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# A Delphi Study of Effective Strategies for Addressing the Most Significant Challenges to Creating Gender-Balanced High School Career Technical Education (CTE) Pathways

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# A Delphi Study of Effective Strategies for Addressing the Most Significant Challenges to Creating Gender-Balanced High School Career Technical Education (CTE) Pathways

A Dissertation by

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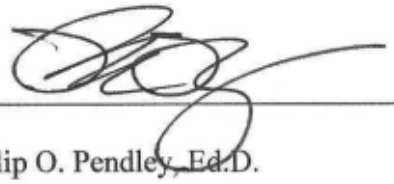

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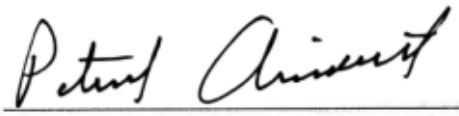

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"*The greatness of a community is most accurately measured by the compassionate actions of its members*." –Coretta Scott King

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-With Love and Gratitude, Jon.

ABSTRACT

A Delphi Study of Effective Strategies for Addressing the Most Significant Challenges to Creating Gender-Balanced High School Career Technical Education (CTE) Pathways

by Jon Black

**Purpose:** The purpose of this Delphi study was to identify what expert high school Career Technical Education (CTE) administrators see as challenges to creating gender-balanced classes across all high school CTE pathways, to rate the significance of the identified challenges according to the experts, and to describe the most effective strategies for addressing the five most significant challenges identified in creating balanced CTE enrollment across all high school pathways.

**Methodology:** This study used a three-round Delphi method to collect data from expert high school CTE administrators. In Round 1, the expert panel was asked to identify challenges to creating gender-balanced classes across high school CTE pathways. In Round 2, the identified challenges were rated on a Likert scale survey to determine the significance of each challenge. In Round 3, the expert panel identified strategies to address the most significant challenges discovered in Round 2.

**Findings:** After the input from the expert panel, there were nine themes identified for challenges to creating gender-balanced classes across all high school CTE pathways. Those nine themes were then ranked, and the five most significant were: (a) CTE pathway perceptions/stereotypes, (b) teacher recruitment practices, (c) student awareness/exposure/understanding about certain CTE pathways and/or fields (occupations), (d) gender perceptions/stereotypes (conscious and unconscious biases), and (e) lack of gender role models in certain CTE pathways/fields (occupations). The

panel experts recommended a minimum of two strategies to address each challenge within Round 3.

**Conclusions:** For high school administrators to create gender-balanced classes across all high school CTE pathways, they need to address challenges such as student misperceptions and stereotypes, teacher recruitment practices, and a lack of gender role models in many CTE pathways. Additionally, to overcome those challenges, teachers and counselors need to improve marketing and recruiting efforts, including utilizing guest speakers and field trips and actively recruit people from the workforce who defy gender norms to be CTE teachers.

**Recommendations for Action:** Based on the information collected in this Delphi study, 11 key recommendations were identified to create gender-balanced classes across all high school CTE pathways.

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# CHAPTER I: INTRODUCTION

Career Technical Education (CTE), formerly known as vocational education, is the all-encompassing term for education that fuses academic and technical skills with workplace knowledge and training in a real-world, applied context. CTE programs can be found in middle, high, and post-secondary institutions. The California Department of Education (CDE) defines CTE as "a program of study that involves a multiyear sequence of courses that integrates core academic knowledge with technical and occupational knowledge to provide students a pathway to postsecondary education and careers" (California Department of Education [CDE], n.d.a, para. 1). In California there are 15 industry sectors that CTE pathways are based in including agriculture, education, engineering, hospitality, manufacturing, transportation, and information and communication technologies (CDE, 2023).

CTE makes up a significant portion of high school education in the United States and in California, and it is an important facet of the reform efforts within America's educational system. CTE programs are increasingly academically demanding and offer training for students in new and emerging high-tech fields (National Women's Law Center [NWLC], 2007). The current CTE purpose and objectives incorporate a larger emphasis on the academic achievement of all CTE students and train a labor force that can compete in the worldwide economy. CTE can be an effective means to prevent students from dropping out of high school and preparing them for postsecondary opportunities (Xing et al., 2020).

CTE (vocational training) began in the early 1900s, and Congress provided funding for vocational education beginning with the passage of the Smith-Hughes Act of

1917. However, until the passage of the Title IX Amendments to the Vocational Education Act in 1976, vocational education lacked an emphasis on gender equity, and CTE training in most fields was dominated by males (Lufkin et al., 2007). With the help of advocacy groups who felt addressing gender equity in education was long overdue, changes were made at the federal funding level to provide limited funding to address equity issues in education (Lufkin et al., 2007). Several acts of legislation have passed in the years after the passage of Title IX, including the Carl Perkins Act in 1984, which have attempted to address and eliminate gender equity imbalances in CTE (Robbin, 1992). However, even though legislation has been in effect for over 35 years, research indicates that there has been little change in young women's access to high-skill, high-wage CTE courses, especially those that are nontraditional for their gender (NWLC, 2023).

Historical data shows that women have been routinely drawn toward the service, hygiene, and hospitality industries, while men have congregated in agriculture, construction, and mechanics (Phillips, 2022). Women hold far fewer technology positions than men, with only 24% of the female workforce holding technology positions (Patrick & Patrick, 2022). Additionally, between 2001 and 2014, the participation rates of females in engineering, computing, and advanced manufacturing remained stagnant, and in 2014, only 4.8% of welders were women (Williams, 2016). At the same time, according to Lufkin et al. (2007), young men are enrolled in traditional and nontraditional CTE programs at rates comparable to those of girls, and males make up 9% of students in nontraditional courses for males. Therefore, the continuation of examining the

participation trends of females enrolled in CTE programs is essential to ascertain how the equity goals envisioned by CTE legislation can be realized (Fluhr et al., 2017).

## Background

### Historical Perspectives

An understanding of the history of CTE is fundamental to comprehending the current CTE backdrop. The beginnings of organized vocational training in America arose throughout the early 1900s, preparing young men and women for employment as assembly line workers. In 1914, the Committee on National Aid to Vocational Education articulated the necessity for education past the age of 14 years. It was understood that 14 was the age the majority of schoolchildren ended their formal studies and began performing their vocations (H. R. Gordon, 2014). A series of laws were passed over the 20th century, shaping vocational education into CTE.

#### *History of Secondary Education*

The United States system of formal public education was developed throughout the 19th century, as prior to that, the education system was highly localized and only accessible to the wealthy (Thattai, 2001). Although the public education system first began with elementary schools, it grew to include secondary schools whose main goal was to produce skilled workers.

Secondary education, or high school as it is commonly known today, generally includes grades 9 to 12 and students of ages 14 to 18 (Goldin 1999). Between 1900 and 1996, the percentage of students who graduated from high school increased from 6% to 85% as most states enacted legislation extending compulsory education to the age of 16 (Thattai, 2001).

### *History of Career Technical Education*

The beginning of the federal government's influence and involvement with vocational education began with the authorization of the Smith-Hughes Act of 1917. The Smith-Hughes Act specified for occupational training in agriculture, trades and industry, home economics, and teacher preparation (Wonacott, 2003). The law stressed a separation from classical education and called for education that would more closely meet the needs of teens of the working class who were attending high school but not on their way to the professional occupations that require postsecondary education (Gray, 1991). The George-Barden Act further extended federal support of vocational education about thirty years later (Barrett, 1948). Then, in 1958, the National Defense Education Act specified supplementary funding for vocational training to prepare students for technical professions related to national defense (Hunt, 2021). Next came the Vocational Education Act of 1963, which augmented funding assistance for occupational training and provided funding for vocational work-study programs and research, training, and demonstration programs related to vocational instruction (Dugger, 1965). Additionally, in 1968, the Vocational Education Amendments established a National Advisory Council on Vocational Education and specified funding for gathering and distributing information about programs overseen by the Commissioner of Education (Forsythe & Weintraub, 1969). This series of legislation paved the way for CTE.

### *History of Gender Equity in Education*

Equal opportunity in education has been problematic for women throughout the history of the United States. For example, in colonial days, it was universally recognized that females only needed to be equipped to be wives and mothers (Tozer et al., 2002). In

the 1800s, a larger tolerance for educating girls emerged and led to increased enrollments of females (Reef, 2009). The first post-secondary institution to confer baccalaureate degrees to females was the Georgia Female College in 1836, and Oberlin College became the first university to offer bachelor's degrees to both males and females enrolled in similar courses in 1837 (Reef, 2009). About 20 years later, the first state university to admit women was the University of Iowa. However, despite these increased opportunities for females in education, women's capacity to contend with men for higher-status professions did not increase (Rury, 2005). Additionally, further gains for women in education would not really come until the passage of Title IX in 1972. Even after the passage of Title IX, educationalists disregarded concerns pertinent to females, such as gender bias in testing and achievement gaps in math and science (Weaver-Hightower, 2009).

### *History of Gender Equity in Career and Technical Education*

The roots of CTE, branded then as vocational education, can be traced to philosophies suggested by Snedden (1913) and Prosser (1939), who suggested that CTE was a channel for training boys and girls for specific types of labor. At that time, specific types of work were nearly exclusive by gender. This led to a historically inequitable CTE system by gender. Even though Title IX, which barred discrimination in education based on sex, later unlocked the door for females in all educational fields, gender equity and females taking part in nontraditional programs is still a critical concern in CTE programs (Malik 2005). There are many aspects that contribute to a CTE system that limits opportunities for girls and steers them away from nontraditional careers, including gender

segregation, inadequate access and opportunities, and the underrepresentation of female advisors (WEEA Resource Center, 2002).

## Legislation Regarding Gender Equity in Career and Technical Education

Title IX and additional legislation have attempted to address the equity gaps in CTE, including the Carl D. Perkins Act in the mid-1980s that emphasized providing marketable skills and making vocational programs available to all students and gender equity in occupational programs and initiatives (Association for Career and Technical Education [ACTE], 2007). After decades of this type of legislation supporting gender equity in CTE and the training of women in nontraditional professions, noteworthy steps have been made in developing workforce skills for both males and females. These improvements include offering equal access and preparation to young women pursuing nontraditional careers (ACTE, 2007).

### *Title IX*

Title IX of the Education Amendments of 1972 protects individuals from discrimination in education based on sex. Title IX states that "no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity…" (U.S. Department of Education Office for Civil Rights, 2021, Title IX section). Title IX initially sought to enforce equality between men's and women's sports in schools (Uwire Text, 2022). However, over time, it was used to enforce this equality in additional educational programs and activities, including participation in high school CTE programs.

The brevity of the legislation initially allowed leeway for educational institutions to interpret it differently, which caused concerns with the implementation of policies regarding Title IX. To create consistency, regulations were drafted in 1974; however, differences in interpretation continued, so the Office for Civil Rights issued official compliance guidelines in 1979 (Uloop, 2022). Today, current key Title IX obligations for educational institutions include recruitment, admissions, counseling, and gender-based harassment (U.S. Department of Education, Office for Civil Rights, 2021). Title IX obligates high schools to ensure that both females and males get equal access to all CTE pathways.

### *Carl D. Perkins Vocational Education Act of 1984*

The Vocational Education Act of 1984, frequently referred to as the Perkins Act, sanctions federal money to help fund occupational training programs, now known as CTE. The law states that all individuals must be afforded equal access to recruitment, enrollment, and placement activities in CTE. Additionally, it is required that all students be provided with equal access to the full gamut of CTE programs and pathways (National Association of Special Education Teachers, 2022). This would include females and males receiving access and being encouraged in all CTE pathways. The Perkins Act was reauthorized in 1990, 1998, 2006, and 2018.

## Career Technical Education Framework for California Public Schools

According to the CDE, the CTE Framework for California Public Schools serves as the how-to manual for educators to develop standards-based CTE pathways, courses, curricula, and assessments. The CTE Framework is intended as the blueprint to provide public school educators with the steps to implement the CTE model curriculum standards

adopted by California's State Board of Education. The Framework provides a context for CTE standards, presents best practices, and explores other important issues to implementing the CTE standards (CDE, 2007).

## Theoretical Foundation

The general theoretical foundation for this study was facts and assumptions about the nature of gender differences and the implications for gender equity. There have been many studies and much research done on the topic and authors such as Bem, Eagly, Eccles, and Bandura have contributed to the field with research and insight into the topic of gender equity.

### Gender Schema Theory

Bem (1981) developed the view that schemas, or knowledge structures, establish and shape thought and viewpoint through the practice of sex typing, which is how bodily differences between boys and girls are transformed into culturally endorsed, differentiated masculine and feminine functions, behaviors, and prospects. Gender schema theory (GST) suggests that human beings recognize and process data in terms of organized networks of mental associations characterizing knowledge about themselves and the genders and that sex-typed behavior is sanctioned and maintained through these culturally diffused gender schemas (Hyde & Lindberg, 2007).

### Social Cognitive Theory

Bandura (1986) presented another model of gender differentiation called social cognitive theory (SCT), which recognizes that there are three bases that affect gender development: (a) individual dynamics such as biology and individual attitudes, (b) the environment including communal forces and role models, and (c) conduct. SCT suggests

that males and females learn gender roles and habits through modeling, enactive experience, and direct teaching (Hyde & Lindberg, 2007).

### Expectancy-Value Theory

Eccles et al. (1983) developed a psychological model of gender differentiation that suggests that gender differences in achievement are rooted in the different achievement-related choices that are made by men and women, for example, which courses to enroll in or which undertakings to participate in. Expectancy-value theory (EVT) proposes that men and women hold different outlooks for achievement and different views about the value of success in certain fields, such as mathematics and sports, which direct achievement-connected choices, and therefore, expectations and values cause gender differences (Hyde & Lindberg, 2007).

## Theoretical Framework: Social Role Theory of Gender

This study takes into consideration the literature on the social role theory of gender, which emphasizes that gender stereotypes mirror one's interpretations of what people do in day-to-day life. According to A. Eagly et al. (1982), when a person often observes a certain group of individuals partaking in a certain action, they are likely to believe that the skills and character traits necessary to carry out that action are representative of that group of the populace. For example, if one regularly observes females caring for children, they are likely to believe that traits thought to be necessary for that activity, such as care and warmth, are distinctive of females. Therefore, often, females see the child development pathway as a CTE pathway for them, and they do not associate welding as a CTE pathway for them. Conversely, males do not associate child development with a CTE pathway for them.

A. Eagly and Wood (2012) contend that gender differences and similarities in conduct reinforce gender role attitudes and opinions that, in turn, exemplify people's perceptions of male and female social roles in the culture in which they reside. They assert, therefore, that men are more apt than women to be hired in positions of authority, and women are more prone to fill caretaking jobs. Furthermore, physical differences between males and females cause distribution into social roles where certain activities are more adeptly accomplished by one gender or the other (A. Eagly & Wood, 2012). This distribution results in task specialization and produces a coalition between men and women as they participate in an agreed-upon division of labor, which furthers the interests of society as a whole. Therefore, it is common for young men to drift toward CTE pathways that include automotive, building and construction trades, agriculture, and natural resources; young women enter CTE pathways such as family services, fashion design, and hospitality.

However, in more recent history, there has been a reposition on this acceptance of societal roles, particularly by women and homosexuals who have voiced their dissatisfaction with the status quo, and these groups have pointed to the social exclusion and social disadvantages, particularly with regard to the labor market inherent in the accepted gender roles (Reed, 2006). This movement has led to changes in the workplace, legislation, and education. Much legislation has been passed to provide females with opportunities that have historically not been available to them.

## Summary

CTE has its roots in vocational education dating back to the early 1900s and the Smith-Hughes Act. However, equal opportunity in CTE has been problematic for women

from the start, and despite several legislative efforts to increase the opportunities for young women, including Title IX and the many versions of the Perkins Acts, there is still a gender imbalance in most CTE pathways. One theory that illustrates the root cause of these gender inequities is the social role theory of gender, which underscores the belief that gender stereotypes reflect people's interpretations of what people do in daily life. Paired with the fact that early vocational education was a means for training young men and women for specific sorts of employment that were exclusive by gender, it is no wonder that both males and females, particularly females, have historically had a hard time entering nontraditional CTE pathways.

## Statement of the Research Problem

Educating young people is one of the most vital things a society can do for its citizens. Education, particularly CTE, prepares young men and women for work and future opportunities. The federal government has passed many laws over the years to reform CTE, several of which addressed gender equity in education. However, gender equity and both male and female involvement in nontraditional programs is still a critical concern in CTE programs, particularly for young women (Malik, 2005). Despite decades of legislation supporting gender equity in CTE and requiring equal access and preparation for girls and women pursuing nontraditional careers, gender inequity in many CTE pathways continues (ACTE, 2007).

Ainsworth and Roscigno (2005) suggest that CTE programs, despite reform efforts, continue to be complicit in perpetuating a cycle of training females for lesser paying fields and causing the persistence of a gender pay disparity. For example, women remain as scarce as ever in engineering, computing, and advanced manufacturing, making

up only 12% of the engineering workforce, 26% of the computing workforce, and 10% of the advanced manufacturing workforce as of 2014 (Change the Equation, 2015). Additionally, only 24% of the female workforce held technology positions (Patrick & Patrick, 2022), and only 4% of welders in 2014 were women (National Alliance for Partnerships in Equity [NAPE], 2015). However, at the same time, the main source of income in 40% of households with children was provided by women (Wang et al., 2013). Furthermore, jobs dominated by women usually offer lower economic opportunities in terms of income and earnings potential (Cross & Bagilhole, 2002).

The continued low enrollment rates of young females in nontraditional CTE pathways have a tremendous impact on the earning power and job prospects of women as they graduate (NWLC, 2002). Legislation and institutional attempts to increase gender equity in CTE pathways have been mostly unsuccessful, and those that have been successful have been small and localized (Fluhr et al., 2017). For example, although there are strategies and initiatives that succeed in helping young women into STEM fields, the problem we have not been able to overcome is scale, as these strategies and initiatives do not reach the vast majority of the nation's youth (Change the Equation, 2015). Therefore, it is imperative that educators, legislators, and advocates continue to take steps to ensure that the enrollment and completion of nontraditional programs by women that can lead to higher-paying careers happen (NWLC, 2007).

The limited number of published studies pertaining to gender equity in CTE programs endorses the need for further research on this critical topic. Although there has been some research conducted with regard to the lack of female students in nontraditional CTE pathways and careers, more needs to be done as it continues to be a concern.

Additionally, very little research explores the lack of male students in female-dominated CTE pathways. Additional research is needed to examine the causes and solutions of this issue. Therefore, identifying effective strategies that expert CTE administrators recommend to overcome challenges to gender equity can provide high school programs with actionable steps they can take to create gender-balanced classes in all CTE pathways.

## Purpose Statement

The purpose of this Delphi study was to identify what expert high school CTE administrators see as challenges to creating gender-balanced classes across all high school CTE pathways, to rate the significance of the identified challenges according to the experts, and to describe the most effective strategies for addressing the five most significant challenges identified to creating balanced CTE enrollment across all high school pathways.

## Research Questions

The following questions were developed to help guide the study:

1. What do expert high school CTE administrators identify as challenges to creating gender-balanced classes across all high school CTE pathways?
2. What do expert high school CTE administrators identify as the most significant challenges to creating gender-balanced classes across all high school CTE pathways?
3. What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways?

## Significance of the Problem

Although the federal government has a long history of investment in CTE, high school CTE pathways are still not gender-balanced nationwide or even statewide (Brand et al., 2013). Females are particularly impacted as this work-related gender segregation has serious economic repercussions for them in that they have lower enrollment rates than males in the higher-paying STEM fields (Fluhr et al., 2017). Furthermore, barriers persist that limit young men and women's opportunities to pursue nontraditional careers (Lufkin et al., 2007).

This Delphi research study is important to the field of educational leadership as it will help contribute to the limited research on gender equity in high school CTE pathways. It will help develop an authoritative list of effective strategies and implementation activities and inform decision-making and program practices to support high school CTE administrators as they work to implement gender-balanced CTE pathways. The information gathered and the conclusions reached from surveying expert high school CTE administrators are intended to expand the literature and forward the comprehension of how to create gender-balanced high school CTE pathways that is sustainable for school districts.

The research is consistent with the need for CTE educators, policymakers, and advocates to take measures to ensure that outmoded stereotypes and models affect students' enrollment in nontraditional CTE programs (NWLC, 2007). Additionally, the perpetuation of gender-imbalanced CTE pathways has a deep impact on the earning power of young women and leads to fewer chances for them to master the technology that is so important in today's workplaces (NWLC, 2002). CTE programs must overcome

these challenges to become truly impactful in preparing girls for postsecondary success (Brand et al., 2013).

Expanding the body of research and generating new knowledge for practice may enable school districts to develop their own targeted professional development for CTE practitioners regarding gender equity. It will allow policymakers to enact additional appropriate legislation to provide funding and staffing to support students in nontraditional pathways. It can encourage industry partners and non-profit organizations to provide appropriate support to high school CTE practitioners. For example, as states develop their CTE plans, they are required to consult with a range of stakeholders, including workforce development boards, business and industry, and related organizations (U.S. Government Accountability Office, 2022). Therefore, the conclusions of this study will have real-world implications for high schools and school districts in California, legislators, industry partners, and non-profit organizations who support CTE.

