

## COVID-19 Global Pandemic Upheaval: CTE Teachers Response in the United States

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The United States along with the rest of the world has experienced an unprecedented disruption in daily life due to the COVID-19 pandemic. Almost everyone has experienced some sort of stay at home order resulting in an economic catastrophe greater than the Great Recession of 2008 and on par with the Great Depression almost a century ago. Educational institutions at both the K-12 and post-secondary levels have not been immune from the shutdown, with many schools closed from mid-March through the end of the 2020 school year. Many schools moved classes to remote, distance delivery platforms. Career and Technical Education (CTE) teachers were tasked with creative engaging learning activities online for curricula which is taught in a hands-on contextual learning environment. This paper will present preliminary results from research conducted by a collaborative group of nine researchers from across the United States with collectively over 200 years of career and technical education experience. The conceptual framework used for this study was Danielson's Framework for Teaching and Enhancing Professional Practice and Foundations of Career and Technical Education including Constructivism. 3,267 participants representing all 50 states responded to the 37-item survey. The research objectives included description of participants and identified challenges to planning and delivery of CTE content when schools were closed, and instruction was moved to remote/distance/online platforms. Participants ranked their challenges as instructors and their perceptions of challenges that were experienced by their students. CTE teachers ranked replicating classroom or lab environments online and lack of experience teaching online as their biggest challenges. The perceptions of the participants concerning challenges for their students included motivation to guide and manage their own learning and students' access to reliable internet connection. The emergence and prevalence of the COVID-19 pandemic added a layer of complexity to educational practice that was not foreseen and for which no intentional preparation had occurred. Understanding how CTE teachers and instructors responded to this call, and the challenges they and their students encountered, is important to efforts to improve practice in the

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future and to be in a better position should another crisis occur that forces learning to be delivered in alternative formats from that of the traditional face-to-face classroom.

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## **Introduction**

In December of 2019, infections of a new, novel Coronavirus were first diagnosed in Wuhan, China. In a short time, the virus spread to Europe, the United States, and throughout the world. The virus became what is commonly referred to as COVID-19 and the World Health Organization (WHO) declared the virus a global pandemic in March of 2020 (Centers for Disease Control and Prevention, 2020a; World Health Organization). As of early June 2021, just over 33 million had been diagnosed with COVID-19 in the United States, and just under 600,000 had died from the virus or because of virus related complications (Centers for Disease Control and Prevention, 2021).

With the WHO's declaration, leaders from the federal level down to local jurisdictions began issuing orders and mandates which brought civil society to its knees in an attempt to stop the spread of the outbreak or "bend the curve". Businesses were closed. Corporations and public agencies required employees to work from home. Because of the fear that schools could serve as "super-spreaders"; 48 states, four territories, and the District of Columbia issued school building closure recommendations in the spring. Schools shut down for the rest of the 2019-2020 school year, and students were required to complete learning activities and assignments remotely. Ninety-three percent of households in the United States with school age children and at least 50.8 million public school students were affected by the move from face-to-face learning environments to online platforms (Education Week, 2020; McElrath, 2020).

Career and Technical Education (CTE) students, teachers, and programs were also affected like other disciplines in the U.S. education system. Research has shown that 77% of the approximately 15 million secondary students participate in some form of CTE in the United States (Duffin, 2021). CTE is based on contextualized learning providing "hands-on" activities. School districts and teachers faced a challenge of providing a high-quality learning environment to students in order to learn and develop college and career ready skills. This research explored the CTE teacher perceptions of COVID-19 pandemic challenges to teaching and learning.

## **Conceptual Framework**

In reviewing CTE literature, one can find many research studies using different learning theories as a lens for which to view findings. However, it is difficult to identify a specific and concise theoretical framework for CTE. As Camp and Johnson (2005) argued over a decade ago, "no coherent theoretical

framework” for CTE exists (p. 42). For this study, the researchers developed a conceptual framework based on the foundations of Career and Technical Education and the Danielson (2007) framework for teaching and enhancing professional practice.

