ○ Yes
- ○ No

Have you served as a mentor to a colleague?

- ○ Yes
- ○ No

Because a colleague served as my mentor:

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
I am a more successful teacher	○	○	○	○	○
I have remained in teaching	○	○	○	○	○
I seek out professional development activities	○	○	○	○	○
I set career goals	○	○	○	○	○

Please rank the following statements from 1 - 4 in order of importance with the most important = 1.

The purpose of Career and Technical Education courses are to:

- ☐ Provide more hands on learning opportunities
- ☐ Encourage students to explore career options
- ☐ Prepare students for employment after high school graduation
- ☐ Prepare students to continue their education after high school graduation (trade school, community college, apprenticeship, etc.)

What are three characteristics that you believe a CTE teacher should have to be considered a great teacher?

1.
2.
3.

End of survey.

APPENDIX B

Institutional Review Board Approval Letter

University of Idaho
Office of Research Assurances
Institutional Review Board
875 Perimeter Drive, MS 3010
Moscow ID 83844-3010
Phone: 208-885-6162
Fax: 208-885-5752
irb@uidaho.edu

To: John G. Cannon

Cc: Cynthia Williams, Daniel R. L. Campbell

From: Jennifer Walker, IRB Coordinator

Approval Date: January 25, 2018

Title: Characteristics of High-Quality Career and Technical Education Teachers

Project: 18-018
Certified: Certified as exempt under category 2 at 45 CFR 46.101(b)(2).

On behalf of the Institutional Review Board at the University of Idaho, I am pleased to inform you that the protocol for the research project Characteristics of High-Quality Career and Technical Education Teachers has been certified as exempt under the category and reference number listed above.

This certification is valid only for the study protocol as it was submitted. Studies certified as Exempt are not subject to continuing review and this certification does not expire. However, if changes are made to the study protocol, you must submit the changes through VERAS for review before implementing the changes. Amendments may include but are not limited to, changes in study population, study personnel, study instruments, consent documents, recruitment materials, sites of research, etc. If you have any additional questions, please contact me through the VERAS messaging system by clicking the 'Reply' button.

As Principal Investigator, you are responsible for ensuring compliance with all applicable FERPA regulations, University of Idaho policies, state and federal regulations. Every effort should be made to ensure that the project is conducted in a manner consistent with the three fundamental principles identified in the Belmont Report: respect for persons; beneficence; and justice. The Principal Investigator is responsible for ensuring that all study personnel have completed the online human subjects training requirement.

You are required to timely notify the IRB if any unanticipated or adverse events occur during the study, if you experience and increased risk to the participants, or if you have participants withdraw or register complaints about the study.