## Definitions

*Career technical education*. CTE is a broad term for a multiyear program of study in high school that integrates academic knowledge with technical and occupational skills and knowledge to provide students with a pathway to postsecondary education and careers (CDE, n.d.a).

*Gender equity*. The elimination of gender role stereotyping and gender bias from the educational process, thereby providing the opportunity and atmosphere to validate and empower individuals as they make career choices (Hilke & Conway-Gerhardt, 1994).

*Nontraditional careers*. Careers in which more than 75% of the workforce is of the opposite gender (Hansen, n.d.).

*Social role theory of gender*. Sex similarities and differences in behavior reflect gender role beliefs that, in turn, represent people's perceptions of men's and women's social roles in the society in which they live (A. Eagly & Wood, 2012).

*Southern California*. The southern California region includes the following counties: Imperial, Inyo, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura.

*Vocational education*. High school or postsecondary training for a specific occupation in agriculture, trade, or industry through a combination of theoretical teaching and practical application (Merriam-Webster, n.d.).

## Delimitations

This Delphi study was delimited to individuals who are expert CTE administrators within southern California.

## Organization of the Study

This Delphi study consists of five chapters, a list of applied references, and applicable materials in the appendix. Chapter I introduced the study and background to support the essential research. Chapter I also included the research problems, the purpose, the research questions, and the significance of the study. Chapter II is an expansion of the literature review on the history of gender inequities in CTE. Chapter III is a comprehensive description of the methodology, including research design, population sample, instrumentation, procedures used for data collection and analysis, as well as limitations within the study. Chapter IV describes the results of the study along with the presentation and analysis of the data collected. Chapter V communicates the conclusion of the study, the significant findings, and the implications for future research.

# CHAPTER II: REVIEW OF THE LITERATURE

CTE has gained widespread attention in recent years as an effective means of preparing high school students for the workforce. However, gender imbalances persist in CTE programs, with certain fields being dominated by one gender. High school administrators play a crucial role in building gender-balanced CTE pathways, but they face a range of challenges in doing so. This study explored the challenges high school administrators face when trying to build gender-balanced CTE pathways. A rigorous review of the current literature related to the topic was completed.

Gender imbalances are prevalent in many CTE pathways; for example, girls are underrepresented in science, technology, engineering, and math (STEM) fields, while boys are underrepresented in health and human services, education, and hospitality fields (Koch et al., 2020). These gender imbalances can be attributed to a range of factors, including societal stereotypes, lack of access to information, and lack of role models (Koch et al., 2020).

One of the primary challenges facing high school administrators when attempting to build gender-balanced CTE pathways is the lack of resources and funding for CTE programs, and in many cases, CTE programs are underfunded and do not receive the same level of support as academic programs (NWLC, 2018). Another challenge faced by high school administrators is the lack of trained educators in certain CTE fields; for example, there is a shortage of female educators in STEM fields, which can make it difficult to attract and retain female students (Bullock et al., 2019). Additionally, there is a lack of diversity in the CTE workforce, with certain fields being dominated by one gender (Koch et al., 2020). This lack of diversity can make it difficult for students to

envision themselves in certain careers. Another challenge high school administrators face in building gender-balanced CTE pathways is societal stereotypes and bias. For instance, girls may be discouraged from pursuing STEM fields due to the belief that these fields are masculine and not suited for women (Koch et al., 2020). Similarly, boys may be discouraged from pursuing traditionally feminine fields such as education and nursing (NWLC, 2018). High school administrators must work to challenge these stereotypes and create a welcoming and inclusive environment for all students. Addressing these challenges will require a concerted effort from educators, policymakers, and society as a whole to create an environment that supports gender equity in CTE pathways.

The literature review begins with a brief overview of the historical background of secondary education, CTE, and gender equity in education in the United States. Following the brief historical review, legislation related to gender equity in CTE is examined. Once the historical and legislative foundations have been presented, the theoretical foundation is offered with a look at three theories: (a) GST, (b) SCT, and (c) EVT. Next, the review of literature investigates the theoretical framework: Social role theory of gender. Lastly, the gap in the research is presented by the researcher.

The purpose is to understand the significance of addressing gender equity challenges in achieving gender-balanced high school CTE pathways. The primary emphasis of the literature review is to highlight the research surrounding the history of gender inequities in CTE, legislation attempting to address the gender inequities in CTE, and theories on why those gender inequities in CTE continue to persist. The shortage of research containing information on strategies to address gender inequities in CTE provides a gap, and the research is identified in the literature review.

## Historical Perspectives

### History of Secondary Education

Secondary education in America has a long and complex history that has evolved over centuries. The national system of formal public education in the United States of America developed in the 1800s and was first suggested by Thomas Jefferson, whose ideas formed the basis of the education systems developed in the 19th century (Thattai, 2001). Jefferson and other Founding Fathers believed the success of democracy in the United States would depend on the competency of its citizens, and they recognized that educating people for citizenship would be difficult to accomplish without a systematic approach to public schooling (Kober et al., 2020). Prior to the passing of compulsory education laws in the mid-19th century, it was the responsibility of parents to educate their children (Hutt, 2012). Prior to the mid-1800s, only wealthy people could afford the highly localized education system (Thattai, 2001).

The first publicly supported secondary school in the United States was the Boston Latin School, which was founded in 1635, and the curriculum was specialized and focused on Greek and Latin (Mintz et al., n.d.; Thattai, 2001). The demand for skilled workers led Benjamin Franklin to start a new kind of secondary school, and he helped establish the American Academy in Philadelphia in 1751 (Thattai, 2001). It later became the University of Pennsylvania (Judd, 1935). The first public high school opened in Boston in 1821 and became known as English High School (Mintz et al., n.d.). In the latter half of the 19th century, particularly between 1873 and 1885, the United States became the first country to open secondary education to the general public (Judd, 1935; Mintz et al., n.d.). In 1890, there were approximately 200,000 students enrolled in high

schools, and that number increased to 1,000,000 by 1910 and to 2,000,000 by 1920 (K12 Academics, n.d.). Between 1910 and 1940, high schools grew rapidly in number and size as more and more students enrolled. In 1910, only 9% of Americans had a high school diploma, but by 1935, 40% of Americans had one (K12 Academics, n.d.). However, high school attendance did not become commonplace in the United States until the 20th century, and even then, it wasn't until 1970 that the high school completion rate was 55% (Kober et al., 2020). By 2017, at least 90% of Americans aged 25 and older had a high school diploma (Kober et al., 2020).

Despite the belief that public education should be available to every child irrespective of race, gender, or economic status, this has not been the reality, and discrimination in schools on the basis of gender and race has always persisted (Thattai, 2001). For example, as public schools rely heavily on local property taxes to meet the majority of school expenses, schools have tended to reflect the values and financial capabilities of the communities in which they are located (Thattai, 2001). Free tuition laws were passed that made the local school district responsible for the payment of high school tuition, and most of these laws were passed between 1910 and 1920 (Goldin, 1999). Additionally, the General Educational Development (GED) credential was instituted in 1942 to give veterans without a high school diploma a chance to earn credit through examination; this was later expanded to civilians in 1952 (Goldin, 1999).

The education of African Americans remained extremely low until the Civil War; however, even after that, segregation in public high schools was common, especially in the South (Thattai, 2001). It was not until 1954 that the Supreme Court ruled in Brown v. Board of Education of Topeka that racial segregation in public schools was

unconstitutional and struck down the Plessy v. Ferguson separate but equal ruling (Mintz et al., n.d.). Even after the Brown v. Board ruling, it was difficult to eliminate discrimination in practice as many Whites and middle-class African Americans had moved out of the central cities, leaving poor African Americans and Hispanics to attend urban schools (Thattai, 2001).

Other minorities, such as Native Americans, lack exposure to a rigorous academic curriculum, often due to poverty and low attendance rates (Mintz et al., n.d.). Almost 50% of Native Americans drop out of high school, and only 17% continue on with their education to college and university (Mintz et al., n.d.). Women have been equally discriminated against in American schools even though they began being admitted to public high schools in the late 1800s, as schools were slower to provide full access to girls than to boys (Kober et al., 2020). The emergence of the women's rights movement during the 1960s was a boost against sexual discrimination, and in 1972, the passage of the Title IX Education Amendments prohibited discrimination on the basis of sex in public education and private educational institutions that receive federal aid (Thattai, 2001).

The history of public secondary education in the United States is a multifaceted story that reflects the evolving needs and priorities of American society. From its colonial origins to its present-day challenges, secondary education has been shaped by numerous historical movements and trends, including the rise of compulsory education and the impact of federal and legislative involvement on education policy.

## History of Career Technical Education

CTE has a rich history in America, beginning with its early roots in the colonial era. CTE has evolved and adapted to meet the changing needs of society. The origins of CTE in the United States can be traced back to the apprenticeship system that was prevalent in colonial times (Wonacott, 2003). Organized apprenticeship was the main means of preparing for work until the 19th century (Wonacott, 2003). In the early 19th century, schools specializing in training students to enter a certain area of the workforce started to open their doors (ACTE, n.d.). CTE was originally known as vocational education and was largely limited to boys, although in the early 1800s, girls began to enter schools to prepare for teaching (ACTE, n.d.). However, schools did not adequately serve the needs of youth, and the Commission on National Aid to Vocational Education in 1914 began stressing how public education was falling short of training youth for work (Wonacott, 2003). Originally, vocational education programs tended to include students who were at risk of not finishing high school (Thompson, 1973). The first manual training school in St. Louis, Missouri, set the foundation for modern CTE by combining hands-on learning with classroom learning (ACTE, n.d.). Later, the first trade school opened in New York in 1881, and by the turn of the century, agricultural education was thriving with agriculture schools opening their doors (ACTE, n.d.).

The beginning of the federal government's influence and involvement with vocational education began with the authorization of the Smith-Hughes Act of 1917, which helped create vocational programs in high schools (Thattai, 2001). The Smith-Hughes Act specified occupational training in agriculture, trades and industry, home economics, and teacher preparation (Wonacott, 2003). The law stressed separation from

classical education and called for education that would more closely meet the needs of teens of the working class who were attending high school but not on their way to professional occupations that required postsecondary education (Gray, 1991). The Smith-Hughes Act provided the first federal money for vocational education (H. R. D. Gordon & Schultz, 2020). The Act was designed to create a separate vocational education that would provide semiskilled workers to the labor force (Malkus, 2019). The first mass acceptance of CTE came after World War I and expanded to include adult education and retraining citizens to re-enter the workforce (ACTE, n.d.).

The George-Barden Act further extended federal support of vocational education about 30 years later (Barrett, 1948). The 1946 Act provided $29 million per year to vocational education, added funding to the agriculture-related organizations of Future Farmers of America and the New Farmers of America, and set limits on equipment spending (ACTE, 2021).

World War II caused a surge in CTE as skills were needed for defense purposes (ACTE, n.d.). In 1958, the National Defense Education Act specified supplementary funding for vocational training to prepare students for technical professions related to national defense (Hunt, 2021). The Act was passed in response to the Soviet acceleration of the space race and the launch of Sputnik, and it provided federal funding to ensure trained manpower in both quality and quantity to meet the national defense needs of the United States (United States House of Representatives, n.d.).

Then came the Vocational Education Act of 1963, which augmented funding assistance for occupational training and provided funding for vocational work-study programs and research, training, and demonstration programs related to vocational

instruction (Dugger, 1965). The Act expanded vocational education to persons of all ages in all communities, and funding for states was authorized by the student population rather than by field of study (ACTE, 2021). The Vocational Education Act focused on students disadvantaged academically, economically, or due to disability (Malkus, 2019). Additionally, in 1968, the Vocational Education Amendments established a National Advisory Council on Vocational Education and specified funding for gathering and distributing information about programs overseen by the Commissioner of Education (Forsythe & Weintraub, 1969). The 1994 School-to-Work Opportunities Act moved toward a different type of CTE based on the integration of academic and vocational coursework (EdSource, 2005). The School-to-Work Opportunities Act linked work-based learning with school-based learning, which was supported by industry partnerships (ACTE, 2021). This series of legislation, along with the Carl D. Perkins Acts, paved the way for CTE as we know it today.

In addition to reform efforts driven by federal legislation, there have been reform strategies such as career academies, career magnets, and career pathways (Castellano & Stringfield, 2003). Career academies were developed with the aim of restructuring large high schools into small learning communities to create stronger pathways from high school to further education or the workplace (MRDC, n.d.). Most career academies incorporate the elements of a broad career focus, links to postsecondary education and business, and curriculum integration (Castellano et al., 2003). Career magnet schools and programs offer an alternative approach by embracing a dual mission of college and career preparation that is achieved through explicit connections between occupation and academic coursework within the school and structured links between coursework and

work-based learning outside of school (Crain et al., 1998). Career pathways are intended to provide a rigorous, coherent program of study that includes academics in addition to technology applications and work-based learning (Castellano et al., 2003). They are an integrated collection of programs intended to develop students' academic, technical, and employability skills to place them in high-demand, high-opportunity jobs.

**History of Gender Equity in Education**

Gender equity in education has been a critical issue in the United States for over a century. Equal opportunity in education has been problematic for women throughout the history of the United States. For example, in colonial days, it was universally recognized that females only needed to be equipped to be wives and mothers (Tozer et al., 2002). In the 1700s, female students were thought to need the domestic arts skills of sewing, cooking, raising children, and teaching religion (Goyette, 2017). Although early in American history, women were largely uneducated, as public schools were established by the states in the 19th century, most were coeducational and provided boys and girls with similar educational opportunities (Rury, 2005).

In the 1800s, a larger tolerance for educating girls emerged and led to increased enrollments of females (Reef, 2009). It was not until 1826 that larger numbers of girls were allowed to attend the growing number of public high schools (Goyette, 2017). Women were not admitted into higher education until 1803, and when they were, it was usually into their own sex-segregated academies (Goyette, 2017). The first post-secondary institution to confer baccalaureate degrees to females was the Georgia Female College in 1836, and Oberlin College became the first university to offer bachelor's degrees to both males and females enrolled in similar courses in 1837 (Reef, 2009).

About 20 years later, the first state university to admit women was the University of Iowa. However, despite these increased opportunities for females in education, women's capacity to contend with men for higher-status professions did not increase (Rury, 2005).

The expansion of women into education was halted after World War II when the GI Bill was signed in 1944 to provide tuition assistance and living expenses for veterans to attend college or vocational education programs (Goyette, 2017). The civil rights movement reignited discussion about equal opportunities for women in education (Goyette, 2017). Further gains for women in education would not really come until the passage of Title IX in 1972. Even after the passage of Title IX, educationalists disregarded concerns pertinent to females, such as gender bias in testing and achievement gaps in math and science (Weaver-Hightower, 2009). The Women's Educational Equity Act of 1974 established a Council on Women's Educational Programs to help provide educational equity for women in the United States (Brookman, 2011). There are very few male-only institutions still in existence. One of the last educational institutions to admit women was the Virginia Military Institute, which did so in 1997 after being sued for discrimination (Goyette, 2017).

**History of Gender Equity in Career and Technical Education**

Since its inception in 1862, vocational education has been available to students through public schools as a response to the need for adequate preparation for an industrial society with two programs. One program is for males, focusing on agriculture, trade, and industrial careers, and another program for females, focusing on home economics and homemaking careers (Brookman, 2011). As Commissioner of Education for Massachusetts, David Snedden set the context for vocational education in 1910 when he

divided vocational education into areas based on the occupations for which individuals were prepared. He specifically labeled education in the household arts to prepare girls for dressmaking, cooking, and management of the home, while the other areas of professional education, commercial education, industrial education, and agricultural education were for boys (Wonacott, 2003).

Gender equity in CTE in the United States has been a longstanding issue that has taken decades to address. Women have long been underrepresented in technical fields and have faced numerous challenges in pursuing careers in these fields. The history of gender equity in CTE can be traced back to the mid-20th century when the United States began to experience a shortage of skilled labor. To address this shortage, the federal government passed the Vocational Education Act of 1963, which provided funding for vocational education programs in public schools. However, these programs were primarily geared toward preparing men for jobs in industrial and technical fields, and women were largely excluded from these programs (Dugger, 1965).

Before Title IX of the Education Amendments was passed in 1972, and the Vocational Education Act was passed in 1976, access to nontraditional courses and vocational schools was legally denied to females. This led to a concentration of male students in industrial and agricultural education and a concentration of female students in home economics and entry-level clerical occupations (Robbin, 1992). The Career Education Incentive Act of 1977 attempted to eliminate sex-role stereotyping and bias from career education materials (Hilke & Conway-Gerhardt, 1994). The School-to-Work Opportunities Act of 1994 was enacted to help all young people, including girls, prepare for high-skill and high-wage careers (Wonacott, 2003).

However, women have seen little improvement in the STEM fields since 2001 and are as scarce as ever in engineering, computing, and advanced manufacturing pathways (Change the Equation, 2015). In fact, the participation of women in engineering, computing, and advanced manufacturing pathways has remained flat from 2001 to 2014 (Williams, 2016). There continues to be a gender gap in the technology field, with only 24% of the female workforce holding technology positions (Patrick & Patrick, 2022). Data from 2005 high school graduates show that males were more likely to be CTE pathway completers than females (Levesque et al., 2008). A study by the National Women's Law Center (NWLC) in 2005 found that 98% of students in cosmetology, 87% of students in childcare, and 86% of students in health-related courses are female (Lufkin et al., 2007). Additionally, only 14% of females and 9% of males taking CTE courses are enrolled in a nontraditional course (Lufkin et al., 2007).

### Legislation Regarding Gender Equity in Career and Technical Education

Much of what occurs in public schools is shaped by state and federal laws, and the federal government has been involved in the provision of vocational education since the passage of the Smith-Hughes Act in 1917 (Castellano et al., 2003). As policymakers and educators continue to recognize the importance of ensuring equal opportunities for all students, legislation has played a crucial role in promoting gender equity in CTE by addressing issues such as: (a) access to diverse educational pathways, (b) combating gender-based discrimination, and (c) promoting inclusivity in traditionally male-dominated fields. This section will explore some of the key legislative initiatives and policies implemented to advance gender equity in CTE.

### Title IX of the Education Amendments of 1972

In 1972, Title IX of the Educational Amendments was passed to ensure that all students had equal access to education regardless of their sex (Phillips, 2022). Title IX addressed gender equity in terms of educational access and formally prohibited sex discrimination in education (Fluhr et al., 2017). Title IX states, “No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance” (as cited in Camera, 2022, para. 4). Title IX provides protections for girls against sexual harassment and plays a pivotal role in enshrining gender-based admissions policies and combating discriminatory discipline policies that disproportionately affect African American girls (Camera, 2022). Title IX specified disproportionate course enrollment as an area of focus (Fluhr et al., 2017). Title IX regulations require that each recipient of federal financial assistance designate a Title IX coordinator to ensure compliance with: (a) the law, (b) adopting and publishing policies and procedures for resolving complaints, (c) refraining from segregating courses by sex, and (d) ensuring the disproportionate enrollment of students of one sex in a course is not the result of discrimination (Lufkin et al., 2007).

### Vocational Education Act of 1976

The Vocational Education Act of 1976 was intended to dismantle sex segregation in CTE (Lufkin et al., 2007). The Vocational Education Act requires each state to hire an individual to oversee the implementation of gender equity initiatives in the vocational education system (Hilke & Conway-Gerhardt, 1994). The 1976 amendments mandated a

full-time sex equity coordinator to be appointed in each state to coordinate sex equity work in CTE, and 10 functions were identified (see Table 1) (Lufkin et al., 2007).

**Table 1**

*Functions of State Sex Equity Coordinators*

| Functions of State Sex Equity Coordinators | |
|---|---|
| Create awareness of programs and activities in vocational education to reduce sex bias and stereotyping in vocational education. | Monitor and implement laws prohibiting sex discrimination in all hiring, firing, and promotion procedures within the State related to vocational education. |
| Gather, analyze, and disseminate data on the status of male and female students in vocational education programs. | Assist local education agencies in the State in improving vocational education opportunities for females. |
| Develop and support actions to correct problems brought to the attention of the personnel, including creating awareness of the Title IX complaint process. | Make information developed under this section available to the State Board and other councils and commissions. |
| Review the distribution of grants and contracts by the State board to ensure that the interests and needs of females are addressed in all projects assisted under the Act. | Review and submit recommendations regarding overcoming sex bias and sex stereotyping in vocational education programs to the State Board and other councils and commissions. |
| Review all vocational education programs in the state for sex bias. | Review the self-evaluations required by Title IX. |
| | - |
| | - |

**Carl D. Perkins Vocational Education Act of 1984**

The Carl D. Perkins Vocational Education Act of 1984, commonly known as the Perkins Act provides federal resources to help students gain the scholastic and technical skills needed to be successful in the workforce (Brand et al., 2013). The legislation promotes a larger focus on academic rigor, career-focused programs of study, articulation between secondary and postsecondary education, and greater accountability (Brand et al., 2013). The Perkins Act had two main objectives: To improve vocational programs and provide better services and to increase access to vocational education for students with

special needs (Wonacott, 2003). The Perkins Act provided funding for program development to eliminate sex-role stereotyping in vocational education and to promote enrollment in nontraditional career programs (Robbin, 1992). The funding provisions of the Perkins Act amounted to more than $100 million focused on gender equity (Lufkin et al. 2007).