### **Foundations of Career and Technical Education**

Gordon and Schultz (2020) defined CTE as “organized educational programs offering a sequence of courses directly related to the preparation of individuals in paid or unpaid employment and in current or emerging occupations requiring other than a baccalaureate or advanced degree” (p. 433). Other scholars have described CTE as a conduit for students to develop “college and career ready” skills and provides these skills in an environment that provides real world applications (Stone & Lewis, 2012; Williams, 2019). Completing a rigorous CTE program provides students with skills sought after by employers and can lead students to a high-paying career path (Perna, 2018).

Even though CTE scholars have struggled to create a specific theoretical framework for the discipline, several theories can be identified as foundational underpinnings:

1. Social Efficiency
2. Behaviorism
3. Constructivism
4. Experiential Learning (Clark, Threton, & Ewing, 2010; Doolittle & Camp, 1999).

From the earliest days of modern vocational education, specifically the enactment of the Smith-Hughes Act of 1917, to “contemporary” career and technical education of the first two decades of the 21<sup>st</sup> century; each of these theories should be considered as an important component of the CTE foundational footprint.

Social efficiency theory posits that “only an efficient society could create a positive environment in which the individual could prosper and find satisfaction” (Doolittle & Camp, 1999, p. 2). The “founding fathers” of modern vocational education, David Snedden and Charles Prosser, were proponents of *social efficiency theory*. They advocated that secondary vocational programs were a component of our social system. Because of this, the US public school system would benefit the public good by its contribution to society’s efficiency (Doolittle & Camp, 1999). Pedagogy was considered a fundamental part of the *social efficiency theory*, and it involves the systematic study of teaching and learning (Doolittle & Camp, 1999). According to Doolittle and Camp (1999), Snedden and Prosser concluded that vocational education must have as its base a pedagogy that is hands-on, rigidly sequenced, and highly organized. Prosser went further into the creation of the foundations of CTE by creating the *Sixteen Theorems of Vocational Education* (Prosser & Allen, 1925). Prosser’s theorems served as the guide in the development of vocational curriculum that provided students with realistic, hands-

on learning experiences in the vocational content areas (Prosser & Allen, 1925; Gordon & Schultz, 2020). This realistic, hands-on learning approach is the primary characteristic of contemporary CTE. School closings due to the pandemic led to the CTE curriculum being part of a remote or online environment. Because of COVID 19, most opportunities for hands-on learning were taken away from U.S. students.

*Behaviorism* provided the learning theoretical foundation to *social efficiency theory* and the work of Snedden and Prosser (Doolittle & Camp, 1999). Thorndike (1932) theorized that learning was the result of links forming between specific stimuli and responses due awards applied to the learner. In the late 20<sup>th</sup> century, *behaviorism* continued to be the predominant learning theory underlying CTE (Dobbins, 1999). To demonstrate this, Dobbins (1999) showed that the *competency-based* approach to teaching and learning, evident in CTE, was tied to *behaviorism* learning theory. A *behaviorist* approach to learning was quite clear when one looks through *Prosser's Sixteen Theorems of Vocational Education*. Theorem 6 says, "Vocational education should provide opportunities for students to repeat operations of thinking and manipulative skills until habits are formed characteristic of those required for gainful employment" (Gordon & Schultz, 2020, p. 37). There is a connection between behaviorism and hands-on learning as noted by Prosser in Theorem 1, "Vocational education should occur in the most realistic setting that replicates the work environment" (Gordon & Schultz, 2020, p. 37). Finally, Prosser argued that vocational education should meet individual needs. He wrote in Theorem 13, "Vocational education should meet the needs of individuals when it is needed and in such a way that they can benefit from it" (Gordon & Schultz, 2020, p. 37). In addition to this, he proclaimed in Theorem 14, "Vocational education is more effective when its methods of instruction are best suited to the particular characteristics of any particular group which it serves" (Gordon & Schultz, 2020, p. 37). With school closings as a response to the COVID-19 pandemic, opportunities to learn in a realistic environment were not available to CTE students.