**Carl D. Perkins Vocational and Applied Technology Act of 1990**

The Perkins Act was reauthorized in 1990 as the Carl D. Perkins Vocational and Applied Technology Act and is commonly known as Perkins II. The 1990 reauthorization was envisioned to incorporate CTE with academic instruction and offer closer bonds between high school CTE and post-secondary institutions and corporations (H. Gordon, 2003). This reauthorization did not specifically address any gender equity issues. The Act did mandate that federally funded vocational education programs integrate vocational and academic curricula, promote work-related experience, and include accountability as a required element of funding (Castellano et al., 2003). Perkins II provided a 3.5% set aside from each state's basic CTE grant for gender equity programs and services (Lufkin et al., 2007).

**Carl D. Perkins Vocational and Applied Technology Education Amendments of 1998**

The Perkins Act was resanctioned in 1998 as the Carl D. Perkins Vocational and Applied Technology Education Amendments and is commonly known as Perkins III. Perkins III encouraged states to improve the quality of their vocational education programs. While Perkins III did not specifically address gender equity issues, it did address equity issues for Native Americans and included funding for Native American

employment and technical training programs (Skinner & Apling, 2005). In fact, the Act stripped the funding for gender equity and the requirement of a state sex equity coordinator (Lufkin et al., 2007). Perkins III created the reserve fund in states and modified state authorizations so that 85% of funding would reach local agencies (ACTE, 2021). Perkins III provides funding for state leadership activities, including services related to nontraditional programs and employment (Skinner & Apling, 2005).

**Carl D. Perkins Career and Technical Education Improvement Act of 2006**

The Perkins Act was reapproved in 2006 as the Carl D. Perkins Career and Technical Education Improvement Act and is generally known as Perkins IV. The objective of the 2006 legislation was to advance the academic, career, and technical skills of all secondary and post-secondary students who choose to enroll in CTE pathways (Perkins Collaborative Resource Network, 2022). Perkins IV mandated the organization of vocational education programs into sequences of courses and implemented competency-based applied learning (Brookman, 2011). Additionally, Perkins IV was intended to expand participation and completion rates of all students in CTE pathways nontraditional for their gender (Hyde & Lindberg, 2007). Perkins IV requires local funds to include preparation of special populations, including single parents and displaced homemakers (Lufkin et al., 2007). The 2006 reauthorization also retired the term vocational education and replaced it with CTE (ACTE, 2021). Perkins IV requires states to collect data on nontraditional field participants and formulate plans to improve participation rates for nontraditional students (Fluhr et al., 2017).

### Strengthening Career and Technical Education for the 21st Century Act of 2018

The Perkins Act was reauthorized in 2018 as the Strengthening Career and Technical Education for the 21st Century Act and is frequently known as Perkins V. One of the significant shifts in Perkins V is the expanded role of equity in the law as equity is infused in most aspects including planning, use of funds, stakeholder engagement, accountability, and reporting (ACTE, 2020). Among other things, Perkins V modernizes and enlarges the definition of special populations to include homeless students and foster youth (U.S. Department of Education, 2018). Additionally, the law strengthens local accountability provisions to help ensure continuous program improvement, and it expands opportunities to every student, regardless of race, gender, or disability to explore, choose, and follow CTE pathways to earn credentials (Perkins Collaborative Resource Network, 2022). It is too soon to determine what effects this law will have on gender equity in CTE.

### Career Technical Education Framework for California Public Schools

CTE is a key component of California's educational system. The CDE defines CTE as a "sequence of courses that integrates academic and technical content, providing students with the knowledge and skills necessary to succeed in postsecondary education and in their chosen careers" (CDE, n.d.c, para. 2). In 2002, California passed Assembly Bill 1412 and Senate Bill 1934 which mandated that California develop career technical curriculum standards and frameworks (Edsource, 2005). The CTE Framework for California public schools provides a roadmap for delivering high-quality CTE programs that meet the needs of students, employers, and the economy (CDE, n.d.e). The CTE standards and framework incorporate knowledge about career options, technology, and

skills required for success in post-secondary life. California's CTE standards are organized around 15 industry sectors and were developed by the CDE in collaboration with an advisory group that included educators, employers, and industry leaders (see Table 2) (CDE, n.d.d).

**Table 2**

*California's Career Technical Education Industry Sectors*

| California's Career Technical Education Industry Sectors | |
|---|---|
| Agriculture and Natural Resources | Health Science and Medical Technology |
| Arts, Media, and Entertainment | Hospitality, Tourism, and Recreation |
| Building and Construction Trades | Information and Communication Technologies |
| Business and Finance | Manufacturing and Product Development |
| Education, Child Development, and Family Services | Marketing, Sales, and Services |
| | Public Services |
| Energy, Environment, and Utilities | Transportation |
| Engineering and Architecture | - |
| Fashion and Interior Design | - |

The CTE Framework is organized around five major components: (a) curriculum, (b) instruction, (c) assessment, (d) professional development, and (e) partnerships. The curriculum component emphasizes the need for CTE courses to be aligned with the state's academic content standards and to incorporate real-world, hands-on experiences that engage students in authentic learning. The instruction component emphasizes the importance of using a variety of instructional strategies to meet the needs of diverse learners. The assessment component emphasizes the need for CTE programs to use a variety of assessment methods that measure both academic and technical skills to evaluate student learning. The professional development component emphasizes the need for teachers to have ongoing opportunities to develop their knowledge and skills, work collaboratively with industry partners to stay up to date on the latest trends and practices in the workforce, and use data to inform their practice and continuously improve their

instruction. The partnership component emphasizes the importance of collaboration between schools, employers, and community organizations to develop CTE programs that meet the needs of the local economy and provide students with opportunities to apply their skills in real-world settings (CDE, n.d.b). By implementing the CTE standards and framework, high schools can help ensure that all students, regardless of their gender, are prepared for the challenges and opportunities of the 21st-century workforce.

## Theoretical Foundation

The theoretical foundation for this study is based on facts and assumptions about the nature of gender differences, gender stereotypes, and the implications for gender equity. Gender stereotypes are defined as a culture's shared beliefs about male and female roles, behaviors, and personality traits (Hyde & Lindberg, 2007). One explanation for gender differences, which is supported by evidence that children learn stereotypes very early in development, is that they are caused and perpetuated by gender stereotypes (Hyde & Lindberg, 2007). There is research that highlights that parents' beliefs about the gender appropriateness of math, science, reading, and sports influence their children's beliefs about and aspirations for each domain (Fredricks & Eccles, 2002). Additionally, there is research that documents the role of parents' gender stereotypes in their daughters' career development and career choices (Rainey & Borders, 1997). There have been many studies and much research done on the topic, and authors such as Bem, Eagly, Eccles, and Bandura have contributed to the field with research and insight into the topic of gender equity.

## Gender Schema Theory

GST is a theory that explains how individuals acquire and internalize gender roles and stereotypes through their socialization experiences. The theory posits that individuals develop schemas, or mental frameworks, that organize their perceptions of gender, leading to the formation of gender roles and stereotypes (Martin & Halverson, 1981). GST proposes that sex typing results from the fact that self-concept itself is assimilated in the gender schema (Bem, 1981). Sex-typed individuals tend to translate and categorize incoming information in terms of a gender schema, using the traditional bipolar masculinity/femininity dimension as the organizing principle (Schmitt et al., 1988). Because American culture has been so gender polarizing in its discourse and in its social institutions, American children gender polarize themselves without even realizing it (Starr & Zurbriggen, 2017). GST was first proposed by Sandra Bem in 1981 as an extension of cognitive developmental theory (Martin & Halverson, 1981).

GST is based on three main concepts: (a) gender identity, (b) gender schema, and (c) gender typing. Gender identity refers to an individual's subjective sense of being male or female, while gender schema is a mental framework that organizes an individual's perceptions of gender-related information (Martin & Halverson, 1981). Gender typing refers to the process by which individuals acquire gender roles and stereotypes based on their gender schemas. Several studies have shown that children as young as two to three years old have developed gender schemas and use them to categorize people, objects, and activities as either masculine or feminine (Martin et al., 2002). Furthermore, studies have demonstrated that gender schemas can influence memory, attention, and perception. Individuals are more likely to remember information that is consistent with their gender

schema and pay more attention to gender-related information that confirms their gender schema (Martin & Halverson, 1981). Individuals' cognitions about gender influence their perceptions of the world and themselves (Hyde & Lindberg, 2007).

**Social Cognitive Theory**

SCT is a theory that seeks to explain human behavior through the interaction of cognitive, behavioral, and environmental factors. One of the key concepts of SCT is self-efficacy, which refers to an individual's belief in their ability to perform a specific task or behavior. Individuals with high self-efficacy are more likely to engage in behaviors that lead to positive outcomes, whereas those with low self-efficacy are more likely to avoid such behaviors or engage in behaviors that lead to negative outcomes (Bandura, 1986). Another key concept of SCT is observational learning, which refers to the process by which individuals learn by observing others' behavior and its outcomes. Observational learning is particularly important in situations where direct experience is limited or difficult to obtain. Observational learning can occur through media exposure, such as watching television or reading a book, and can influence the development of attitudes and behaviors (Bandura, 1977). SCT also emphasizes the role of environmental factors in shaping behavior. Environmental cues, such as rewards and punishments, can influence the likelihood of behavior change. For example, individuals are more likely to engage in a behavior if they receive a reward for doing so or if they observe others being rewarded for the same behavior (Bandura, 1986).

SCT was first proposed by psychologist Albert Bandura in the 1960s. SCT is fundamentally an interactional model of causation and gives central roles to cognitive, vicarious, and self-regulatory processes, which are based on reciprocal determinism.

(Wulfert, 2023). SCT presents an alternative model of gender differentiation, which acknowledges three sources of influence on gender development: (a) individual factors such as biology and preferences, (b) the environment, and (c) behavior/experience (Hyde & Lindberg, 2007). Additionally, SCT highlights three processes by which gender roles and behaviors are learned: (a) modeling, (b) enactive experience, and (c) direct tuition (Hyde & Lindberg, 2007). SCT proposes that once it is learned, gendered behavior is maintained through social sanctions and self-regulation (Bussey & Bandura, 1992).

**Expectancy-Value Theory**

The EVT explains individuals' motivation and achievement-related behaviors. EVT is a psychological concept that posits that an individual's motivation for doing something directly corresponds to whether the task is viewed as possible and whether the individual is willing to do the task (Ungvarsky, 2023). According to EVT, motivation is influenced by two primary factors: Expectancy and value. Expectancy refers to an individuals' belief in his/her ability to succeed in a particular task or activity, while value refers to the importance or relevance of that task or activity to the individual (Eccles & Wigfield, 2020). EVT suggests that individuals are more likely to engage in behaviors that they believe they can successfully accomplish and that they value (Eccles, 2009). Individuals who have a high belief in their ability to succeed and perceive a high value in academic achievement are more likely to engage in academic behaviors such as studying and completing assignments (Wigfield & Eccles, 2000). Research has shown that girls tend to value academic achievement more than boys, but boys tend to have higher self-efficacy beliefs in math and science (Eccles & Wigfield, 2020).

EVT proposes that what individuals believe and how individuals evaluate their options determines what they do (Ungvarsky, 2023). The EVT was developed by Eccles to help understand gender differences in adolescents' achievement choices, such as why boys take more advanced high school math classes than girls and why boys are more likely than girls to pursue math and science careers (Eccles & Wigfield, 2023). EVT suggests that gender differences in achievement stem from the different achievement-related choices that males and females make (Hyde & Lindberg, 2007). Additionally, studies have shown that parents play a key role in shaping their children's attitudes toward success in mathematics and other domains (Frome & Eccles, 1998). EVT provides a cohesive structure for integrating the influences of parents and teachers with individual children's cognitions related to their abilities and the achievement-related choices they make (Hyde & Lindberg, 2007).

## Theoretical Framework: Social Role Theory of Gender

Gender roles and stereotypes are deeply ingrained in American society. While these roles and stereotypes may seem natural or innate, they are socially constructed and maintained. The social role theory of gender attempts to explain how gender roles are formed and perpetuated, suggesting that gender roles arise from the social roles that individuals take on in their lives and that these roles are shaped by social expectations and norms (A. H. Eagly & Wood, 1999). According to the social role theory of gender, gender roles are created and reinforced through the division of labor in society (A. Eagly & Wood, 2012). Gender stereotypes reflect individuals' observations of what people do in daily life. "If individuals often observe a particular group of people engaging in a particular activity, they are likely to believe that the abilities and personality attributes

required to carry out that activity are typical of that group of people" (A. Eagly et al., 1982, pp. 3-4). For example, if boys and girls consistently observe women caring for children and babies, they are prone to believe that traits thought to be necessary for that activity, such as nurturance and warmth, are typical of women (A. Eagly et al., 1982).

The social role theory of gender emphasizes that there is significant variability in gender differences across cultures (Hyde & Lindberg, 2007). There tend to be substantial psychological gender differences in societies with large differences between the status of males and females (A. H. Eagly & Wood, 1999). The social role theory of gender contends that the gendered division of labor underlies most other gender differences (Hyde & Lindberg, 2007). One study found that gender roles in different cultures were strongly influenced by the division of labor in those cultures (A. H. Eagly et al., 2000). Another study found that gender roles were more flexible in societies where women had more economic power (Fiske, 2018).

The social role theory of gender goes on to illustrate that the activities that individuals carry out are typically determined by their social roles because each role has associated with it the obligation to perform a certain set of activities (A. Eagly et al., 1982). Due to this link between individuals' activities and their social roles, stereotypes about groups of people typically reflect the distribution of people into social roles in a society (A. Eagly et al., 1982). In the United States, men and women have historically been expected to perform different tasks and take on different roles. For example, men have typically been seen as breadwinners and providers, while women have been expected to be caretakers and nurturers (A. Eagly & Wood, 2012). These roles have been

reinforced through cultural norms, such as the idea that women should prioritize family over work or that men should be aggressive and competitive (A. H. Eagly et al., 2000).

However, one key aspect of the social role theory of gender is that gender roles can change over time as society changes (A. H. Eagly et al., 2000). For example, as more women enter the workforce, traditional gender roles may become less relevant or important (Koenig & Eagly, 2014). Similarly, as societies become more accepting of gender diversity, people may be freer to express themselves in ways that challenge traditional gender roles (A. H. Eagly et al., 2000). This helps to explain how both boys and girls are expanding their occupational restrictions and limits following ever-changing social roles (Fluhr et al., 2017).

## Research Gap

Gender equity in CTE is an area that has received limited attention in research literature. The limited number of published studies pertaining to gender equity in CTE programs endorses the need for further research on this critical topic. Currently, very little research explores the lack of male students in female-dominated CTE pathways. Additional research is needed to examine the causes and solutions of this issue. Furthermore, although there has been some research conducted with regard to the lack of female students in nontraditional CTE pathways and careers, more needs to be done as it continues to be a concern. Therefore, information, findings, and recommendations for this part of the issue will need to be investigated more thoroughly.

## Summary

CTE has regained widespread attention in recent years as an effective means of preparing high school students for the workforce. However, gender imbalances persist in

CTE programs, with certain fields being dominated by one gender. This review of the literature presented the theoretical foundation of the research as well as the conceptual framework. The characteristics and framework of California's CTE model were also presented, including industry sectors, curriculum, and advisory partnerships. Included was a brief overview of the histories of secondary education and career technical education in America. Considerable attention was given to the issues facing females in CTE programs and those preparing for nontraditional careers, including gender equity in education, specifically CTE, and legislation pertaining to gender equity in education. According to the literature, CTE programs continue to provide limited access for female students in nontraditional career pathways and continue gender segregation despite repeated legislative action contributing to the persistence of the gender wage gap (Ainsworth & Roscigno, 2005). Additionally, females continue to be underrepresented in the higher-paying STEM fields, which contributes to the lack of preparation for nontraditional careers. Recent studies on CTE have found that gender segregation is still extensive, reflecting labor market trends. Females are overrepresented in fields such as cosmetology, childcare, and the health professions, while males are overrepresented in fields such as agriculture, engineering, and construction (NWLC, 2005).

## Synthesis Matrix

The sources and references used to create this literature review are presented in the synthesis matrix, which can be found in Appendix A.

# CHAPTER III: METHODOLOGY

## Overview

This research study examined the challenges high school CTE administrators face as they work to create gender-balanced classes in CTE pathways. Due to the limited amount of research with regard to effectively creating gender-balanced high school CTE classes, this study identified the challenges to creating gender-balanced classes and described effective strategies for addressing the challenges. This chapter will describe the framework for the implementation of the study, beginning with a review of the purpose of the study and research questions. It will then provide a description of the research design. That will be followed by descriptions and explanations of the population, target population, and sample used for the study. Then, the instrumentation, data collection procedures, and a description of data analysis will follow. Lastly, the limitations of the study and a summary will complete Chapter III.

## Purpose Statement

The purpose of this Delphi study is to identify what expert high school CTE administrators see as challenges to creating gender-balanced classes across all high school CTE pathways, to rate the significance of the identified challenges according to the experts, and to describe the most effective strategies for addressing the five most significant challenges identified to creating balanced CTE enrollment across all high school pathways.

## Research Questions

The following questions were developed to help guide the study:

1. What do expert high school CTE administrators identify as challenges to creating gender-balanced classes across all high school CTE pathways?

2. What do expert high school CTE administrators identify as the most significant challenges to creating gender-balanced classes across all high school CTE pathways?
3. What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways?

## Research Design

This study utilizes the normative Delphi study approach to collect data from expert high school CTE administrators. The Delphi method is characterized by multiple rounds of inquiry (Hsu & Sandford, 2012) and is based on the consensus theory, which is the belief that pursuing consensus on a topic creates a commitment to objectives within a group (Salkind, 2007). The Delphi method encapsulates ideas from experts on a particular subject, processes the viewpoints, and reaches a culminating agreement for a multifaceted topic through statistical analysis (Salkind, 2007). Due to the iterative aspect of the Delphi method, instrument development, data collection, and questionnaire administration are interconnected between rounds (Hsu & Sanford, 2012). As described by Hsu and Sandford (2012), the first round begins with an open-ended question and is the cornerstone for soliciting specific information about the subject from the Delphi participants.

The researcher then takes the qualitative data generated from Round 1, converts the information into a controlled statistical tool, and it becomes the basis for the second round of the Delphi method (Salkind, 2007). In Round 2, the Delphi panel evaluates the data collected from Round 1 and rates or ranks the new statements (Hsu & Sanford,

2012). Round 3 encompasses the final rating from the Delphi panel to determine the most impactful assertions for the research topic (Salkind, 2007). Three rounds are typically sufficient to achieve the desired result. However, a fourth round is permissible, if necessary, for clarification (Hsu & Sandford, 2012).

The purpose of this study was to ascertain what expert high school CTE administrators believe are the challenges and strategies necessary to build gender-balanced CTE classes. Experts were asked to identify the challenges to creating gender-balanced CTE classes. The researcher synthesized the information to develop a 6-point Likert scale to allow the Delphi panel to rate the challenges by significance. Once the most significant challenges were identified, the third and final round allowed the Delphi expert panel to communicate the most effective strategies to address those challenges.

As part of the methodology selection process, the researcher considered a variety of research designs. Based on the need in the field of high school CTE for research on gender equity, the collection of information from experts currently working in the field was chosen. Latif et al. (2017) suggest the Delphi technique is an acceptable method when building consensus with experts in the field. Hsu and Sanford (2012) agree that the Delphi technique is an accepted method for gathering data from respondents within their domain of expertise and is a widely used technique.

Additionally, the Delphi technique allows for the collection of both qualitative and quantitative data collection throughout the study. The population and sample size were additional considerations in selecting the research study methodology. Experts within a Delphi study can participate virtually, and this allows for a wider range of individuals. Removing the geographical barrier is beneficial as the Delphi method relies

on the opinions of the selected experts (Latif et al., 2017). An additional benefit of the Delphi method is the ability to develop multiple iterations, which provides the opportunity for the experts to expand on their ideas or retract a concept originally put forth to the researcher (Salkind, 2010).

## Population

A population is a group of individuals that a researcher is interested in (Patten & Newhart, 2018). McMillan and Schumacher (2010) define a population as "a group of individuals or events from which a sample is drawn and to which results can be generalized" (p. 5). The population for this study was certificated high school administrators who oversee CTE programs within California. The CDE (2022) published data stating that there were 2,034 high schools in California including continuation and alternative education high schools in 2022.