At the end of the last century, scholars questioned the connection of CTE to *behaviorism*. Numerous researchers suggested that it was time to consider *constructivism* as part of a theoretical framework underlying CTE (Doolittle & Camp, 1999; Gregson, 1997). Whereas those who advocated for the social efficiency/behaviorist approach to vocational education to meet the country's labor needs (Rojewski, 2002), constructivist scholars have argued for consideration of the individual learner. Individual learning needs must be met for the learner to be prepared for life and career success. This line of scholarship was based on Dewey's philosophy of pragmatism (Rojewski, 2002). Hysop-Margison (2000) wrote:

Dewey rejected the image of students as passive individuals controlled by market economy forces and existentially limited by inherently prescribed intellectual capacities. In his view, students were active pursuers and constructors of knowledge, living, and working in a world of dynamic social being (p. 25).

The student as the "constructor of knowledge" is the basis for *constructivism*. This is the concept that knowledge is constructed through a learner's experience

(Fosnot, 1996). Doolittle and Camp (1999) summarized the “essential factors” for a *constructivist* pedagogy:

1. Learning should take place in authentic and real-world environments;
2. Learning should involve social negotiation and mediation;
3. Content and skills should be relevant to the learner;
4. Content and skills should be understood within the framework of the learner’s prior knowledge;
5. Students should be assessed formatively, serving to inform future learning experiences;
6. Students should be encouraged to become self-regulatory, self-mediated, and self-aware;
7. Teachers serve primarily as guides and facilitators of learning, not instructors; and
8. Teachers should provide for and encourage multiple perspectives and representations on content.

There is a “hands-on” nature to constructivism. Learning is best in the “authentic” and “real-world” environment. This sounds very similar to Prosser. If one adopts *constructivism* as a framework for CTE, one can see the challenges to students and teachers when schools were closed, and programs were forced to an online/remote learning environment.

The final theoretical component to the CTE foundations component of this study’s conceptual framework is *experiential learning*. It can be argued that *experiential learning* is more identifiable with CTE than *social efficiency*, *behaviorism*, and *constructivism*. Clark, Threeton, and Ewing (2010) noted that *experiential learning* has been a significant part of CTE for a long time. *Experiential learning* has been described as having two contexts (Clark, Threeton, & Ewing, 2010). The first as described by Smith (2013) is that experiential learning takes place where learners are provided with the opportunity to gain knowledge and develop skills from immediate and relevant environments. Also important with this context is that learners are also able to apply the knowledge and skills in the relevant learning environment (Smith, 2001). The second context is the learner’s reflection of participation and encounters in everyday life which make up the experience (Houle, 1980). Clark, Threeton, and Ewing (2010) described this context as being aligned with life-long learning. They also argued that CTE fits into parameters of the first context (Clark, Threeton, & Ewing, 2010). As with the other theoretical framings, relevant “hands-on”, “contextual” environments are needed for the successful use of *experiential learning*. Again, closing schools and moving to the remote/distance classrooms removed learners from engaging experiential learning environments.

### **Danielson's Framework for Teaching and Enhancing Professional Practice**

The second component to this study's conceptual framework is based on Danielson's (2007) framework for teaching and enhancing professional practice. The Danielson framework has been identified as being grounded in the *constructivist* approach to learning (Williams, 2019). Danielson described good teaching as requiring the design of learning activities and assignments which provide the learner an opportunity to problem solve which leads to the construction of knowledge (Williams, 2019). She developed an evaluation tool for which good teachers would consistently demonstrate proficient or distinguished levels of performance in four domains (Danielson, 2007; Williams, 2019). Those four domains consist of the following:

1. planning and preparation;
2. classroom environment;
3. instruction; and
4. Professional responsibilities (Williams, 2019).

"Planning and preparation" is how teachers prepare and organize content and activities for students to learn (Williams, 2019). This is the instructional design for which the learning environment will provide a platform for delivery. Because of the pandemic school closures, CTE teachers were faced with the challenge of providing engaging activities through the online environment. They were forced to move away from the traditional face-to-face environments which provided the platform for hands-on activities.

The second part of the Danielson (2007) framework is the classroom environment. With this component, the teacher creates the learning environment to implement planning and preparation for the learner to construct knowledge. In the CTE discipline, the construction of knowledge combines with the development of college and career ready skills. A good teacher has the skill to manage a classroom culture where students have the belief that they are safe and comfortable and can concentrate on learning (Williams, 2019). In the spring of 2020, schools throughout the United States as well as many across the world went to remote learning environments. Suddenly, CTE teachers were faced with trying to help students perceive that they were safe and comfortable in a much different classroom environment.

Planning and preparation along with the classroom environment lead to the third component of Danielson's (2007) framework, instruction. Student engagement is important to instruction. This provides the learner with the opportunity to construct new knowledge and develop new skills. Williams (2019) found that the interaction with students is key to high quality CTE teachers. Also, good CTE teachers have been found to be actively involved in student-centered activities outside of the classroom such as Career and Technical Student Organization (CTSO) events. These activities contribute to the overall effectiveness of a CTE teacher's professional practice (Cannon, Tenuto, & Kitchel, 2013). Besides the school closures, CTSOs experienced numerous cancellations of events such as

leadership conferences and career development events. This added to the challenges facing teachers to provide environments and activities consistent with the “hands-on” learning characteristic of good CTE programs.

The final cornerstone of the Danielson (2007) framework is professional responsibilities. This encompasses the teacher’s commitment to high ethical and professional standards leading to improve practice (Williams, 2019). Two important parts to this component of the framework are “participating in the professional community” and “growing and developing professionally” (Danielson, 2007; Williams, 2019). The COVID-19 pandemic led to the school closures, cancellation of CTSO events, and the absence of professional development activities and events. CTE teachers use all of these as components to professional development. Added to profound changes in classroom environment, instruction, planning and preparation, this is yet another area where CTE teachers were challenged to fulfill their responsibilities.

The foundations of CTE and the Danielson (2007) framework for teaching and enhancing professional practice comprised the conceptual framework for this study. The data was analyzed and interpreted through this conceptual lens. COVID-19 became a global pandemic which led to the challenge for CTE teachers to provide engaging learning experiences congruent to the traditional CTE model.

### **Research Problem**

This study sought to explore the impact of the COVID-19 pandemic school shut down on CTE teachers and programs.

### **Research Objectives**

Specifically, the following research objectives were developed:

1. Identify the challenges to planning and delivery of CTE content when schools were closed, and instruction was moved to remote/distance/ online platforms; and
2. Identify the challenges for students as perceived by CTE teachers when learning environments were moved to remote/distance/online platforms.

### **Methods**

CTE researchers from Idaho, Illinois, Kansas, North Carolina, North Dakota, Oklahoma, and Pennsylvania began meeting in late March 2020 to develop this study. The researchers collectively have over 200 years of experience in most of the CTE content areas, and experience at both secondary and post-secondary levels. Meetings took place through Zoom, and this panel of experts developed the initial

survey items by the end of April 2020. Qualtrics served as the online software to create, organize, and administer the survey. Upon completion of the initial draft, the researchers pilot tested the instrument with at least two CTE teachers in each of the seven researcher's states. The data from the pilot test was analyzed and used to make final revisions to the instrument. The final instrument contained 37 questions including demographic information. The use of the panel of experts and the pilot test are considered best practices to strengthen content validity (Dillman, Smyth, & Christian, 2014).