## Target Population

According to Creswell (2012), the target population is a group of individuals with some general characteristics that can be identified and studied by researchers. Creswell further defined the target population as a small percentage of the total population narrowed to specifically define participants who display clear characteristics of significance and concern to the study. As previously stated, there are over 2,000 high schools in California, and interviewing all administrators who oversee CTE programs is unrealistic due to the large number of administrators that includes. Therefore, the researcher chose to select high school administrators in southern California. The target population for this study is expert high school CTE administrators in southern California who meet the following criteria:

- A minimum of three years as a high school administrator.
- Three or more years of supervisory experience of CTE.
- Currently overseeing a high school CTE program or pathway.

## Sample

McMillan and Schumacher (2010) define the sample as "the group of subjects or participants from whom the data are collected" (p. 129). Researchers intend to extract conclusions from the information provided by the sample to inform the greater population (Singh, 2007). In this study, the targeted sample size was 15, and the experts within the sample were individuals who oversee high school CTE programs. Delbecq et al. (1975) suggest that 10 to 15 subjects could be sufficient if the background of the Delphi subjects is similar. The participants were identified through recommendation by district-level CTE coordinators/directors using purposeful sampling, which, as described by McMillan and Schumacher, "occurs when the researcher selects particular elements from the population that will be representative or informative about the topic of interest" (p. 138). The selection for the experts was:

- A minimum of three years as a high school administrator.
- Three or more years of supervisory experience of CTE.
- Currently overseeing a high school CTE program or pathway.

### Sample Selection Process

The researcher notified professional contacts in the field of high school CTE who meet the qualifications of the study. The researcher also contacted school district level administrators to develop a list of professionals who meet the selection criteria for the

study. All individuals meeting the selection criteria were contacted via email to solicit their participation in the study (see Appendix B).

Those individuals who responded with a willingness to participate in the study were sent a follow-up demographic survey email to confirm the selection criteria (see Appendix C). From the individuals meeting the selection criteria, 15 were selected to participate in the study.

Selected individuals were sent informed consent materials and the Participant's Bill of Rights prior to beginning the study (see Appendix D and E). In addition, an item was placed at the beginning of each survey that asked the participant for their agreement to voluntary participation. Surveys for Rounds 1-3 were then administered.

## Instrumentation

In this Delphi study, the researcher conducted a three-round method with the identified experts. The study utilized Google Forms as the tool to collect the information from the experts throughout the three rounds. The first round encompassed open-ended questions for qualitative analysis engaging the experts in the challenges they see in creating gender-balanced high school CTE pathways. The information in Round 1 was synthesized and placed on a Likert scale for the experts to rate by significance within Round 2. Round 3 allowed the experts to explain the best strategies to address the challenges found to be of most significance within Round 2.

### Round 1

Round 1 utilized an open-ended format to answer the question: *What do expert high school CTE administrators identify as challenges to creating gender-balanced*

*classes across all high school CTE pathways?* The researcher coded the answers by frequency within Round 1, and they were put forth for a rating in Round 2.

**Round 2**

Round 2 contained a list of expert recommendations on the challenges in creating gender-balanced high school CTE pathways found in Round 1. The instrument for research in Round 2 was the Likert scale. The experts rated each skill based on the significance of a 6-point Likert scale. The ranges on the Likert scale are *Very Significant, Significant, Slightly Significant, Slightly Insignificant, Insignificant,* and *Very Insignificant.*

**Round 3**

The final round within this Delphi study utilized an open-ended question format for each of the challenges found to be highest in significance for creating gender-balanced high school CTE pathways. The question was: *What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways?*

**Validity**

Validity, as defined by Patten and Newhart (2018), "refers to the extent to which a test measures what it claims to measure" (p. 123). Cramer and Howitt (2004) utilize a similar definition and designate validity as the degree to which a measure can be shown to measure what it proposes to measure. Maul (2018) further describes validity as a central concept within research, and it examines if a claim, outcome, or result is factually based. Validity is critical to instruments and, therefore, to research, as it can control the

quality of the study (Golafshani, 2003). The selection and use of qualified experts ensure the validity of the instrument and collected data because of the experts' knowledge and competence on the research topic (Habibi et al., 2014). The consensus of the experts and the controlled feedback further provide validity (Golafshani, 2003).

**Reliability**

Reliability in research, as defined by Coghlan and Brydon-Miller (2014), is the quality of dependability and consistency within a measure or procedure. Patten and Newhart (2018) states that a measure is reliable if it produces consistent results. Another definition of reliability, also known as measurement precision, is the consistency of assessment results over independent administrations of the testing procedure (Fan & Randall, 2018). If an assessment or measure does not yield consistent results, the researcher should not make inferences about what a score signifies. Coghlan and Brydon-Miller recommends that all research questions be written with clarity to assist in the reliability among research participants. For this Delphi study, a field test will be completed to ascertain the clarity of the research questions within Round 1, allowing for stronger reliability within the research study.

**Field Test**

Field testing is when the researcher administers an early version of a survey to a sample of the target audience to gather information to help the researcher improve the survey items (Hays & Brown, 2005). Field tests allow the researcher to see if the instrument will work for the research study in the data collection stages (Bagdaddy, 2020). The purpose of the field test is to verify reliability. Two CTE administrators within southern California, who have been practicing for more than three years with a minimum of three years of CTE leadership experience was chosen for the field study.

These individuals will not be part of the expert panel for the research study. The field study participants agreed to participate in three rounds of questions via email and Google Forms and provide feedback regarding ease of process and clarity of questions for each round. Round 1 consists of the question: *What do expert high school CTE administrators identify as challenges to creating gender-balanced classes across all high school CTE pathways?* Round 2 utilized the answers put forth by the field study participants via the Likert scale, 6-point model. The field study participants were asked to rate the skills ranging from *Very Significant* to *Very Insignificant.* Round 3 provided a third and final question to the field study participants: *What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways?* The researcher was able to adjust the instrument based on the feedback from the field study participants to safeguard clarity and process for the study.

## Data Collection

In preparation for data collection, in April 2022, the researcher completed the certification for human subject's research provided by the Collaborative Intuitional Training Initiative (see Appendix F). The researcher then requested permission from the University of Massachusetts Global Institutional Review Board before surveying participants and collecting data (see Appendix G). The researcher invited participation by email. Along with the request to participate as an expert in the study, the researcher provided an explanation of the study as well as what to expect and an estimation of the time commitment to move through the process. Those who agreed to participate received a Google Forms link to begin question one in Round 1 of the study (see Appendix H). Survey participant identification remained anonymous via Google Forms, and the

researcher did not know the participant identities concerning the answers, and the study was voluntary.

**Round 1**

The researcher provided a hyperlink via Google Forms to each expert in the panel to complete Round 1 of the study. The experts had a maximum of one week to complete the survey. As the experts began to respond, only the researcher had access to the results. All respondents remained anonymous, and responses were collected, stored, and maintained by Google Forms. The question for Round 1 was: *What do expert high school CTE administrators identify as challenges to creating gender-balanced classes across all high school CTE pathways?* The responses from Round 1 were the groundwork for Round 2 in the study.

**Round 2**

The responses from the expert panel in Round 1 were totaled and synthesized by frequency themes. Once the challenges to creating gender-balanced classes across all high school CTE pathways were determined, they were placed into a 6-point Likert scale for Round 2. The Likert scale ranged from *Very Significant* to *Very Insignificant.* The panelists received an email with a hyperlink to participate in Round 2 of the study. The results of the Likert scale were used to ascertain unanimity among the experts on the most significant challenges to creating gender-balanced classes across all high school CTE pathways. The expert panel had one week to complete Round 2 of the study (see Appendix I). Responses remained confidential via Google Forms, and only the researcher had access.

### Round 3

After the researcher had identified the most significant challenges to creating gender-balanced classes across all high school CTE pathways, they were used for Round 3 of the study (see Appendix J). Round 3 consisted of the following open-ended survey question: *What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways?* A consistent approach was used for timing, providing each expert with one week to complete Round 3 of the survey. Round 3 responses were coded and sorted by the researcher to provide useful information to the greater population. Responses were stored and maintained by Google Forms; all respondents remained confidential, and only the researcher had access.

## Data Analysis

This Delphi research study consisted of three rounds of questions and analysis based on panel experts in the field of high school CTE programs. The Google Forms platform was utilized to collect, store, and preserve all results in a confidential manner. Each round was analyzed by the researcher, with the description of the process below.

### Round 1

The question for Round 1 was: *What do expert high school CTE administrators identify as challenges to creating gender-balanced classes across all high school CTE pathways?*

The responses from Round 1 allowed the expert panelists to communicate what they have learned through their years of working in CTE as high school administrators.

The open-ended question allowed for qualitative analysis. The themes obtained within Round 1 were used as the groundwork for Round 2.

**Round 2**

Round 2 consisted of the themes generated from Round 1. Google Forms was the platform used to collect, store, and maintain the confidential answers of the expert panelists. The Round 2 surveys consisted of a 6-point Likert scale. The experts were asked to rate each skill based on the importance of a 6-point Likert scale. The ranges on the Likert scale consist of: *Very Significant, Significant, Slightly Significant, Slightly Insignificant, Insignificant,* and *Very Insignificant.*

Round 2 of the study required quantitative analysis. The researcher determined the mean rating for each challenge presented on the 6-point Likert scale. The five highest-rated challenges were presented in Round 3 of the study.

**Round 3**

The five highest-rated challenges determined in Round 2 were presented in Round 3 of the study. Google Forms was the platform used to collect, store, and maintain the confidential answers of the expert panelists. Each challenge listed in Round 3 of the study had the final open-ended question for response by the panelists: *What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways?* The researcher utilized qualitative analysis and coded the responses for Round 3 of the study. The researcher placed the strategy into a data matrix based on the frequency of responses by the panelists.

## Limitations

There were some limitations present in this research study. The first notable limitation was the inherent limitations in the knowledge, experience, and expertise of the individuals who served as the expert panel for the Delphi study. Second, the researcher is an educator and school district administrator who served as a CTE administrator by trade, creating possible bias. A third limitation is the research study was limited to high school CTE administrators within school districts in southern California. The geographical boundary on respondents was necessary due to access, time, and resources. The last limitation of the study was the instrument; although a field test was conducted to ensure reliability, the instrument was created and analyzed by the researcher.

## Summary

Chapter III illustrated the framework for how the study was conducted. The chapter began with a review of the purpose of the study as well as the research questions. The next portion of the chapter was a descriptive review of the research design. The researcher utilized the Delphi method to ascertain information from a panel of experts on the challenges and solutions to creating gender-balanced classes across high school CTE programs. Chapter III further described the population, target population, and sample employed in the research study. This was followed by the information presented regarding instrumentation, validity, reliability, and the field test employed before study implementation. Additionally, a description of data collection and analysis and limitations were presented within Chapter III.

The following chapter, Chapter IV, provides the compilation of results, analysis of the data, and presents the findings. Following Chapter IV, Chapter V delivers a

summary of the study and presents findings, implications, conclusions, and recommendations for additional research regarding gender equity in high school CTE programs.

# CHAPTER IV: RESEARCH, DATA COLLECTION, AND FINDINGS

This Delphi study was designed to identify the challenges high school CTE administrators face as they work to create gender-balanced classes in CTE pathways. A combination of 15 expert high school CTE administrators in southern California participated in three rounds of surveys. All three rounds of the survey were designed to build consensus around the research topic. Chapter IV of this study provides a comprehensive summary of the data accumulated and the findings.

## Overview

This chapter is designed to provide a review of the purpose statement and research questions, followed by an explanation of the research methodology and the procedures followed during the data collection process. The chapter will also provide a review of the population and target population used for the study. The sample for this study was delimited to expert high school CTE administrators within southern California. Additionally, the criterion to qualify as an expert within the study is reviewed within the chapter. Lastly, the data and analysis of the data are offered in the chapter, followed by a summary of the information provided.

## Purpose Statement

The purpose of this Delphi study was to identify what expert high school CTE administrators see as challenges to creating gender-balanced classes across all high school CTE pathways, to rate the significance of the identified challenges according to the experts, and to describe the most effective strategies for addressing the five most significant challenges identified to creating balanced CTE enrollment across all high school pathways.

## Research Questions

The following questions were developed to help guide the study:

1. What do expert high school CTE administrators identify as challenges to creating gender-balanced classes across all high school CTE pathways?
2. What do expert high school CTE administrators identify as the most significant challenges to creating gender-balanced classes across all high school CTE pathways?
3. What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways?

## Research Methods and Data Collection Procedures

This study used a normative Delphi study approach to collect data from expert high school CTE administrators regarding challenges to creating gender-balanced classes across all high School CTE pathways. The researcher conducted a three-round method with the identified experts. The study utilized Google Forms as the tool to collect the information from the experts throughout the three rounds. The first round encompassed open-ended questions for qualitative analysis engaging the experts in the challenges they see in creating gender-balanced high school CTE pathways. The information in Round 1 was synthesized and placed on a Likert scale for the experts to rate by significance within Round 2. Round 3 allowed the experts to explain the best strategies to address the challenges found to be of most significance within Round 2.

## Population

McMillan and Schumacher (2010) define a population as "a group of individuals or events from which a sample is drawn and to which results can be generalized" (p. 5). The population for this study was certificated high school administrators who oversee CTE programs within California. The CDE (2022) published data stating that there were 2,034 high schools in California, including continuation and alternative education high schools in 2022.

### Target Population

The target population for this study was expert high school CTE administrators in southern California who meet the following criterion:

- A minimum of three years as a high school administrator.
- Three or more years of supervisory experience of CTE.
- Currently overseeing a high school CTE program or pathway.

## Sample

The targeted sample size for this study was 15 expert high school CTE administrators within southern California. The experts chosen for this study were individuals who oversee high school CTE programs identified through recommendation by district-level CTE coordinators/directors and met the following criterion:

- A minimum of three years as a high school administrator.
- Three or more years of supervisory experience of CTE.
- Currently overseeing a high school CTE program or pathway.

## Presentation and Analysis of Data

### Delphi Round 1

The study began with an open-ended question emailed via Google Forms to chosen panel experts. Responses were collected and retained within Google Forms, a secure cloud-based server.

#### *Delphi Round 1, Research Question 1*

The first survey question provided to the panel experts was, "*What do expert high school CTE administrators identify as challenges to creating gender-balanced classes across all high school CTE pathways*?" Fifteen expert high school CTE administrators were given Round 1, and there were 15 respondents to the question. All responses were analyzed, coded, and categorized into a set of nine challenges to creating gender-balanced classes across all high school CTE pathways (see Table 3).

Table 3

***Identified Challenges to Creating Gender-Balanced Classes Across all High School CTE Pathways***

| Challenges List | Description of Challenge |
|---|---|
| Challenge 1 | Master scheduling limitations and issues, including school site CTE requirements |
| Challenge 2 | Class size limitations |
| Challenge 3 | Student awareness/exposure/understanding about certain CTE pathways and/or fields (occupations) |
| Challenge 4 | Teacher recruitment practices |
| Challenge 5 | Family dynamics and values |
| Challenge 6 | Gender perceptions/stereotypes (conscious and unconscious biases) |
| Challenge 7 | CTE pathway perceptions/stereotypes |
| Challenge 8 | Lack of gender role models in certain CTE pathways/fields (occupations) |
| Challenge 9 | Students not wanting (concerned) to go into opposite gender dominated fields (occupations) |

*Note.* Total respondents = 15.

**Delphi Round 2**

Through the analysis of responses provided in Round 1, the nine challenges identified as challenges to creating gender-balanced classes across all high school CTE pathways were placed on a Likert scale style survey. Within the second round, the expert panel was asked to rank the significance of each identified challenge as it relates to creating gender-balanced classes across all high school CTE pathways. The Likert scale categories were: *Extremely Significant* (6), *Very Significant* (5), *Significant* (4), *Slightly Significant* (3), *Low Significance,* and (2) *Not at all Significant* (1). The survey was emailed via Google Forms to each panelist.

Twelve panelists responded to the Round 2 survey questions by ranking the identified challenges in Round 1 based on their significance via a 6-point Likert scale. The mean scores were computed for each challenge, and a ranking was established. The rankings ranged from a mean score of 4.58 to 3.25. See Table 4 for each identified challenge and mean score.

Table 4

***Identified Challenge and Mean Score***

| Identified challenge | Mean score |
|---|---|
| CTE pathway perceptions/stereotypes | 4.58 |
| Teacher recruitment practices | 4.42 |
| Student awareness/exposure/understanding about certain CTE pathways and/or fields (occupations) fields (occupations) | 4.33 |
| Gender perceptions/stereotypes (conscious and unconscious biases) | 4.33 |
| Lack of gender role models in certain CTE pathways/fields (occupations) | 4.25 |
| Master scheduling limitations and issues including school site CTE requirements | 4.00 |
| Students not wanting (concerned) to go into opposite gender-dominated fields (occupations) | 4.00 |
| Class size limitations | 3.58 |
| Family dynamics and values | 3.25 |

*Note*. Total respondents = 12.

The top-rated challenge to creating gender-balanced classes across all high school CTE pathways was: *CTE pathway perceptions/stereotypes*. The mean score was 4.58. The challenge CTE pathway perceptions/stereotypes had two panel members rate the challenge as *Extremely Significant*, six panel members rated the challenge as *Very Significant*, two panel members rated the challenge as *Significant*, one panel member rated the challenge as *Slightly Significant*, and one panel member rated the challenge as *Low Significance*. No panel members rated the challenge as *Not at all Significant*. Rating for the challenge: CTE pathway perceptions/stereotypes are displayed in Table 5.

Table 5

***CTE Pathway Perceptions/Stereotypes***

| Response | Number of respondents | Percentage of respondents |
|---|---|---|
| Extremely significant | 2 | 16.67% |
| Very significant | 6 | 50.00% |
| Significant | 2 | 16.67% |
| Slightly significant | 1 | 8.33% |
| Low significance | 1 | 8.33% |
| Not at all significant | 0 | 0.00% |

*Note*. Total respondents = 12; Mean score = 4.58

The second highest-rated challenge identified in creating gender-balanced classes across all high school CTE pathways was: *Teacher recruitment practices*. The mean score was 4.42. The challenge Teacher recruitment practices had three panel members rate the challenge as *Extremely Significant*, two panel members rated the challenge as *Very Significant*, five panel members rated the challenge as *Significant*, one panel member rated the challenge as *Slightly Significant*, and one panel member rated the challenge as *Low Significance*. No panel members rated the challenge as *Not at all Significant*. Rating for the challenge: Teacher recruitment practices are displayed in Table 6.

Table 6

***Teacher Recruitment Practices***

| Response | Number of respondents | Percentage of respondents |
|---|---|---|
| Extremely significant | 3 | 25.00% |
| Very significant | 2 | 16.67% |
| Significant | 5 | 41.67% |
| Slightly significant | 1 | 8.33% |
| Low significance | 1 | 8.33% |
| Not at all significant | 0 | 0.00% |

*Note*. Total respondents = 12; Mean score = 4.42.

The third highest-rated challenge identified by the panel experts was a tie between two challenges based on the mean score for each challenge. The following two challenges had a mean of 4.33. The challenges were: (a) *Student awareness/exposure/understanding about certain CTE pathways and/or fields (occupations)* and (b) *Gender perceptions/ stereotypes (conscious and unconscious biases)*. All respondents identified these skills as either *Extremely Significant*, *Very Significant*, *Significant*, *Slightly Significant*, or *Low Significance*. There were no panelists who identified the above two skills as *Not at all Significant*. At least half of the respondents rated these two challenges as *Extremely Significant* or *Very Significant*. The remaining panelists rated the two challenges as either *Significant*, *Slightly Significant*, or *Low Significance*. See Table 7 for the ratings of the challenge: Student awareness/exposure/understanding about certain CTE pathways and/or fields (occupations) and Table 8 for the ratings of the challenge: Gender perceptions/stereotypes (conscious and unconscious biases).

Table 7

***Student Awareness/Exposure/Understanding About Certain CTE Pathways and/or Fields (Occupations)***

| Response | Number of respondents | Percentage of respondents |
|---|---|---|
| Extremely significant | 1 | 8.33% |
| Very significant | 5 | 41.67% |
| Significant | 3 | 25.00% |
| Slightly significant | 3 | 25.00% |
| Low significance | 0 | 0.00% |
| Not at all significant | 0 | 0.00% |

*Note*. Total respondents = 12; Mean score = 4.33.

Table 8

***Gender Perceptions/Stereotypes (Conscious and Unconscious Biases)***

| Response | Number of respondents | Percentage of respondents |
|---|---|---|
| Extremely significant | 2 | 16.67% |
| Very significant | 5 | 41.67% |
| Significant | 2 | 16.67% |
| Slightly significant | 1 | 8.33% |
| Low significance | 2 | 16.67% |
| Not at all significant | 0 | 0.00% |

*Note*. Total respondents = 12; Mean score = 4.33.

The fifth highest-rated challenge identified to creating gender-balanced classes across all high school CTE pathways was: *Lack of gender role models in certain CTE pathways/fields (occupations)*. The mean score was 4.25. The challenge Lack of gender role models in certain CTE pathways/fields (occupations) had one panel member rate the challenge as *Extremely Significant*, five panel members rated the challenge as *Very Significant*, three panel members rated the challenge as *Significant*, two panel members rated the challenge as *Slightly Significant*, and one panel member rated the challenge as *Low Significance*. No panel members rated the challenge as *Not at all Significant*. Rating for the challenge: Lack of gender role models in certain CTE pathways/fields (occupations) is displayed in Table 9.

Table 9

***Lack of Gender Role Models in Certain CTE Pathways/Fields (Occupations)***

| Response | Number of respondents | Percentage of respondents |
|---|---|---|
| Extremely significant | 1 | 8.33% |
| Very significant | 5 | 41.67% |
| Significant | 3 | 25.00% |
| Slightly significant | 2 | 16.67% |
| Low significance | 1 | 8.33% |
| Not at all significant | 0 | 0.00% |

*Note*. Total respondents = 12; Mean score = 4.25.

**Delphi Round 3**

The top five challenges were established by assessing the mean score from Round 2. The five challenges with the highest mean were moved to the third round of the Delphi study. In Round 3, the experts were asked what strategies could be utilized by high school CTE administrators to address the challenges of creating gender-balanced classes across all high school CTE pathways. The five top-rated challenges were:

- CTE pathway perceptions/stereotypes
- Teacher recruitment practices
- Student awareness/exposure/understanding about certain CTE pathways and/or fields (occupations)
- Gender perceptions/stereotypes (conscious and unconscious biases)
- Lack of gender role models in certain CTE pathways/fields (occupations)

***Delphi Round 3, Research Question 1***

Challenge 1: CTE pathway perceptions/stereotypes was rated as one of the five most significant challenges to creating gender-balanced classes across all high school CTE pathways. Round 3 provided an opportunity for the expert panel to identify strategies to address this challenge. The recommendations from the expert panel were

coded and revealed the following themes to address Challenge 1: CTE pathway perceptions/stereotypes:

- Targeted marketing and recruiting efforts by teachers and counselors, including guest presentations and field trips.
- Hire a diverse teaching staff, including those who defy gender perceptions/stereotypes.
- Offer more CTE courses in the lower grades, including apprenticeships.
- Give priority during master scheduling to students who are interested in nontraditional CTE pathways.

The most recommended strategy was *Targeted marketing and recruiting efforts by teachers and counselors including presentations and field trips*. Nine of the 12 respondents, 75% of the panel, commented on the importance of meaningful dialogue with students to ensure they receive the information they need to make an informed choice. The second most recommended strategy was *Hire a diverse teaching staff, including those who defy gender perceptions/stereotypes*. Four of the 12 respondents, 33% of the panel, suggested how important the role of the CTE teacher is. Additionally, *More CTE courses in the lower grades, including apprenticeships* and *Giving priority during master scheduling to students who are interested in nontraditional CTE pathways*, were each recommended by two panelists.

***Delphi Round 3, Research Question 2***

Challenge 2: *Teacher recruitment practices* were rated as one of the five most significant challenges to creating gender-balanced classes across all high school CTE pathways. Round 3 provided an opportunity for the expert panel to identify strategies to

address this challenge. The recommendations from the expert panel were coded and revealed the following themes to address Challenge 2: Teacher recruitment practices:

- Targeted marketing and recruiting efforts by teachers and counselors including guest presentations and field trips.
- Actively recruit people from the field who defy perceived gender norms (including increasing teacher pay).
- Create more CTE partnerships that target a more diverse workforce and expose industry workers to potential careers in education in their field.
- Hold recruitment fairs at both the high school and middle school levels.

The most recommended strategy was *Targeted marketing and recruiting efforts by teachers and counselors including guest presentations and field trips*. Five of the 12 respondents, 42% of the panel, commented on the importance of meaningful dialogue with students to ensure they receive the information they need to make an informed choice. This was also the most recommended strategy for Round 3, Question 1. The second most recommended strategy was to *Actively recruit people from the field who defy perceived gender norms (including increasing teacher pay)*. Four of the 12 respondents, 33% of the panel, suggested how important and difficult it is to currently find CTE teachers, particularly those in nontraditional careers, for their gender. Additionally, *Create more CTE partnerships which target a more diverse workforce and expose industry workers to potential careers in education in their field* and *Hold recruitment fairs at both the high school and middle school levels* were each recommended by two panelists.

***Delphi Round 3, Research Question 3***

Challenge 3: *Student awareness/exposure/understanding about certain CTE pathways and/or fields (occupations)* was rated as one of the five most significant challenges to creating gender-balanced classes across all high school CTE pathways. Round 3 provided an opportunity for the expert panel to identify strategies to address this challenge. The recommendations from the expert panel were coded and revealed the following themes to address Challenge 3: Student awareness/exposure/understanding about certain CTE pathways and/or fields (occupations):

- Targeted marketing and recruiting efforts by teachers and counselors including guest presentations and field trips (including middle school).
- Actively recruit people from the field who defy perceived gender norms.

The most recommended strategy was *Targeted marketing and recruiting efforts by teachers and counselors including guest presentations and field trips (including middle school)*. Ten of the 12 respondents, 83% of the panel, commented on the importance of meaningful dialogue with students to ensure they receive the information they need to make an informed choice. The second most recommended strategy was to *Actively recruit people from the field who defy perceived gender norms*. Four of the 12 respondents, 33% of the panel, suggested how important and difficult it is to currently find CTE teachers, particularly those in nontraditional careers for their gender.

***Delphi Round 3, Research Question 4***

Challenge 4: *Gender perceptions/stereotypes (conscious and unconscious biases)* was rated as one of the five most significant challenges to creating gender-balanced classes across all high school CTE pathways. Round 3 provided an opportunity for the

expert panel to identify strategies to address this challenge. The recommendations from the expert panel were coded and revealed the following themes to address Challenge 4: Gender perceptions/stereotypes (conscious and unconscious biases):

- Targeted marketing and recruiting efforts by teachers and counselors including guest presentations, field trips, and recruitment fairs.
- Actively recruit people from the field who defy perceived gender norms.
- Hold class discussions on the topic.
- Hold unconscious bias presentations for teachers, counselors, and staff.

The most recommended strategy was *Targeted marketing and recruiting efforts by teachers and counselors including guest presentations, field trips, and recruitment fairs*. Eight of the 12 respondents, 67% of the panel, commented on the importance of meaningful dialogue with students to ensure they receive the information they need to make an informed choice. The second most recommended strategy was *Actively recruit people from the field who defy perceived gender norms*. Four of the 12 respondents, 33% of the panel, suggested how important and difficult it is to currently find CTE teachers, particularly those in nontraditional careers for their gender. Additionally, *Hold class discussions on the topic* and *Hold unconscious bias presentations for teachers, counselors, and staff* were each recommended by two panelists.

***Delphi Round 3, Research Question 5***

Challenge 5: *Lack of gender role models in certain CTE pathways/fields (occupations)* was rated as one of the five most significant challenges to creating gender-balanced classes across all high school CTE pathways. Round 3 provided an opportunity for the expert panel to identify strategies to address this challenge. The recommendations

from the expert panel were coded and revealed the following themes to address Challenge 5: Lack of gender role models in certain CTE pathways/fields (occupations):

- Marketing materials and guest speakers that highlight people in nontraditional careers/fields.
- Actively recruit people from the field who defy perceived gender norms.

The most recommended strategy was *Marketing materials and guest speakers that highlight people in nontraditional careers/fields*. Nine of the 12 respondents, 75% of the panel commented on the importance of providing examples of people in nontraditional careers and fields to students as they consider high school CTE pathways. The second most recommended strategy was *Actively recruit people from the field who defy perceived gender norms*. Six of the 12 respondents, 50% of the panel, suggested how important and difficult it is to find CTE teachers, particularly those in nontraditional careers for their gender.

## Summary

Chapter IV provided a description of the research methodology, data collection procedures, and a summary of the data collected in each round. In Round 1, 20 panel experts were contacted, and 15 expert panelists replied and provided the challenges to creating gender-balanced classes across all high school CTE pathways. The responses were coded and categorized into a set of nine challenges. The nine challenges identified by the expert panel were presented in Round 2.

In Round 2, 15 panel experts were asked to respond to a Likert scale survey to rate the nine identified challenges. Twelve panel experts participated in Round 2, and a mean score for each challenge was calculated. Panel experts were asked to identify

strategies to address the most significant challenges from Round 2. A total of 10 themes were identified in Round 3.

This Delphi research study produced trends within challenges and recommended strategies for creating gender-balanced classes across all high school CTE pathways. Themes relating to *Targeted marketing and recruiting efforts by teachers and counselors including guest presentations and field trips*, and *Actively recruit people from the field who defy perceived gender norms can be seen throughout the responses*. The strategies address the need for high schools to recruit qualified CTE teachers of both genders and provide students with adequate information to make informed choices when selecting CTE pathways. Recommendations from the panel experts revealed similar thoughts on what strategies high school CTE administrators may need to utilize to successfully create gender-balanced classes in CTE pathways.

# CHAPTER V: FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

High school CTE courses are an important avenue for students to become college and career-ready as they provide students with the opportunity to learn both academic and technical skills. Additionally, CTE pathways make up a significant portion of high school education in the United States and are increasingly academically demanding. Furthermore, more and more emphasis is being placed on schools to produce students who are college and career-ready and training up a labor force that can compete in the worldwide economy. However, the participation trends of females enrolled in CTE programs show that girls are often left out of the higher-paying STEM fields. Therefore, it is imperative that high school administrators try to identify the challenges in creating gender-balanced classes in CTE pathways and work to overcome those challenges. High school administrators must work to create a welcoming and inclusive environment for all students in CTE pathways.

Chapter I of this study was an introduction to the Delphi study and presented the background for the information applicable to the study. Additionally, in Chapter I, the research problem, purpose statement, and research questions were introduced. Finally, the significance of the study, definitions, delimitations, and the organization of the study were presented.

Chapter II of the study was a review of the literature associated with the study. Chapter II opened with a summary of the historical perspectives of secondary education, CTE, and gender equity in education. The chapter then highlighted the legislation related to gender equity in CTE. Next, Chapter II provided the California framework for CTE. Next, the literature review examined the theoretical foundation of GST, SCT, and EVT

and the theoretical framework of the study, social role theory of gender. Lastly, the literature review concluded with the gap in the research and the continued lack of gender equity in CTE.

Chapter III presented the methodology of the research study. The Delphi research design was established as the selected approach, and the research explored why the Delphi method was appropriate. Secondly, the population, target population, and sample were presented. The instrumentation, validity, reliability, and field test information are also explained in Chapter III. In addition, a description of data collection and data analysis and limitations are presented in Chapter III.

Chapter IV of this study encompassed the research outcomes and analysis of the data. This Delphi study was delimited to individuals who are expert high school CTE administrators within southern California. The target population and criterion for participation were reviewed in Chapter IV. Following the population review, the presentation and analysis of data were presented for Rounds 1, 2, and 3. Round 1 was a qualitative analysis, Round 2 was a quantitative evaluation, and the study closed with Round 3, and a qualitative analysis of the data.

Chapter V of this study is a conclusion of the information. The purpose statement, research questions, and methodology are restated. The major findings, unexpected findings, conclusions, recommendations for action, and further research are presented in Chapter V. Concluding remarks and reflections are presented at the end of Chapter V.

## Purpose Statement

The purpose of this Delphi study was to identify what expert high school CTE administrators see as challenges to creating gender-balanced classes across all high

school CTE pathways, to rate the significance of the identified challenges according to the experts, and to describe the most effective strategies for addressing the five most significant challenges identified to creating balanced CTE enrollment across all high school pathways.

## Research Questions

The following questions were developed to help guide the study:

1. What do expert high school CTE administrators identify as challenges to creating gender-balanced classes across all high school CTE pathways?
2. What do expert high school CTE administrators identify as the most significant challenges to creating gender-balanced classes across all high school CTE pathways?
3. What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways?

## Methodology

A Delphi study was used to collect information from expert high school CTE administrators on the challenges they face in creating gender-balanced classes across all high school CTE pathways. Rounds 1 and 2 explored the challenges to creating gender-balanced classes across all high school CTE pathways. The third round provided an opportunity for the expert panel to communicate the strategies vital to overcoming the challenges identified through Rounds 1 and 2. The Delphi method was selected due to the consensus theory, and the concept that consensus on a topic promotes commitment to goals and objectives within the group or population (Salkind, 2007). Additionally, the

Delphi method provided a framework for information gathered from experts and the statistical analysis of that information (Salkind, 2007). As the purpose of this study was to gather information from experts and analyze the results to provide consensus to the high school CTE community, it was determined the Delphi method was the appropriate selection for this study.

This study was comprised of qualitative and quantitative components through three rounds of surveys. The various rounds allowed the panel experts to expand or retract their input throughout the process (Salkind, 2010). The three-round process took place over three weeks. Each study participant was given five days minimum to respond to each round before the survey was closed.

Participants were chosen based on criteria put forth by the researcher. All participants were required to have a minimum of three years as a high school administrator, three or more years of supervisory experience of CTE, and currently oversee a high school CTE program or pathway. The researcher utilized a professional network to ascertain the professionals in adherence to the criteria. Once the participants confirmed the criteria via the demographic survey, the expert was emailed Round 1 via Google Forms. In total, 15 experts were identified and provided consent to participate in three rounds of the study.

Round 1 encompassed the task of asking each panel participant an open-ended question to determine, asking: *What do expert high school CTE administrators identify as challenges to creating gender-balanced classes across all high school CTE pathways*? Within Round 1, 15 participants responded. All responses were synthesized, coded, and categorized into nine challenges for the Round 2 survey.

In Round 2, panel experts were asked to rate the significance of each identified challenge on a 6-point Likert scale to determine the significance of each challenge of the nine challenges identified in Round 1. The rankings on the Likert scale were: *Extremely Significant* (6), *Very Significant* (5), *Significant* (4), *Slightly Significant* (3), *Low Significance* (2), and *Not at all Significant* (1). After the results were collected for each challenge, a mean score was calculated, and the skills were ranked based on the highest mean score. The five challenges rated as most significant were moved to Round 3.

In Round 3, the panelists were asked to answer five open-ended questions to identify the strategies necessary to address each of the five highest-rated challenges in Round 2.

## Population

McMillan and Schumacher (2010) define a population as "a group of individuals or events from which a sample is drawn and to which results can be generalized" (p. 5). The population for this study was certificated high school administrators who oversee CTE programs within California. The CDE (2022) published data stating that there were 2,034 high schools in California including continuation and alternative education high schools in 2022.

## Target Population

The target population for this study is expert high school CTE administrators in southern California who meet the following criterion:

- A minimum of three years as a high school administrator.
- Three or more years of supervisory experience of CTE.
- Currently overseeing a high school CTE program or pathway.

## Sample

The targeted sample size for this study was 15 expert high school CTE administrators within southern California. The experts chosen for this study were individuals who oversee high school CTE programs identified through recommendation by district level CTE coordinators/directors and meet the following criterion:

- A minimum of three years as a high school administrator.
- Three or more years of supervisory experience of CTE.
- Currently overseeing a high school CTE program or pathway.

## Major Findings

This section of Chapter V covers the major findings discovered during data collection and analysis. These findings were uncovered through the analysis of the expert panel's responses in Rounds 1 through 3. This section solidifies the answers to the question of what expert high school CTE administrators identify as challenges to creating gender-balanced classes across all high school CTE pathways and the strategies to address those challenges.

### Delphi Round 1

Round 1 of the Delphi study included an open-ended question emailed securely through Google Forms to all 15 expert panelists. All panel experts returned the demographic information to determine and confirm eligibility based on the criterion set by the researcher before receiving the Round 1 question.

### *Delphi Round 1, Research Question 1*

The first question received by the expert panelists was: *What do expert high school CTE administrators identify as challenges to creating gender-balanced classes across all high school CTE pathways*? The expert panelists were able to respond openly without constraints to the question. All the expert panelists responded to the first survey question. After the analysis of all responses, a list of nine challenges was identified.

The nine identified challenges within Round 1 are centered around three main topics: (a) Areas that are school system issues such as master scheduling limitations, class size limitations, and teacher recruitment practices; (b) Areas that are family and student issues such as family dynamics and values, gender perceptions/stereotypes, and students not wanting (concerned) to go into opposite gender dominated fields (occupations); and (c) Areas that are workforce issues such as CTE pathway perceptions/stereotypes and lack of gender role models in certain CTE pathways/field (occupations). All the identified challenges can be connected to the original research presented in Chapter II, which showed there is a lack of funding for CTE programs, a lack of trained educators in many CTE fields, a lack of diversity in the CTE workforce, and societal stereotypes and biases.

### Delphi Round 2

In Round 2 of this Delphi study, all nine challenges recommended by the expert panel were placed on a 6-point Likert scale and distributed to the 15 panel experts. The expert panel was asked to rank the significance of each identified challenge as it relates to creating gender-balanced classes across all high school CTE pathways. The Likert scale categories were: *Extremely Significant* (6), *Very Significant* (5), *Significant* (4), *Slightly Significant* (3), *Low Significance* (2), and *Not at all Significant* (1). The survey was

emailed via Google Forms to each panelist, and each response was anonymous to the researcher. The mean scores were calculated for each challenge and a ranking was established. The five challenges rated as most significant were moved to Round 3.

The rankings ranged from a mean score of 4.58 to 3.25. Twelve of the 15 panelists replied to all questions on the Round 2 survey. The top five most significantly rated challenges identified in Round 2 are identified in Table 10.

Table 10

***Most Significant Challenges Identified in Round 2***

| Most Significant Identified Challenges | Mean Score |
|---|---|
| CTE pathway perceptions/stereotypes | 4.58 |
| Teacher recruitment practices | 4.42 |
| Student awareness/exposure/understanding about certain CTE pathways and/or fields (occupations) | 4.33 |
| Gender perceptions/stereotypes (conscious and unconscious biases) | 4.33 |
| Lack of gender role models in certain CTE pathways/fields (occupations) | 4.25 |

*Note*. Data is organized in ascending order, with the mean score controlling the sort.

A major finding within Round 2 was the undeniable agreement between expert panelists on the Importance that perceptions/stereotypes play in the selection of high school CTE pathways by students. Three of the highest-rated challenges are associated with gender perceptions/stereotypes held by students: (a) CTE pathway perceptions/ stereotypes, (b) Student awareness/exposure/understanding about certain CTE pathways and/or fields (occupations), and (c) Gender perceptions/stereotypes (conscious and unconscious biases). These challenges can be linked back to the research explored in Chapter II related to the theoretical foundations of GST, SCT, and EVT, as well as the theoretical framework of the social role theory of gender. For example, gender roles are created and reinforced through the division of labor in society (A. Eagly & Wood, 2012).

Another finding was the second highest-rated challenge, Teacher recruitment practices. There was a total of 12 respondents for this question, and they collectively placed this as a *Significant* challenge, with three respondents ranking it as *Extremely Significant,* two respondents ranked it as *Very Significant,* and five respondents ranked it as *Significant*. The remaining respondents ranked it as *Slightly Significant* or *Low Significance*. Teacher recruitment practices were described in the literature review, particularly with regard to legislation, including the Carl D. Perkins Vocational Education Acts.

The third highest ranking challenge was a tie between Student awareness/ exposure/understanding about certain CTE pathways and/or fields (occupations) and Gender perceptions/stereotypes (conscious and unconscious biases). These two identified challenges each earned a mean score of 4.33. Eleven of the respondents ranked Student awareness/exposure/understanding about certain CTE pathways and/or fields (occupations) as *Significant* or above, and nine of the respondents ranked Gender perceptions/stereotypes (conscious and unconscious biases) as *Significant* or above. Both of these identified challenges deal with student perceptions and understandings.

The fifth highest-ranking challenge was the Lack of gender role models in certain CTE pathways/fields (occupations). One respondent rated this challenge as *Extremely Significant,* five respondents rated it as *Very Significant,* three respondents rated it as *Significant,* two respondents rated it as *Slightly Significant,* and two respondents rated it as *Low Significance*. This identified challenge coincides with information in the literature review that shows that females continue to be underrepresented in the higher-paying STEM fields which contributes to the lack of preparation for nontraditional careers.

## Delphi Round 3

In Round 3, the 15 expert panelists were asked five open-ended questions based on the results of Rounds 1 and 2. The questions were designed to gain recommendations from the experts on the type of strategies that address the most significant challenges to creating gender-balanced classes across all high school CTE pathways. Twelve of the 15 panel experts replied to all five questions.