The population for the study were U.S. CTE teachers employed by secondary and post-secondary institutions during the spring of 2020. Researchers used convenience sampling in their states of residence to administer the instrument and collect data. Previous research has shown that "convenience" sampling can be an effective method to collect and analyze data (Swanson, 2005; Maddy & Cannon, 2014). The following describes how the convenience samples were determined in each state:

- Idaho: An email list of certified secondary and post-secondary CTE teachers was provided by the state CTE agency.
- Illinois: An email containing the survey link was emailed to the CTE State Consultants and the Illinois Association of Career and Technical Education Executive Director for distribution.
- Kansas: An email containing the survey link was shared with the Kansas State Department of Education CTE Consultants who are assigned to specific CTE areas in Kansas. The link was distributed to secondary CTE educators across the state.
- North Carolina: The link was sent to the state's CTE administrators. After conferring with the principal investigator for more information the link was sent to CTE teachers.
- North Dakota: The survey link was sent to the state CTE content supervisors who then sent it out to their respective secondary and post-secondary CTE teachers in the state.
- Oklahoma: Solicitation email was sent directly to email addresses from a publicly accessible directory of all CTE teachers in the state; to all instructional leaders in Oklahoma via OkACTE association
- Pennsylvania: Invitations to participate in the study with a link to the survey were sent to business teachers in Pennsylvania using a distribution list comprised of business teachers in the summer of 2020.

Additionally, an email with the survey link was sent to every state CTE director in the U.S. and all Career and Technical Student Organizations executive directors. The link was provided to CTE professional organizations such as Association for Career and Technical Education (ACTE) and the University Council for Workforce and Human Resource Education (UCWHRE) for dissemination to members and member institutions.

The instrument was implemented in mid-summer 2020 using research supported protocol for online surveys developed by Dillman, Smyth, and Christian



(2014). Five email contacts containing the survey link took place over approximately a month and half from the first contact. Data was collected through Qualtrics and analyzed using Excel and SPSS.

## Findings

The effects of the pandemic on society began to emerge in North America in February of 2020. By March of 2020 schools were forced to respond to the emerging crisis and began to change their practices. These changes involved modification for face-to-face instruction, as well as a shift to distance education facilitated through online instruction. The pandemic worsened throughout 2020, during which time CTE teachers struggled to adapt to the changing educational environment. The data used for this study was collected during the critical three-month period from mid-June 2020 to mid-September 2020. The findings represent the perceptions and experiences of CTE teachers who responded to the request to complete the study's online survey consisting of 37 questions. The findings also include a description of the demographics of the research participants.

At the end of the data collection period, 4,460 survey responses had been submitted despite the survey being administered during part of the summer months into September. The responses were analyzed for completeness, errors, and consistency. The analysis consisted of a review of two distinct sections of the survey: demographic and background data, and transition challenges. Responses that provided nearly complete demographic and background data were first identified. This resulted in the identification of 3,492 records. Further analysis included a review of record and construct completeness. The key criteria for this study was the extent to which respondents completed all 13 of the survey questions concerning transition challenges for teachers. When a record had nearly complete demographic and background data, and all 13 transition challenges for CTE teachers had been responded to, then the record was kept for analysis. The result of the screening provided the researchers 3,418 records that addressed transition challenges for CTE teachers. Of these, 3,267 respondents also completed all 13 items that addressed their perceptions of the transition challenges faced by students.

## Demographics and Background

Approximately two-thirds of survey respondents identified as female ( $n = 2,311$ ), while one third identified as male ( $n = 1,060$ ). A small number ( $n = 47$ ) did not provide a response on the gender question. The ages of the respondents varied, with the majority (86%) being 35 years or older ( $n = 2,924$ ). Of this 86%, the ages were distributed relatively evenly between the ages of 35-44, 45-54, and 55 years and older. All other participants indicated their age to be less than 35 years of old ( $n = 494$ ).

The level at which respondents taught ranged from middle school to postsecondary college programs. Some participants reported they taught at mixed

levels, even changing schools during a single workday. Overall, 16% indicated they taught at both the middle school and high school levels, while another 11% indicated they taught at both the high school and postsecondary levels. The remaining 77% indicated they taught at only one level: either the middle school level, the high school level, or the postsecondary level.

The number of years that respondents had been teaching varied widely. Six percent indicated they had either one year of teaching experience or were still in their first year of teaching. Twenty-three percent had 2-5 years of experience. The remaining 65% were distributed somewhat evenly between 6-10 years, 11-20 years, and 21-30 years respectively.

Most sizes of communities were represented, with 41% of survey responders indicating they taught in a rural community with a population of less than 2,500. The other 59% indicated they taught in an urban community, with about half of these indicating a community size of 2,500-49,999, and the other half indicating community size of 50,000 or larger.

The participants of the study represented nearly all the states within the United States. Oklahoma ( $n = 930$ ), Kansas ( $n = 426$ ) and Idaho ( $n = 422$ ) had the highest participation numbers. There were eight states that each had over 100 CTE teachers provide responses. States with less than 30 respondents collectively represented 7% of the total number of participants, some of these had as low as one respondent to the survey. There were 19 states where there were at least 30 participants, and these states combined represented 93% of those who completed the survey for this study (Table 1). Despite it being the summer months and off contract time for many CTE teachers, a solid number of participants responded to the survey.

Table 1. Location of Study Participants

Location	Teacher Transition Challenges	Perceived Student Challenges
Oklahoma	930	878
Kansas	426	409
Idaho	422	407
North Dakota	287	277
North Carolina	230	225
Missouri	159	157
Illinois	128	121
Pennsylvania	113	109
Michigan	75	72
Virginia	68	63
Kentucky	65	65
Indiana	41	40
Montana	34	33
Georgia	33	33
California	33	31
New York	33	33
New Mexico	33	27
Wyoming	32	29
Nevada	32	29
< 30 responses/location	244	229
Total	3418	3267

In addition to the wide representation from regional areas, CTE content areas were also well represented. Teachers indicated the content area for which they teach. For many, this involved a single content area, but some reported teaching across a mix of content areas (Table 2).

*Table 2. CTE Content Areas Represented in Survey Responses*

CTE Content Area	Teacher Challenges Responses	Student Challenges Responses
Agricultural & Natural Resources Education	324	318
Business Education	425	397
Business and Marketing Education	151	144
Engineering & Technology Education	251	237
Family & Consumer Sciences Education	995	957
Health Occupations Education	349	332
Marketing Education	39	39
Trade & Industry Education	402	376
Mix of CTE content areas	288	281
Unsure	179	173
Did not respond (blank)	15	13
Total	3418	3267

## Research Objective #2: Challenges to Planning and Delivery of CTE Content

Thirteen plausible transition challenges for teachers, plus one “other” write-in option, were presented to the CTE teachers participating in the study. The participants were asked to rank these challenges based on their own professional experiences during the first half-year of the pandemic. Perhaps not surprising, particularly for the CTE context, replicating the classroom or lab environment was the item that was ranked first more than any other item. The next two teaching challenges that followed were teachers’ lack of experience teaching online, and then engagement with students as remote learners (Table 3).

*Table 3. Rank Order List of Pandemic Transition Challenges for CTE Teachers*

Item	Rank
Replicating classroom or lab environment online.	1
Lack of experience teaching online.	2
Engaging students as remote learners.	3
My access to reliable internet connection, software, and equipment.	4
Delivering class content in a meaningful and impactful way.	5
Students have not been adequately available/responsive.	6
Balancing teaching with additional family responsibilities (caring for children or older adults etc).	7
Course lessons or activities that haven't translated well to a remote environment.	8
Other (write in)	9
Using educational technologies (i.e., Zoom, RN, others)	10
Student discomfort or lack of familiarity with required technology.	11
Assessing student learning.	12
My own discomfort or lack of familiarity with required technology.	13
Using best practices in online instruction.	14

### Research Objective #3: Challenges for Students as Perceived by CTE Teachers

In addition to ranking transition challenges for CTE teachers based on their own experiences, CTE teachers were also asked to rank order items identified as plausible perceived transition challenges for students. Thirteen plausible transition challenges for students, plus one “other” write-in option, were presented to the CTE teachers participating in the study. The teachers were asked to rank these challenges based on their experiences with and perceptions of their students’ challenges. Of the student challenges presented, teachers indicated a student’s motivation to guide and manage their own learning as the highest ranked student challenge. The next most top ranked student challenge was having appropriate internet access, followed by the student challenge of student’s lack of experience being an online learner (Table 4).