### *Delphi Round 3, Research Question 1*

Challenge 1: CTE pathway perceptions/stereotypes was rated the most significant challenge to creating gender-balanced classes across all high school CTE pathways. The panel experts were then asked: *What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways*? The answers provided by the expert panelists were synthesized into four themes: (1) Targeted marketing and recruiting efforts by teachers and counselors including guest presentations and field trips, (2) Hire a diverse teaching staff, including those who defy gender perceptions/stereotypes, (3) Offer more CTE courses in the lower grades, including apprenticeships, and (4) Give priority during master scheduling to students who are interested in nontraditional CTE pathways. A common thread between the identified themes was providing more information and offering more opportunities to students.

***Delphi Round 3, Research Question 2***

Challenge 2: Teacher recruitment practices was rated as one of the five most significant challenges to creating gender-balanced classes across all high school CTE pathways. The panel experts were then asked: *What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways*? The answers provided by the expert panelists were synthesized into four themes: (1) Targeted marketing and recruiting efforts by teachers and counselors including guest presentations and field trips, (2) Actively recruit people from the field who defy perceived gender norms (including increasing teacher pay), (3) Create more CTE partnerships which target a more diverse workforce and expose industry workers to potential careers in education in their field, and (4) Hold recruitment fairs at both the high school and middle school levels. The commonality between the themes was including industry partners in recruiting students to CTE pathways.

***Delphi Round 3, Research Question 3***

Challenge 3: Student awareness/exposure/ understanding about certain CTE pathways and/or fields (occupations) was rated as one of the five most significant challenges to creating gender-balanced classes across all high school CTE pathways. The panel experts were then asked: *What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways*? The answers provided by the expert panelists were synthesized into two highly suggested themes: (1) Targeted marketing and recruiting efforts by teachers and counselors

including guest presentations and field trips (including middle school), and (2) Actively recruit people from the field who defy perceived gender norms.

***Delphi Round 3, Research Question 4***

Challenge 4: Gender perceptions/stereotypes (conscious and unconscious biases) was rated as one of the five most significant challenges to creating gender-balanced classes across all high school CTE pathways. The panel experts were then asked: *What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways*? The answers provided by the expert panelists were synthesized into four themes: (1) Targeted marketing and recruiting efforts by teachers and counselors including guest presentations, field trips, and recruitment fairs, (2) Actively recruit people from the field who defy perceived gender norms, (3) Hold class discussions on the topic, (4) Hold unconscious bias presentations for teachers, counselors, and staff. Question 4 yielded responses that suggested involving students in addressing their biases with regard to CTE pathways.

***Delphi Round 3, Research Question 5***

Challenge 5: Lack of gender role models in certain CTE pathways/fields (occupations) was rated as one of the five most significant challenges to creating gender-balanced classes across all high school CTE pathways. The panel experts were then asked: *What do expert high school CTE administrators describe as the most effective strategies for addressing the five most significant challenges identified to creating gender-balanced classes across all high school CTE pathways*? The answers provided by the expert panelists were synthesized into two themes: (1) Marketing materials and guest

speakers that highlight people in nontraditional careers/fields, and (2) Actively recruit people from the field who defy perceived gender norms.

## Unexpected Findings

An unexpected finding was how similar the expert panelist responses were given that they are from many different high schools and school districts in southern California. Although there was a total of 15 respondents, the study concluded with only nine themes with regard to the challenges faced in creating gender-balanced classes across all high school CTE pathways. Additionally, two themes emerged in each of the five most significant challenges: the need to market CTE pathways and recruit students better, particularly to those students for whom the pathway is nontraditional, and hire teachers from the field who defy perceived gender norms.

## Conclusions

The purpose of this Delphi study was to identify what expert high school CTE administrators see as challenges to creating gender-balanced classes across all high school CTE pathways, to rate the significance of the identified challenges according to the experts, and to describe the most effective strategies for addressing the five most significant challenges identified to creating balanced CTE enrollment across all high school pathways.

After data collection and analysis, it can be concluded that to create gender-balanced classes across all high school CTE pathways, schools must do an enhanced job of recruiting CTE teachers from the workforce of both genders in all CTE pathways, particularly females in the STEM fields. An overwhelming number of the respondents wrote about this theme. Not only were the panel experts in agreement with actively

recruiting teachers from nontraditional careers, they also rated the challenge in a similar weight within the Likert scale, placing additional emphasis on its significance. Furthermore, several respondents commented on how hard it currently is to find CTE teachers in general and suggested increasing teacher pay as one way to help with recruitment. Some of the respondents wrote that creating more CTE industry partnerships could target a more diverse workforce and expose additional industry workers to potential careers in education in their field.

An additional conclusion is the importance of challenging gender perceptions and stereotypes held by students, parents, and others with regard to certain CTE pathways. Based on responses from the expert panelists, unconscious and conscious biases must be addressed as part of recruiting students to CTE pathways nontraditional for their gender. This was the top-rated challenge identified by the expert panel, with 67% of the respondents rating the challenge as *Extremely Significant* or *Very Significant*. It can further be concluded that administrators need to widen their student recruitment efforts by holding recruitment fairs at both the high school and middle school levels. Several panelists suggested providing potential CTE students with the opportunities to hear from guest speakers and attend field trips to industries nontraditional for their gender. This was the most recommended strategy for achieving gender-balanced classes across all high school CTE pathways. Additionally, schools need to provide introductory CTE courses in middle school and lower high school grades which include apprenticeship opportunities. While not explicitly stated by the respondents, it can also be inferred that career awareness as early as elementary school would help with CTE recruitment in high school.

Furthermore, the respondents suggested that schools need to consider giving priority during master scheduling to students who are interested in nontraditional CTE pathways as one strategy for achieving gender-balanced CTE classes. This strategy addresses the identified challenges of master scheduling limitations and issues, including school site CTE requirements and class size limitations.

Lastly the challenges and strategies named by the panel experts were in alignment with many of the topics in the literature review, specifically the theoretical foundations and theoretical framework for the study. For example, gender perceptions and unconscious and conscious biases greatly affect a student's thinking process when considering CTE pathways. As stated in the literature review, one's gender schema is a mental framework that organizes an individual's perceptions of gender-related information (Martin & Halverson, 1981). Responses from the expert panel illustrate a correlation in how this affects a student's decision in choosing a CTE pathway. The results of the study are consistent with the need for CTE educators to take measures to ensure that outmoded stereotypes do not negatively affect students' enrollment in nontraditional CTE programs (NWLC, 2007).

## Implications for Action

Although the federal government and California lawmakers have a history of investment in CTE, high school pathways are still not gender-balanced nationwide let alone statewide (Brand et al., 2013). Female students are particularly impacted as this work-related gender segregation has serious economic repercussions for them. Much work needs to be done on a large scale by policymakers, educators, and industry partners to achieve gender-balanced classes across all high school CTE pathways.

Furthermore, the findings from this Delphi study show that there are common challenges among high schools in southern California with regard to creating gender-balanced CTE classes. Additionally, the expert panel identified several strategies to address those challenges.

Based on the research presented and the expert panel who served in this Delphi study, it can be concluded that the challenges facing high schools in creating gender-balanced high school CTE classes need to be addressed. Moreover, the results of the study provide a list of strategies, actionable steps, and implementation activities to inform decision-making and program practices to support high school CTE administrators as they work to implement gender-balanced CTE pathways in a scaled sustainable manner. Based on the information presented the results can be applied as follows:

- Mandatory professional development for teachers, counselors, and administrators on unconscious biases.
- Mandatory professional development for counselors and CTE teachers on master scheduling best practices.
- School districts need to have a formal, systematic process to identify future CTE teachers, particularly in careers nontraditional to their gender and those who defy gender perceptions and stereotypes.
- School districts need to evaluate the salaries of CTE teachers compared to what they make as employees in their industry and consider pay scale, stipends, etc.
- School districts need to consider funding the CTE credentialing of potential CTE teachers.

- High schools need to have a formal, systematic process to market their CTE pathways to students beginning at the middle school level, including opportunities for guest speakers, field trips to industry workplaces, recruitment fairs, and brochures/flyers that highlight people in nontraditional careers.
- School districts need to prioritize CTE courses in the lower high school grades and middle school.
- CTE courses must include apprenticeship and work-based learning opportunities.
- School districts must create more industry partnerships which target a more diverse workforce and expose industry workers to potential careers in education in their field.
- Legislators need to continue to fund Career Technical Education, particularly with a focus on advocating for students to enroll in CTE pathways nontraditional to their gender.
- The CDE should revise its CTE curriculum standards and frameworks to include information on how to address the challenges of gender equity in CTE programs.

## Recommendations for Further Research

Given the importance of providing equitable educational opportunities to all students, there is value in continued research on this topic specific to CTE programs. The following are recommendations for future research:

- Replicate this study in other parts of California.
- Replicate this study in other states.
- Replicate this study at the community college level.
- Conduct a case study on a high school campus with multiple CTE pathways.
- Conduct a case study on a high school campus that has been successful in creating gender-balanced classes across all CTE pathways.
- Additional research is necessary to identify professional development needs regarding gender equity practices in CTE programs and the workforce.
- Conduct a research study that explores methods of recruiting current industry workers into CTE teaching positions.
- Conduct a research study that explores methods of recruiting current industry workers who occupy roles nontraditional for their gender into CTE teaching positions.
- Conduct a research study that explores alternative/nontraditional methods of salary payment to CTE teachers by school districts.

## Concluding Remarks and Reflections

As an educator myself, I often see the shortcomings of the public education system firsthand. However, I also see the great things that educators, schools, and districts are doing for students. There are many teachers, counselor, administrators, and classified staff that go out of their way to help students succeed. One shortcoming in the education system, and the focus of this study, is that gender-balanced high school CTE classes are not a common occurrence; rather, it is much more likely to find a larger proportion of males in the STEM fields and a larger proportion of females in the

hospitality, fashion, and health science pathways. Yet, there are many school districts working at changing this reality.

As I embarked on this study, the research confirmed that gender equity practices, especially the lack of female participation in nontraditional CTE programs, are still issues in the vast majority of high school CTE programs. There are very few high schools or school districts that have clear and defined systems for gender-balanced CTE classes. Even though the results of this study and the research suggest several strategies, such as professional development for educators and both teacher and student recruitment, there is not a current standard or general plan for high schools to utilize to create gender-balanced classes across all CTE pathways. Instead, high schools and school districts across California are left to make their own decisions on how to best address the challenges if they even decide to address the challenges.

Although CTE is a key component of California's educational system with mandated curriculum standards and frameworks that provide a roadmap for delivering CTE programs at the high school level, those standards and frameworks do not address the issues of gender equity within CTE programs. The standards and frameworks incorporate knowledge about career options, technology, and skills; however, they do not incorporate knowledge and strategies to challenge gender perceptions and stereotypes regarding CTE. The CTE framework is organized around five major components, including curriculum, professional development, and partnerships, and those components need to include strategies for addressing gender inequities that currently exist in most high school CTE programs.

The partnership component of CTE emphasizes the importance of collaboration between schools, employers, and community organizations to develop CTE programs that meet the needs of the local economy and provide students with opportunities to apply their skills in real-world settings. Unfortunately, most of these partnerships seem to lack key aspects necessary to attract males and females to CTE pathways nontraditional for their gender. It is imperative that we strengthen these partnerships and advisory councils with the knowledge of how to affect the gender equity issues that continue to exist in CTE programs.

My intention in completing this Delphi study and advancing the information regarding how to create gender-balanced classes across all high school CTE pathways is to bring attention to the critical need and inspire action. Action in the form of funding at the district, county, state, and federal levels. Action in the form of the revision of CDE CTE policies, guidance, and frameworks. Action in the form of strengthening industry partnerships with local high schools with a focus on gender equity in CTE. Action in the form of high schools and school districts revising master scheduling practices and policies, adding professional development for staff in the areas of gender equity, unconscious bias, and master scheduling, and revising teacher recruitment and salary practices for prospective CTE teachers. Not only will the added support for CTE programs promote gender equity, but it can also assist with other equity issues, including ethnicity and special education, which will only make CTE programs stronger and more appealing for all students.

# REFERENCES


Ainsworth, J. W., & Roscigno, V. J. (2005). Stratification, school-work linkages, and vocational education. *Social Forces, 84*, 259-286.

Association for Career and Technical Education. (n.d.). History of CTE. Retrieved May 17, 2023, from https://www.acteonline.org/history-of-cte/

Association for Career and Technical Education. (2007). *Expanding opportunities: Postsecondary career-technical education and preparing tomorrow's workforce.*

Association for Career and Technical Education. (2020). *An analysis of states' Perkins V priorities.*

Association for Career and Technical Education. (2021). *A brief history of CTE* [Infographic]. ACTE Online. https://www.acteonline.org/wp-content/uploads/2021/12/BriefHistoryofCTE-Timeline-Dec2021.pdf

Bagdady, I. (2020, March 25). Qualitative calculation for field test inclusion, implementation and execution stages. Medium. https://medium.com/@irenabagdady/qualitative-calculation-for-field-test-inclusion-implementation-and-execution-stageseea3eaa56ba5#:~:text=A%20field%20 test%20is%20similar,commonly %20used%20in%20qualitative%20research

Bandura, A. (1977). *Social learning theory*. Prentice-Hall.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.

Barrett, E. S., (1948). Vocational guidance and the George-Barden Act. *The High School Journal, 31*(1), 1-3.

Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. *Psychological Review, 88*(4), 354-364. https://doi.org/10.1037/0033-295X.88.4.354

Brand, B., Valent, A., & Browning, A. (2013). *How career and technical education can help students be college and career ready: A primer*. College and Career Readiness and Success Center at American Institutes for Research. https://www.aypf.org/wp-content/uploads/2013/04/CCRS-CTE-Primer-2013.pdf

Brookman, M. A. (2011). *Gender equity: Practices in an urban career-technical education program*. (Publication No. 3459304) [Doctoral dissertation, California State University, Fullerton]. ProQuest.

Bullock, L. M., Dodson, M., & Hussain, S. (2019). Empowering females in CTE through peer mentoring: A program evaluation. *Journal of Career and Technical Education, 34*(1), 1-16.

Bussey, K., & Bandura, A. (1992). Self-regulatory mechanisms governing gender development. *Child Development, 63*, 1236-1250.

California Department of Education. (n.d.a). *Career technical education*. California Department of Education. Retrieved January 15, 2022, from https://cde.ca.gov/ci/ct/

California Department of Education. (n.d.b*). Career technical education framework for California public schools*. Retrieved April 23, 2023, from https://www.cde.ca.gov/ci/ct/sf/documents/cteframework.pdf

California Department of Education. (n.d.c) CTE general public fact sheet. Retrieved January 25, 2023, from https://www.cde.ca.gov/ci/ct/gi/ctegeneralfacts.asp

California Department of Education. (n.d.d). *CTE model curriculum standards*. Retrieved January 15, 2023, from http://www.cde.ca.gov/ci/ct/sf/ctemcstandards.asp

California Department of Education. (n.d.e). *Standards and framework*. Retrieved April 23, 2023, from https://www.cde.ca.gov/ci/ct/sf

California Department of Education. (2022). *Fingertip facts on education in California*. Retrieved on February 11, 2023.

Camera, L. (2022). Title IX marks 50 years of gains and goals for gender equity in education. *U.S. News and World Report*. ttps://www.usnews.com/news/education-news/articles/2022-06-22/title-ix-marks-50-years-of-gains-and-goals-for-gender-equity-in-education #:~:text=While%20the%20law%20is%20rooted,weren't%20allowed %20to%20access.

Castellano, M., Stringfield, S., & Stone, J. R. (2003). Secondary career and technical education and comprehensive school reform: Implications for research and practice. *Review of Educational Research, 73*(2), 231-272.

Change the Equation. (2015). Solving the diversity dilemma: Changing the face of the STEM workforce. https://files.eric.ed.gov/fulltext/ED564127.pdf

Coghlan, D., & Brydon-Miller, M. (2014). *The SAGE encyclopedia of action research* (Vols. 1-2). SAGE Publications Ltd. doi: 10.4135/978144629440

Crain, R. L., Allen, A., Warren Little, J., Sullivan, D., Thaler, R., Quigley, D., & Zellman, G. (1998). *The effects of career magnet schools. Institute on education and the economy*.

Cramer, D., & Howitt, D. (2004). *The SAGE dictionary of statistics* (Vol. 1-0). SAGE Publications, Ltd. doi: 10.4135/9780857020123

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Pearson.

Cross, S., & Bagilhole, B. (2002). Girls' jobs for the boys? Men, masculinity and non-traditional occupations. *Gender, Work and Organization 9*(2), 204-226.

Dalporto, H. & Tessler, B. (2020). *Voices from the field: How community colleges are advancing equity in career and technical education*. MDRC.

Delbecq, A. L., Van de Ven, A. H., & Gustafson, D. H. (1975). *Group techniques for program planning*. Scott, Foresman, and Co.

Dugger, R. (1965). The Vocational Education Act of I963. *The Bulletin of the National Association of Secondary School Principals, 49*(301), 15-23. https://doi.org/10.1177/019263656504930104

Eagly, A. & Wood, W. (2012). Social role theory. *Handbook of Theories in Social Psychology, 1*(1), 458-476.

Eagly, A., Wood, W., & Steffen V. (1982). *Gender and social roles: A distributional theory of gender stereotypes.* [Paper presentation]. American Psychological Association, Washington D. C., United States.

Eagly, A. H., & Wood, W. (1999). The origins of sex differences in human behavior: Evolved dispositions versus social roles. *American Psychologist, 54*, 408-423.

Eagly, A. H., Wood, W., & Diekman, A. B. (2000). Social role theory of sex differences and similarities: A current appraisal. In Eckes, T. & Trautner, H. M. (Eds.), *The developmental social psychology of gender* (pp. 123-174). Erlbaum.

Eccles, J. S. (2009). Who am I and what am I going to do with my life? Personal and collective identities as motivators of action. *Educational Psychologist, 44*(2), 78-89.

Eccles, J. E., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., et al. (1983). Expectations, values, and academic behaviors. In Spence, J. T. (Ed.), *Achievement and achievement motives* (pp. 75-145). Freeman.

Eccles, J. S., & Wigfield, A. (2020). Expectancy-value theory of achievement motivation. In Lerner, R. M., & Eastbrooks (Eds.), *Handbook of psychology: Developmental psychology* (Vol. 6, pp. 387-414). Wiley.

Eccles, J. S., & Wigfield, A. (2023). Expectancy-value theory to situated expectancy-value theory: Reflections on the legacy of 40+ years of working together. *Motivation Science, 9*(1), 1-12. https://doi-org.umassglobal.idm.oclc.org/10.1037/mot0000275

EdSource, (2005). The evolution of career and technical education in California. (Issue Brief). EdSource. https://edsource.org/wp-content/publications/CareerTech05.pdf

Fan, F., & Randall, J. (Eds.) (2018). *The SAGE encyclopedia of educational research, measurement, and evaluation* (Vols. 1-4). SAGE Publications, Inc., https://doi.org/10.4135/9781506326139

Fiske, S. T. (2018). Social cognition and social perception. *Annual Review of Psychology, 69*, 375-397.

Fluhr, S., Choi, N., Herd, A., Woo, H., & Alagaraja, M. (2017). Gender, career and technical education (CTE) nontraditional coursetaking, and wage gap. *High School Journal, 100(*3), 166-182.

Forsythe, J. S. & Weintraub, F. J. (1969). The Vocational Education Amendments of 1968, Public Law 90-576. *Exceptional Children, 35*(9), 751–754. https://doi.org/10.1177/001440296903500913

Fredricks, J. A., & Eccles, J. S. (2002). Children's competence and value beliefs from childhood through adolescence: Growth trajectories in two male-sex typed domains. *Developmental Psychology, 38,* 519-533.

Frome, P. M., & Eccles, J. S. (1998). Parents' influence on children's achievement-related perceptions. *Journal of Personality and Social Psychology*, *74*(2), 435–452. https://doi.org/10.1037/0022-3514.74.2.435

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report, 8*(4), 597-606. https://doi.org/10.46743/2160-3715/2003.1870

Goldin, C. (1999). *A brief history of education in the United States.* National Bureau of Economic Research.

Gordon, H. (2003). *The history and growth of vocational education in America* (2nd ed.). Waveland Press, Inc.

Gordon, H. R. (2014). *The history and growth of career and technical education in America* (4th ed.). Waveland Press, Inc.

Gordon, H. R. D. & Shultz, D. (2020). *The history and growth of career and technical education in America* (5th ed.). Waveland Press, Inc.

Goyette, K. A. (2017). *Education in America*. University of California Press.

Gray, K. (1991). Vocational education in high school: A modern phoenix? *Phi Delta Kappan, 71*(6) 437-445.

Grayson, C. J. (2017). *Examining gender equity in Florida's career and technical education nontraditional programs.* (Publication No. 10256919) [Doctoral dissertation, North Central University]. ProQuest Dissertations and Theses Global.

Habibi, A., Sarafrazi, A., & Izadyar, S. (2014). Delphi technique theoretical framework In qualitative research. *The International Journal of Engineering and Science, 3*(4), 08-13.