Table 4. Rank Order List of Pandemic Transition Challenges for Students as Perceived by CTE Teachers

Item	All-R
Motivation to guide & manage their own learning	1
Students' access to reliable internet connection.	2
Lack of experience with remote learning	3
Students' access to technology equipment	4
Mental health and well-being/social isolation	5
Students' access to software.	6
Other (write in)	7
Family commitments	8
Work obligations	9
Financial barriers	10
Food or housing insecurity	11
Health/sickness COVID-19 related	12
Lack of access to assistive technologies	13
Health/sickness non-COVID-19 related	14

### Discussion

Due to the contextual nature of CTE instructional delivery, school districts and teachers faced a challenge of providing a high-quality learning environment while teaching in a pandemic. To better understand the difficulties, this research explored the CTE teacher perceptions of COVID-19 pandemic challenges to teaching and learning. Specifically, the study sought to identify the pandemic transition challenges among CTE teachers and pandemic transition challenges for students perceived by CTE teachers. Over three thousand CTE teachers with nearly every state in the union represented, responded to the survey. All CTE teaching areas were represented with most respondents from Family and Consumer Sciences Education followed by Business and Marketing Education. The majority of the respondents were female. Age, size of community, years teaching, and school level had varied representation in each range. This profile

data provides a national snapshot of CTE teachers' challenges teaching in a pandemic.

The conceptual framework used in this study comprised of the foundation underpinnings of CTE and the Danielson (2007) framework for teaching and enhancing professional practice allows for interpretation of the findings through conceptual lens. Because of the nature of being a "hands-on" discipline or incorporating a constructivist approach, the challenges for CTE teachers themselves and their perceived student challenges represent significant altering of their skilled pedagogy due to transitioning from a traditional classroom setting to an online format. As a result, the findings of this study provided reasoning given the challenges among CTE teachers and their students.

CTE teachers in this study ranked *replicating classroom or lab environment online* as the top challenge when school closed and/or transitioned to an online platform. Doolittle and Camp (1999) believed learning should take place in authentic and real-world environments. These CTE teachers found it difficult to provide environments and activities consistent with the "hands-on" learning which is a characteristic of good CTE programs. Therefore, the struggle to teach technical skills while being online proved problematic for many CTE teachers. For example, it would be nearly impossible to teach welding proficiency online. Without a contextual classroom, a welding teacher would have difficulty demonstrating welding lines then having students practice while being closely supervised. CTE teachers had to improvise content instruction that did not have a hands-on component.

With the swift pivot from face-to-face to online instruction, the second ranked challenge among CTE teachers was their *lack of experience with teaching online*. By not having the familiarity or knowledge of technology platforms and software equipment, this challenge could be interwoven in all the other identified challenges. For example, experience with technology could *reduce the challenges of delivering content in a meaningful and impactful way* (ranked 4<sup>th</sup>), *course lessons or activities that haven't translated well to a remote environment* (ranked 8<sup>th</sup>), and *being able to assess student learning remotely* (ranked 12<sup>th</sup>). This challenge, *lack of experience with technology*, espouses the importance of Danielson's (2007) professional responsibilities component citing the need to improve practice (Williams, 2019).