Hansen, R. (n.d.). *Non-traditional career paths for men and women*. Retrieved January 30, 2023 from https://www.livecareer.com/resources/jobs/search/non-traditional-careers

Hays, R. D., & Brown, J. A. (2005). Field testing: What it is and how we do it. *Consumer Assessment of Healthcare Providers and Systems Connection, 2*(1), 4-5.

Hilke, E. V. & Conway-Gerhardt, C. (1994). *Gender equity in education*. Fastback 372. Phi Delta Kappa.

Hsu, C-C., & Sandford, B. A. (2007). The Delphi technique: Making sense of consensus. *Practical Assessment, Research, and Evaluation, 12*(10), 1-8.

Hunt, T. C. (2021, August 26). *National Defense Education Act*. Encyclopedia Britannica. https://www.britannica.com/topic/National-Defense-Education-Act

Hutt, E. L. (2012). Formalism over function: Compulsion, courts, and the rise of educational formalism in America, 1870-1930. *Teachers College Record, 114*(1), 1-27.

Hyde, J., & Lindberg, S. (2007). Facts and assumptions about the nature of gender differences and the implications for gender equity. In Klein, S., Richardson, B.,

Grayson, D., Fox, L., Kramarae, C., Pollard, D., & Dwyer, C. (Eds.), *Handbook for achieving gender equity through education* (2nd ed., pp. 19-32). Routledge. https://doi.org/10.4324/9781315759586

Judd, C. H. (1935). The historical development of secondary education in America. *The School Review*, *43*(3), 173-183.

K12 Academics. (n.d.). *History of education in the United States: Secondary education*. Retrieved on May 2, 2023, from https://www.k12academics.com/history-education-united-states/secondary-schools

Kober, N., Rentner, D. S., & Ferguson, M. (2020). *History and evolution of public education in the US.* Center on Education Policy.

Koch, K., Livingston, L. R., & Rust, K. (2020). Gender equity in career and technical education: Opportunities and challenges. *Journal of Career and Technical Education*, *35*(1), 1-17.

Koenig, A. M., & Eagly, A. H. (2014). Evidence for the social role theory of stereotype content: Observations of groups' roles shape stereotypes. *Journal of Personality and Social Psychology, 107*(3), 371-392.

Latif, R. A., Dahlan, A., Mulud, Z. A., & Nor, M. Z. M. (2017). The Delphi technique as a method to obtain consensus in health care education research. *Education in Medicine Journal*, *9*(3), 89–102. https://doi-org.umassglobal.idm.oclc.org/10.21315/eimj2017.9.3.10

Lerner, R. M., & Eastbrooks (Eds.), *Handbook of psychology: Developmental psychology* (Vol. 6, pp. 387-414). Wiley.

Levesque, K., Laird, J., Hensley, E., Choy, S. P., Cataldi, E. F., & Hudson, L. (2008). *Career and technical education in the United States 1990 to 2005*. United States Department of Education, National Center for Education Statistics.

Lufkin, M., Wiberg, M., Jenkins, C., Berardi, S., Boyer, T., Eardley, E., & Huss, J. (2007). Gender equity in career and technical education. In Klein, S., Richardson, B., Grayson, D., Fox, L., Kramarae, C., Pollard, D., & Dwyer, C. (Eds.), *Handbook for achieving gender equity through education* (2nd ed., pp. 421-443). Routledge. https://doi.org/10.4324/9781315759586

Malik, R. (2005). *School counselors' perceptions about female participation in nontraditional secondary career and technical education (CTE) programs.* (Doctoral dissertation, Western Michigan University).

Malkus, N. (2019, May). *The evolution of career and technical education 1982-2013.* American Enterprise Institute. https://www.aei.org/wp-content/uploads/2019/04/The- Evolution-of- Career-and-Technical-Education.pdf?x91208

Martin, C. L., & Halverson, C. F. (1981). A schematic processing model of sex typing and stereotyping in children. *Child Development, 52*(4), 1119-1134. https://doi.org/10.2307/1129490

Martin, C. L., Ruble, D. N., & Szkrybalo, J. (2002). Cognitive theories of early gender development. *Psychological Bulletin, 128*(6), 903-933. https://doi.org/10.1037/0033-2909.128.6.903

Maul, A. (Ed.) (2018). *The SAGE encyclopedia of educational research, measurement, and evaluation* (Vols. 1-4). SAGE Publications, Inc. https://doi.org/10.4135/9781506326139

McMillan, J. H., & Schumacher, S. (2010). *Research in education: Evidence-based inquiry* (7th ed.). Pearson.

Merriam-Webster. (n.d.). *Vocational education*. Merriam-Webster. Retrieved September 25, 2022, from https://merriam-webster.com/dictionary/vocational%20education

Mintz, S. I., Tirozzi, G. N., & Holsinger, D. B. (n.d.). *History of secondary education*. Encyclopedia.com. Retrieved May 9, 2023, from https://www.encyclopedia.com

MRDC. (n.d.). *Career academies: Exploring College and Career Options (ECCO).* MRDC. Retrieved May 25, 2023, from https://www.mdrc.org/project/career-academies-exploring-college-and-career-options-ecco#overview

National Alliance for Partnerships in Equity. (2015). *Startling statements: Non-traditional*. http://www.napequity.org/nape-content/uploads/Startling-Statements-Nontraditional_final_5-22-151.pdf

National Association of Special Education Teachers (NASET). (2022). *The Vocational Education Act of 1984 (Perkins Act).* Retrieved on January 22, 2023, from https://www.naset.org/professional-resources/special-education-and-the-law/perkins-vocational-education-act

National Women's Law Center. (2002). *Title IX and equal opportunity in vocational and technical education: A promise still owed to the nation's young women*. http://www.nwlc.org/pdf/TitleIXCareerEducationReport.pdf

National Women's Law Center. (2005). *Tools of the trade: Using the law to address sex segregation in high school career and technical education*. Washington, D. C.

National Women's Law Center. (2007). *How to promote gender equity in Career and Technical Education: A primer for schools*. https://www.careerladdersproject .org/wpcontent/ uploads/2011/06/how-to-promote-gender-equity-in-CTE.pdf

National Women's Law Center. (2018). *Unlocking opportunity for African American girls: A call to action for educational equity*. National Women's Law Center. https://nwlc.org/wp-content/uploads/2015/08/unlocking_opportunity_executive_ summary.pdf

Patrick, D. & Patrick, S. (2022). TechGirlz—Teaching STEM skills to bridge the gender gap. *Computers in Libraries. 42*(8), 32-36.

Patten, M. L., & Newhart, M. (2018). *Understanding research methods: An overview of the essentials* (10th ed.). Taylor & Francis.

Perkins Collaborative Resource Network. (n.d.). *Perkins V.* Retrieved March 19, 2023, from https://cte.ed.gov/legislation/perkinsv

Perkins Collaborative Resource Network. (2022). *Perkins IV.* Retrieved March 19, 2023, from https://cte.ed.gov/legislation/about-perkins-iv

Phillips, A. (2022). Understanding the barriers: How microagressions, equity & perception affect black female CTE students. *Techniques: Connecting Education & Careers*. *97*(1), 16-20.

Rainey, L. M., & Borders, L. D. (1997). Influential factor in career orientation and career aspiration of early adolescent girls. *Journal of Counseling Psychology, 44*, 160-172.

Reed, K. (2006). *New directions in social theory: Race, gender, and the canon.* Sage Publications Ltd.

Reef, C. (2009). *Education and learning in America.* Facts on File, Inc.

Richardson, B., Grayson, D., Fox, L., Kramarae, C., Pollard, D., & Dwyer, C. (Eds.). (2007). *Handbook for achieving gender equity through education* (2nd ed., pp. 421-443). Routledge. https://doi.org/10.4324/9781315759586

Robbin, D. (1992). *Gender equity in vocational education*. Women's Educational Equity Act Program. https://www2.edc.org/WomensEquity/pubs/digests/digest-voced.html

Rury, J. L. (2005). *Education and social change: Themes in the history of American schooling*. Routledge.

Salkind, N. J. (2007). *Encyclopedia of measurement and statistics* (Vol. 1-0). Sage Publications. doi: 10.4135/9781412952644

Salkind, N. J. (2010). *Encyclopedia of research design* (Vol. 1-0). SAGE Publications, Inc. doi: 10.4135/9781412961288

Schmitt, B. H., Leclerc, F., & Dube-Rioux, L. (1988). Sex typing and consumer behavior: A test of gender schema theory. *Journal of Consumer Research, 15*(1), 122-128. https://doi-org.umassglobal.idm.oclc.org/10.1086/209151

Singh, K. (2007). Sampling and sample size estimation. In *Quantitative social research methods*. SAGE Publications.

Skinner, R. R., & Apling, R. N. (2005). *The Carl D. Perkins Vocational and Technical Education Act of 1998: Background and implementation*. Congressional Research Service, The Library of Congress.

Starr, C., & Zurbriggen, E. (2017). Sandra Bem's gender schema theory after 34 years: A review of its reach and impact. *Sex Roles, 76*(9-10), 566-578. https://doi-

org.umassglobal.idm.oclc.org/10.1007/s11199-016-0591-4Thattai, D. (2001). A history of public education in the United States. *Journal of Literacy and Education in Developing Societies, 1*(2) 2001-2011.

Thompson, J. F. (1973). *Foundations of vocational education: Social and philosophical concepts*. Prentice Hall.

Tozer, S. E., Violas, P. C. & Senese, G. (2002). *School and society: Historical and contemporary perspectives.* McGraw-Hill.

Ungvarsky, J. (2023). *Expectancy-value theory*. Salem Press Encyclopedia.

U.S. Department of Education. (2018). *Strengthening career and technical education for the 21st century act signed into law.* https://www2.ed.gov/about/offices/list /ocr/docs /tix_dis.html https://www.ed.gov/ content /strengthening-career-and-technical-education-21st-century-act-signed-Department%20of%20Education-,Strengthening%20Career%20and%20Technical%20Education%20for%20the%2021st%20Century%20Act,and%20technical%20education%20(CTE).

U.S. Department of Education, Office for Civil Rights. (2021). Title IX and sex discrimination. https://www2.ed.gov/about/offices/list/ocr/docs/tix_dis.html

U.S. Government Accountability Office. (2022, March). *Career and technical education: Perspectives on program strategies and challenges.* https://www.gao.gov/assets/gao-22-104544.pdf

United States House of Representatives. (n.d.). National Defense Education Act. Office of Art and Archives. Retrieved on May 20, 2023 from https://history.house.gov/HouseRecord/Detail/15032436195

Uwire Text. (2022). *Trials and transformation: The 50-year history of title ix.* Uloop. https://link-Gale-com.umassglobal.idm.oclc.org/apps/doc/A708083763/AONE?u=irv3447&sid=ebsco&xid=ad65d596

Wang, W., Parker, K., & Taylor, P. (2013). *Breadwinner moms*. Pew Research Center. http://www.pewsocialtrends.org/2013/05/29/breadwinner-moms

Weaver-Hightower, M. B. (2009). *Issues of boys' education in the United States.* Routledge.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*(1), 68-81.

Williams, B. (2016). Increasing access, equity and diversity: NAPE's program improvement process for equity. *Techniques: Connecting Education & Careers*. *91*(8), 20-24.

Women's Educational Equity Act Resource Center. (2002). *Progress and promise.* WEEA Digest. https://www2.edc.org/womensequity/pdffiles/careers.pdf

Wonacott, M. E. (2003). *History and evolution of vocational and career-technical education. A compilation*. ERIC Clearinghouse on Adult, Career, and Vocational Education.

Wulfert, E. (2023). *Social learning according to Albert Bandura*. Salem Press Encyclopedia of Health.

Xing, X., Garza, T., & Huerta, M. (2020). Factors influencing high school students' career and technical education enrollment. *Career and Technical Education Research, 44*(3), 53-70.

# APPENDICES

APPENDIX A

## Synthesis Matrix

| Jon Black<br><br>Synthesis Matrix | History of Secondary Education | History of CTE | History of Gender Equity in Education | History of Gender Equity in CTE | Legislation Regarding Gender Equity in CTE | CA CTE Framework | Gender Schema Theory | Social Cognitive Theory | Expectancy Value Theory | Social Role Theory of Gender |
|---|---|---|---|---|---|---|---|---|---|---|
| Association for Career and Technical Education (ACTE). (2007). *Expanding opportunities: Postsecondary career-technical education and preparing tomorrow's workforce.* | | X | X | X | X | | | | | |
| Association for Career and Technical Education (ACTE). (2020). *An analysis of states' Perkins V priorities.* | | X | X | X | X | | | | | |
| Barrett, E. S., (1948). Vocational guidance and the George-Barden Act. *The High School Journal, 31*(1), 1-3. | | X | | | | | | | | |
| Bem, S. L. (1981). Gender schema theory: A cognitive account of sex typing. *Psychological Review, 88*(4), 354-364. https://doi.org/10.1037/0033-295X.88.4.354 | | | | | | | X | | | |
| Brand, B., Valent, A., & Browning, A. (2013). *How career and technical education can help students be college and career ready: A primer.* College and Career Readiness and Success Center at American Institutes for Research. https://www.aypf.org/wp-content/uploads/2013/04/CCRS-CTE-Primer-2013.pdf | | X | X | X | X | | | | | |
| California Department of Education. (nd). *Career Technical Education.* Retrieved January 15, 2023, from http://www.cde.ca.gov/ci/ct | | | | | | X | | | | |
| California Department of Education. (2007). *Career technical education framework for California public schools, grades seven through twelve.* | | | | | | X | | | | |
| California Department of Education. (nd). *CTE Model Curriculum Standards.* Retrieved January 15, 2023, from http://www.cde.ca.gov/ci/ct/sf/ctemcstandards.asp | | | | | | X | | | | |
| Dugger, R. (1965). The Vocational Education Act of 1963. *The Bulletin of the National Association of Secondary School Principals, 49*(301), 15–23. https://doi.org/10.1177/019263656504930104 | | X | | | | | | | | |
| Eagly, A., Wood, W., & Steffen V. (1982). *Gender and social roles: A distributional theory of gender stereotypes.* [Paper presentation]. American Psychological Association, Washington D. C., United States. | | | | | | | | | | X |
| Eagly, A. and Wood, W. (2012). *Social role theory. Handbook of Theories in Social Psychology 1*(1) 458-476. | | | | | | | | | | X |
| Eccles, J. E., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., et al. (1983). Expectations, values, and academic behaviors. In Spence, J. T. (Ed.), *Achievement and achievement motives* (pp. 75-145). Freeman. | | | | | | | | | X | |
| Fluhr, S., Choi, N., Herd, A., Woo, H., & Alagaraja, M. (2017). Gender, Career and Technical Education (CTE) nontraditional coursetaking, and wage gap. *High School Journal. 100*(3), 166-182. | | X | | X | | | | | | |
| Forsythe, J. S. & Weintraub, F. J. (1969). The Vocational Education Amendments of 1968, Public Law 90-576. *Exceptional Children, 35*(9), 751–754. https://doi.org/10.1177/001440296903500913 | | X | | | | | | | | |
| Goldin, C. (1999). *A brief history of education in the United States.* National Bureau of Economic Research. | X | | | | | | | | | |
| Gordon, H. (2003). *The history and growth of vocational education in America.* (2nd ed.). Waveland Press, Inc. | | X | X | X | X | | | | | |
| Gordon, H. R. (2014). *The history and growth of career and technical education in America.* (4th ed.). Waveland Press, Inc. | | X | X | X | X | | | | | |
| Gray, K. (1991). Vocational education in high school: A modern phoenix? *Phi Delta Kappan 71*(6) 437-445. | | X | | | | | | | | |
| Grayson, C. J. (2017). *Examining gender equity in Florida's career and technical education nontraditional programs.* (Publication No. 10256919) [Doctoral dissertation, North Central University]. ProQuest Dissertations and Theses Global. | | X | X | X | X | | | | | |
| Hunt, T. C. (2021, August 26). *National Defense Education Act.* Encyclopedia Britannica. https://www.britannica.com/topic/National-Defense-Education-Act | | X | | | | | | | | |
| Hyde, J., and Lindberg, S. (2007). Facts and assumptions about the nature of gender differences and the implications for gender equity. In Klein, S., Richardson, B., Grayson, D., Fox, L., Kramarae, C., Pollard, D., & Dwyer, C. (Eds.), *Handbook for achieving gender equity through education* (2nd ed., pp. 19-32). Routledge. https://doi.org/10.4324/9781315759586 | | | | | | | X | X | X | X |

| Jon Black<br>Synthesis Matrix | History of Secondary Education | History of CTE | History of Gender Equity in Education | History of Gender Equity in CTE | Legislation Regarding Gender Equity in CTE | CA CTE Framework | Gender Schema Theory | Social Cognitive Theory | Expectancy Value Theory | Social Role Theory of Gender |
|---|---|---|---|---|---|---|---|---|---|---|
| Kerber, L. K. (1980). *Women of the republic: Intellect and ideology in revolutionary America.* University of North Carolina Press. | | | X | | | | | | | |
| Lufkin, M., Wiberg, M., Jenkins, C., Berardi, S., Boyer, T., Eardley, E., & Huss, J. (2007) Gender equity in Career and Technical Education. In Klein, S., Richardson, B., Grayson, D., Fox, L., Kramarae, C., Pollard, D., & Dwyer, C. (Eds.), *Handbook for achieving gender equity through education* (2nd ed., pp. 421-443). Routledge. https://doi.org/10.4324/9781315759586 | | X | | | | | | | | |
| Malik, R. (2005). *School counselors' perceptions about female participation in nontraditional secondary career and technical education (CTE) programs.* (Doctoral dissertation, Western Michigan University). | | | | | X | | | | | |
| Malkus, N. (2019, May). *The evolution of career and technical education 1982-2013.* American Enterprise Institute. https://www.aei.org/wp-content/uploads/2019/04/The-Evolution-of-Career-and-Technical-Education.pdf?x91208 | | X | X | X | X | | | | | |
| McClelland, A. E. (1992). *The education of women in the United States.* Garland. | | | X | | | | | | | |
| National Association of Special Education Teachers (NASET). *The Vocational Education Act of 1984 (Perkins Act).* (n. d.). https://www.naset.org/professional-resources/special-education-and-the-law/perkins-vocational-education-act | | X | X | X | X | | | | | |
| National Center for Education Statistics. (2007). *The condition of education 2007.* U. S. Department of Education. | | | X | | | | | | | |
| National Women's Law Center. (2002). *Title IX and equal opportunity in vocational and technical education: A promise still owed to the nation's young women.* http://www.nwlc.org/pdf/TitleIXCareerEducationReport.pdf. | | | | X | X | | | | | |
| National Women's Law Center. (2007). *How to promote gender equity in Career and Technical Education: A primer for schools.* https://www.careerladdersproject.org/wpcontent/ uploads/2011/06/how-to-promote-gender-equity-in-CTE.pdf | | X | X | X | | | | | | |
| Patrick, D. & Patrick, S. (2022). TechGirlz—Teaching STEM skills to bridge the gender gap. *Computers in Libraries. 42*(8), 32-36. | | | | X | | | | | | |
| Perkins Collaborative Resource Network. *Perkins IV.* (n.d.). https://cte.ed.gov/legislation/about-perkins-iv | | X | X | X | X | | | | | |
| Perkins Collaborative Resource Network. *Perkins V. (n.d.). https://cte.ed.gov/legislation/perkinsv* | | X | X | X | X | | | | | |
| Phillips, A. (2022). Understanding the barriers: How microagressions, equity & perception affect black female CTE students. *Techniques: Connecting Education & Careers. 97*(1), 16-20. | | | | X | | | | | | |
| Prosser, C. (1939). *Secondary education and life.* Harvard University Press. | | X | X | X | | | | | | |
| Reed, K. (2006). *New directions in social theory: Race, gender, and the canon.* Sage Publications Ltd. | | | | | | | | | | X |
| Reef, C. (2009). *Education and learning in America.* Facts on File, Inc. | | | X | | | | | | | |
| Robbin, D. (1992). *Gender equity in vocational education.* Women's Educational Equity Act Program. https://www2.edc.org/WomensEquity/pubs/digests/digest-voced.html | | X | | | | | | | | |
| Rury, J. L. (2005). *Education and social change: Themes in the history of American schooling.* (2nd ed.). Lawrence Erlbaum. | | | X | | | | | | | |
| Schunk, D. H. (2012). Social cognitive theory. In Harris, K. R., Graham, S., Urdan, T., McCormick, C. B., Sinatra, G. M., & Sweller J. (Eds.), *APA educational handbook, Vol. 1 Theories, constructs, and critical issues* (pp. 101-123). American Psychological Association. https://doi.org/10.1037/13273-005 | | | | | | | X | X | X | X |
| Scott, M., Annexstein, L, Ordover, E., Easters, L, Bowen, B., & Reeve, E. (2003). *Equity issues in career and technical education: Information series.* | | X | X | X | | | | | | |
| Skinner, R. R. and Apling, R. N. (2005). *The Carl D. Perkins Vocational and Technical Education Act of 1998: Background and implementation.* Congressional Research Service: The Library of Congress. | | X | X | X | X | | | | | |
| Snedden, D. (1910). *The problem of vocational education.* Houghton Mifflin. | | X | X | X | | | | | | |

| Jon Black<br><br>Synthesis Matrix | History of Secondary Education | History of CTE | History of Gender Equity in Education | History of Gender Equity in CTE | Legislation Regarding Gender Equity in CTE | CA CTE Framework | Gender Schema Theory | Social Cognitive Theory | Expectancy Value Theory | Social Role Theory of Gender |
|---|---|---|---|---|---|---|---|---|---|---|
| Tozer, S. E., Violas, P. C. & Senese, G. (2002). *School and society: Historical and contemporary perspectives.* McGraw-Hill. | | | X | | | | | | | |
| Weaver-Hightower, M. B. (2009). *Issues of boys' education in the United States.* Routledge. | | | X | | | | | | | |
| Whitmore, R. (2010). *Why boys fail: Saving our sons from an educational system that's leaving them behind.* AMACOM. | | | X | | | | | | | |
| Williams, B. (2016). Increasing access, equity and diversity: NAPE's program improvement process for equity. *Techniques: Connecting Education & Careers. 91*(8), 20-24. | | | X | | | | | | | |
| Women's Educational Equity Act (WEEA) Resource Center. (2002). *Progress and promise.* WEEA Digest. | | X | X | X | | | | | | |
| Wonacott, M. E. (2003). *History and evolution of vocational and career-technical education. A compilation.* ERIC Clearinghouse on Adult, Career, and Vocational Education. | | X | | X | | | | | | |
| U.S. Department of Education. (2018). *Strengthening career and technical education for the 21st century act signed into law.* https://www2.ed.gov/about/offices/list/ocr/docs/tix_dis.html https://www.ed.gov/content/strengthening-career-and-technical-education-21st-century-act-signed-law#:~:text=Department%20of%20Education-,Strengthening%20Career%20and%20Technical%20Education%20for%20the%2021st%20Century%20Act,and%20technical%20education%20(CTE). | | X | X | X | X | | | | | |
| U.S. Government Accountability Office. (2022, March). *Career and technical education: Perspectives on program strategies and challenges.* https://www.gao.gov/assets/gao-22-104544.pdf | | X | X | X | X | | | | | |
| Uwire Text. (2022). *Trials and transformation: The 50-year history of title ix.* Uloop. https://link-Gale-com.umassglobal.idm.oclc.org/apps/doc/A708083763/AONE?u=irv3447&sid=ebsco&xid=ad65d596 | | X | X | X | X | | | | | |
| Xing, X., Garza, T., & Huerta, M. (2020). Factors influencing high school students' Career and Technical Education enrollment. *Career and Technical Education Research. 44*(3), 53-70. | | X | | | | | | | | |

APPENDIX B

## Invitation to Participate

**STUDY:** A Delphi Study of Effective Strategies for Addressing the Most Significant Challenges to Creating Gender-Balanced High School Career Technical Education (CTE) Pathways

June 20, 2023

Dear Prospective Study Participant,

You are invited to participate in a research study to identify what expert high school Career Technical Education (CTE) administrators see as challenges to creating gender-balanced classes across all high school CTE pathways. Furthermore, you will be asked to describe the most effective strategies for addressing the most significant challenges. The main investigator for this study is Jon Black, a Doctoral Candidate at the University of Massachusetts, Global (UMass Global) Doctor of Education in Organizational Leadership program. You were selected to participate in this study because of your expertise and experience in high school CTE programs.

**PURPOSE:** The purpose of this Delphi Study is to identify what expert high school CTE administrators see as challenges to creating gender-balanced classes across all high school CTE pathways, to rate the significance of the identified challenges according to the experts, and to describe the most effective strategies for addressing the five most significant challenges identified to creating balanced CTE enrollment across all high school pathways.

**PROCEDURES:** If you decide to participate in this study, you will receive three rounds of electronic surveys via Google Forms, with each survey taking approximately 15 to 20 minutes to complete. The Round 1 survey will contain an open-ended question. The Round 2 survey will utilize a Likert scale survey where participants will rate the challenges that were identified from the first-round survey. The Round 3 survey will contain open-ended questions about each of the strategies that were rated highest.

**RISKS, INCONVENIENCES, AND DISCOMFORTS:** This study involves no more than minimal risk. There are no known harms or discomforts associated with this study beyond those encountered in everyday life. There is no cost to you for participating, and you will not be compensated in any way for your participation. The survey will be completed anonymously, and the researchers will not know your identity.

**POTENTIAL BENEFITS:** Your participation in this study does not yield any direct benefits to you. However, analysis of the data generated from your participation in this study is intended to provide current information on effective strategies for addressing the most significant challenges to creating gender-balanced high school CTE pathways.

**ANONYMITY:** All surveys and research data collected will be stored securely and confidentially on a password-protected server. Records of information that you

provide for the research study, and any personal information you provide will not be linked in any way. It will not be possible to identify you as the person who provided any specific information for the study. Because you will complete the survey anonymously, your name or other identifying information will not be used in reports or publications. Only the research team may have access to study records to protect participants' safety and welfare.

If you have any questions, comments, or concerns regarding this study, you may contact me at [redacted] or by email at [redacted]. You can also contact the study's dissertation chairperson, Dr. Phil Pendley, by email at pendley@umassglobal.edu. If you have any further questions or concerns about your rights as a research subject, please contact UMass Global's Office of Institutional Research, UMass Global, 1635 Laguna Canyon Road, Irvine, CA 92618.
BUIRB@umassglobal.edu.

Respectfully,

Jon Black
Doctoral Candidate, UMass Global

APPENDIX C

## Demographic Survey

Survey Administered Through Google Forms

**RESEARCH STUDY TITLE:** A Delphi Study of Effective Strategies for Addressing the Most Significant Challenges to Creating Gender-Balanced High School Career Technical Education (CTE) Pathways

Lead Researcher:
Jon Black, Doctoral Candidate
UMass Global
Department of Education
[redacted], [redacted]

Faculty Sponsor:
Dr. Philip Pendley
UMass Global
Department of Education
951-712-2065, pendley@umassglobal.edu

- You are invited to participate in a research study to identify what expert high school Career Technical Education (CTE) administrators see as challenges to creating gender-balanced classes across all high school CTE pathways. Furthermore, you will be asked to describe the most effective strategies for addressing the most significant challenges. The main investigator for this study is Jon Black, a Doctoral Candidate at the University of Massachusetts, Global (UMass Global) Doctor of Education in Organizational Leadership program. You were selected to participate in this study because of your expertise and experience in high school CTE programs.

- Public K-12 School districts in five southern California Counties: Los Angeles, Orange, Riverside, San Bernardino, and San Diego, were targeted. Participation should require 45 to 60 minutes in total, which will be broken up into three 15-20 minute intervals spread over three weeks. Participation in this study is voluntary. You may discontinue your involvement in this study at any time without any consequences.

- The purpose of this Delphi study is to identify what expert high school CTE administrators see as challenges to creating gender-balanced classes across all high school CTE pathways, to rate the significance of the identified challenges according to the experts, and to describe the most effective strategies for addressing the five most significant challenges identified to creating balanced CTE enrollment across all high school pathways.

- If you decide to participate in this study, you will receive three rounds of electronic surveys via Google Forms, with each survey taking approximately 15 to 20 minutes to complete. The Round 1 survey will contain open-ended questions. The Round 2 survey will utilize a Likert scale survey where participants will rate the challenges that were identified from the first-round survey. The Round 3 survey will contain open-ended questions pertaining to each of the challenges that were rated most significant.

- This study involves no more than minimal risk. There are no known harms or discomforts associated with this study beyond those encountered in normal daily life. There is no cost to you for participating, and you will not be compensated in any way for your participation. The survey will be completed anonymously, and the researchers will not know your identity.

- Your participation in this study does not yield any direct benefits to you. However, analysis of the data generated from your participation in this study is intended to provide current information on effective strategies for addressing the most significant challenges to creating gender-balanced high school CTE pathways.

- All surveys and research data collected will be stored securely and confidentially on a password-protected server. Records of information that you provide for the research study and any personal information you provide will not be linked in any way. It will not be possible to identify you as the person who provided any specific information for the study. Because you will complete the survey anonymously, your name or other identifying information will not be used in reports or publications. Only the research team may have access to study records to protect participants' safety and welfare.

- If you have any questions, comments, or concerns regarding this study, you may contact me at [redacted] or by email at [redacted]. You can also contact the study's Dissertation Chairperson, Dr. Phil Pendley, by email at pendley@umassglobal.edu. If you have any further questions or concerns about your rights as a research subject, please contact UMass Global's Office of Institutional Research, UMass Global, 16355 Laguna Canyon Road, Irvine, CA 92618.
  BUIRB@umassglobal.edu.

Do you agree to participate in this study? ( ) Yes ( ) No

**Experience / Demographic Information**

1. Are you currently a CTE administrator responsible, solely or in part, for creating high school Career Technical Education (CTE) pathways.
    a. ( ) Yes ( ) No

2. Please indicate your years of experience as a CTE Administrator.
    a. ( ) Less than one year
    b. ( ) At least one year, but less than two years
    c. ( ) At least two years, but less than five years
    d. ( ) Five years or more

3. Please indicate the size of your school district.
    a. ( ) 5,000 to 9,999 students
    b. ( ) 10,000 to 19,999 students
    c. ( ) 20,000 to 29,999 students
    d. ( ) More than 30,000 students

4. Please indicate the County in California that your school district is located.
    a. ( ) Los Angeles County
    b. ( ) Orange County
    c. ( ) Riverside County
    d. ( ) San Bernardino County
    e. ( ) San Diego County

APPENDIX D

**Informed Consent and Confidentiality**

**RESEARCH STUDY TITLE:** A Delphi Study of Effective Strategies for Addressing the Most Significant Challenges to Creating Gender-Balanced High School Career Technical Education (CTE) Pathways

**UMASS GLOBAL**
**16355 LAGUNA CANYON ROAD**
**IRVINE, CA 92618**

**RESPONSIBLE INVESTIGATOR:** Jon Black, Doctoral Candidate

**TITLE OF CONSENT FORM:** Consent to Participate in Research

**PURPOSE OF THE STUDY:** This study is being conducted for a dissertation for the Doctor of Education in Organizational Leadership program at the University of Massachusetts Global (UMass Global). The purpose of this Delphi Study was to identify what expert high school CTE administrators see as challenges to creating gender-balanced classes across all high school CTE pathways, to rate the significance of the identified challenges according to the experts, and to describe the most effective strategies for addressing the five most significant challenges identified to creating balanced CTE enrollment across all high school pathways.

**PROCEDURES:** In participating in this research study, I agree to partake in three rounds of electronic surveys via Google Forms. The First-Round survey will contain open-ended questions. The Second Round will utilize a Likert scale survey where participants will rate the challenges that were identified from the first-round survey. Round 3 will contain open-ended questions pertaining to each of the challenges that were rated most significant.

I understand that:

a) No known major risks or discomforts are associated with this research.

b) I will not be compensated for my participation in this study. However, the information including the findings and recommendations generated from your participation will help to add to the body of literature associated with effective strategies for addressing the most significant challenges to creating gender-balanced high school CTE pathways. The findings and recommendations from this study will be made available to all participants.

c) Any questions I have concerning my participation in this study will be answered by Jon Black, UMass Global Doctoral Candidate. I understand that Mr. Black may be contacted by phone at [redacted] or by email at [redacted]. The

dissertation chairperson may also answer questions: Dr. Phil Pendley at pendley@umassglobal.edu.

d) I understand that I may refuse to participate or withdraw from this study at any time without any negative consequences. I also understand that the investigator may stop the study at any time.

e) The study will utilize electronic surveys. All surveys and research data collected will be stored securely and confidentially on a password-protected server.

f) No information that identifies me will be released without my separate consent, and all identifiable information will be protected to the limits allowed by law. If the study design or the use of the data is to be changed, I will be informed, and my consent re- obtained. If I have any questions, comments, or concerns about the study or the informed consent process, I may contact UMass Global's Office of Institutional Research, UMass Global, 16355 Laguna Canyon Road, Irvine, CA 92618, BUIRB@umassglobal.edu.

I acknowledge that I have received a copy of this form and the Research Participant's Bill of Rights.

I have read the above and understand it and hereby voluntarily consent to the procedure(s) set forth.

_____ _____

**Signature of Participant or Responsible Party** **Date**

_____ _____

**Signature of Principal Investigator** **Date**

APPENDIX E

## Participant Bill of Rights

UMASS GLOBAL
A nonprofit affiliate of the University of Massachusetts

### UMASS GLOBAL INSTITUTIONAL REVIEW BOARD

### Research Participant's Bill of Rights

Any person who is requested to consent to participate as a subject in an experiment, or who is requested to consent on behalf of another, has the following rights:

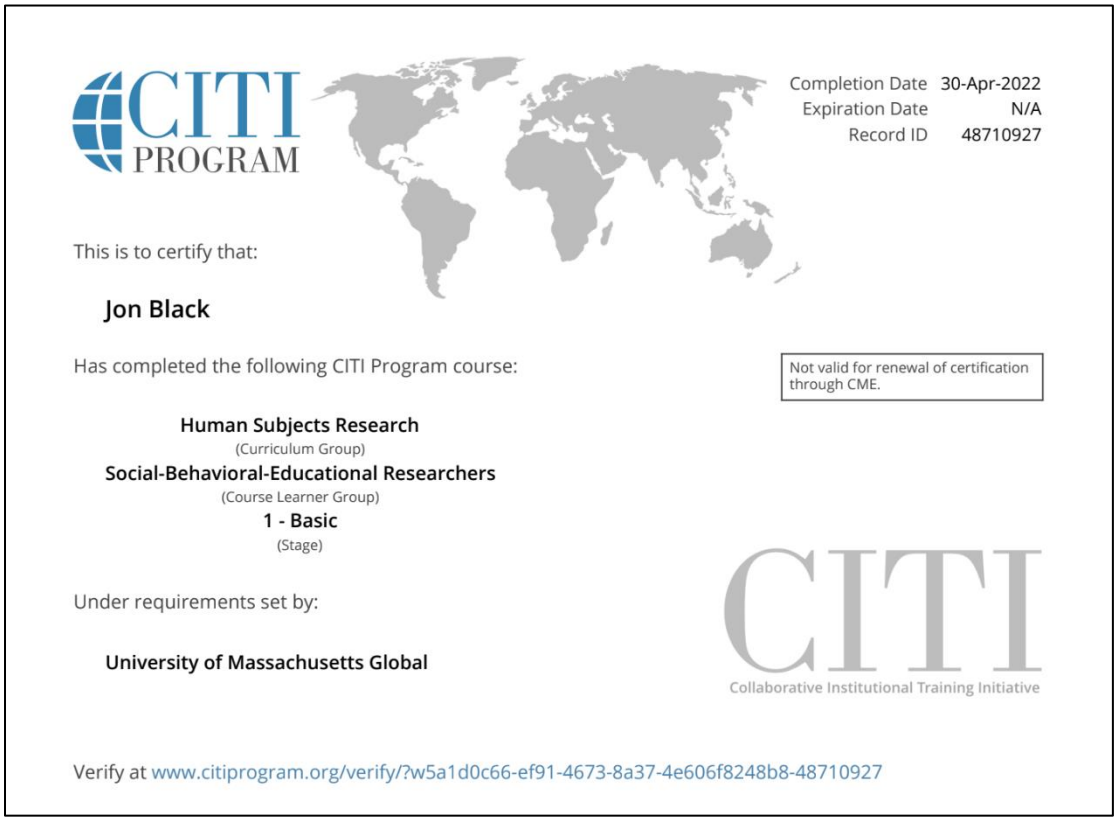
1. To be told what the study is attempting to discover.
2. To be told what will happen in the study and whether any of the procedures, drugs or devices are different from what would be used in standard practice.
3. To be told about the risks, side effects or discomforts of the things that may happen to him/her.
4. To be told if he/she can expect any benefit from participating and, if so, what the benefits might be.
5. To be told what other choices he/she has and how they may be better or worse than being in the study.
6. To be allowed to ask any questions concerning the study both before agreeing to be involved and during the course of the study.
7. To be told what sort of medical treatment is available if any complications arise.
8. To refuse to participate at all before or after the study is started without any adverse effects.
9. To receive a copy of the signed and dated consent form.
10. To be free of pressures when considering whether he/she wishes to agree to be in the study.

If at any time you have questions regarding a research study, you should ask the researchers to answer them. You also may contact the UMASS GLOBAL Institutional Review Board, which is concerned with the protection of volunteers in research projects. The UMass Global Institutional Review Board may be contacted either by telephoning the Office of Academic Affairs at (949) 341-9937 or by writing to the Vice Chancellor of Academic Affairs, UMASS GLOBAL, 16355 Laguna Canyon Road, Irvine, CA, 92618.

UMass Global IRB Adopted 2021

APPENDIX F

**Certificate of Completion of Training by Collaborative Institutional Training Initiative (CITI)**



CITI PROGRAM

Completion Date 30-Apr-2022
Expiration Date N/A
Record ID 48710927

This is to certify that:

**Jon Black**

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

**Human Subjects Research**
(Curriculum Group)
**Social-Behavioral-Educational Researchers**
(Course Learner Group)
**1 - Basic**
(Stage)

Under requirements set by:

**University of Massachusetts Global**

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w5a1d0c66-ef91-4673-8a37-4e606f8248b8-48710927

APPENDIX G

# UMass Global IRB Approval

Dear Jon Black,

Congratulations! Your IRB application to conduct research has been approved by the UMass Global Institutional Review Board. Please keep this email for your records, as it will need to be included in your research appendix.

If you need to modify your IRB application for any reason, please fill out the "Application Modification Form" before proceeding with your research. The Modification form can be found at IRB.umassglobal.edu

Best wishes for a successful completion of your study.

Thank You,

IRB
Academic Affairs
**UMass Global**
16355 Laguna Canyon Road
Irvine, CA 92618
irb@umassglobal.edu
www.umassglobal.edu

APPENDIX H

## Round 1 Survey Instrument

Survey Instrument Hosted by Google Forms

Survey Instrument Round 1

**RESEARCH STUDY TITLE:** A Delphi Study of Effective Strategies for Addressing the Most Significant Challenges to Creating Gender-Balanced High School Career Technical Education (CTE) Pathways

What do you, an expert high school CTE administrator, identify as challenges to creating gender-balanced classes across all high school CTE pathways?

APPENDIX I

**Round 2 Survey Instrument**

Survey Instrument Hosted by Google Forms

Survey Instrument Round 2

**RESEARCH STUDY TITLE:** A Delphi Study of Effective Strategies for Addressing the Most Significant Challenges to Creating Gender-Balanced High School Career Technical Education (CTE) Pathways

Based upon the first survey, below are the responses that were identified as challenges to creating gender-balanced classes across all high school CTE pathways.

Please rate the significance of each challenge listed below as it pertains to creating gender-balanced classes across all high school CTE pathways.

| | Extremely Significant | Very Significant | Significant | Slightly Significant | Low Significance | Not at all Significant |
|---|---|---|---|---|---|---|
| Challenge 1 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Challenge 2 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Challenge 3 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Challenge 4 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Challenge 5 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Challenge 6 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Challenge 7 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Challenge 8 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Challenge 9 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Challenge 10 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

APPENDIX J

## Round 3 Survey Instrument

Survey Instrument Hosted by Google Forms

Survey Instrument Round 3

**RESEARCH STUDY TITLE:** A Delphi Study of Effective Strategies for Addressing the Most Significant Challenges to Creating Gender-Balanced High School Career Technical Education (CTE) Pathways

Based upon the second survey, below are the rated strategies that expert high school CTE Administrators determined as the five most significant challenges to creating gender-balanced classes across all high school CTE pathways.

The five most significant challenges were rated by a means test using Likert scale responses. The five most significant challenges are Challenge 1, Challenge 2, Challenge 3, Challenge 4, Challenge 5.

1. Challenge 1 was rated as an extremely significant challenge to creating gender-balanced classes across all high school CTE pathways. Describe the most effective strategies for addressing this challenge to creating gender-balanced classes across all high school CTE pathways.

2. Challenge 2 was rated as an extremely significant challenge to creating gender-balanced classes across all high school CTE pathways. Describe the most effective strategies for addressing this challenge to creating gender-balanced classes across all high school CTE pathways.

3. Challenge 3 was rated as an extremely significant challenge to creating gender-balanced classes across all high school CTE pathways. Describe the most effective strategies for addressing this challenge to creating gender-balanced classes across all high school CTE pathways.

4. Challenge 4 was rated as an extremely significant challenge to creating gender-balanced classes across all high school CTE pathways. Describe the most effective strategies for addressing this challenge to creating gender-balanced classes across all high school CTE pathways.

5. Challenge 5 was rated as an extremely significant challenge to creating gender-balanced classes across all high school CTE pathways. Describe the most effective strategies for addressing this challenge to creating gender-balanced classes across all high school CTE pathways.