According to Danielson's (2007) framework, student engagement is important to instruction. With the transition from in person to online, CTE teachers in this study ranked *engaging students as remote learners* as the third most ranked challenge. Smith (2001) noted that experiential learning engages learners to gain knowledge, develop skills, and apply the knowledge and skills in the relevant learning environment. Online instruction forced CTE teachers to abandon the engaging experiential learning component that is essential to a CTE classroom and settle for passive activities.

Education is a reciprocal process and challenges are posed for teachers when *students are unavailable or unresponsive* (ranked 6<sup>th</sup>) or *experience discomfort or are unfamiliar with the required technologies* (ranked 11<sup>th</sup>). Danielson's (2007) framework stresses the importance of student engagement to instruction. The lack

of student engagement whether non-participatory or the inability to use technology, disrupts the learning environment.

Several challenges that were ranked by CTE teachers in this study could be categorized as pedagogy for online teaching. These challenges include *engaging students as remote learners* (ranked 2<sup>nd</sup>), *delivering content in a meaningful and impactful way* (ranked 5<sup>th</sup>), *course lessons or activities that haven't translated well to a remote environment* (ranked 8<sup>th</sup>), *assessing student learning remotely* (ranked 12<sup>th</sup>) and *using best practices in online instruction* (ranked 14<sup>th</sup>). Danielson's (2007) framework emphasized professional development to improve practice. Going forward with the return of professional development activities, such as in-service meetings, conferences, and workshops, these are essential topics to focus on for CTE teachers.

While CTE teachers ranked their challenges teaching in a pandemic, they also ranked perceived challenges facing their students while learning in pandemic. The number one ranked perceived student challenge by CTE teachers was *motivation to guide and manage their own learning*. This challenge refers to the skill of self-regulated learning which is the process by which individual learners attempt to monitor and control their own learning (Zimmerman & Schunk, 2011). Transitioning from engaging experiential learning (hands-on) to a passive learning environment (i.e., watching videos) lessens the motivation to self-regulate one's learning. Williams (2019) found that an established classroom culture allows for students to concentrate on learning however with the school closures, students became independent learners away from their peers and teacher.

The next three perceived student challenges are related to technology. These include *students' access to reliable internet connection* (ranked 2<sup>nd</sup>), *lack of experience with remote learning* (ranked 3<sup>rd</sup>), and *students' access to technology equipment* (ranked 4<sup>th</sup>). With the quick transition from the classroom to online learning, there was little to no time to prepare families for technology needs at home. Financial constraints, geographical limits, and time are viable factors for these rankings by CTE teachers.

Ranked 5<sup>th</sup> among the perceived student challenges by CTE teachers was *mental health and well-being/social isolation*. Well documented, increased anxiety and depression among adolescents has exacerbated during the pandemic due to the forced isolation by the federal/state governments and the school closures (Hawes et al., 2021). Williams (2019) reported that a good teacher has the skill to manage a classroom culture where students perceive they are safe and comfortable so this upper-level ranking was a plus that CTE teachers in this study sensed mental health and well-being issues among their students from afar.

## Conclusions and Recommendations

In a "normal" environment educational decision making for pedagogy, andragogy, curriculum design and administrative duties is complex. The first half of 2020 was anything but normal affecting not only education but all aspects of our lives. The emergence and prevalence of the COVID-19 pandemic added a

layer of complexity to educational practice that was not foreseen and for which no intentional preparation had occurred. Essentially, within a simple matter of days, face-to-face instruction and all its normal practices were disrupted, and the educational system and the people involved were asked to deliver instruction through online and various hybrid formats. Understanding how CTE teachers and instructors responded to this call, and the challenges they and their students encountered, is important to efforts to improve practice in the future and to be in a better position should another crisis occur that forces learning to be delivered in alternative formats from that of the traditional face-to-face classroom.

Findings from the current study indicate that CTE teachers may need additional supports in implementing remote teaching. Providing professional development to CTE teachers could help to mitigate the challenges these teachers report experiencing in delivering remote instruction to their students. Technology trainings would provide the opportunity for CTE teachers to feel more confident in their remote instruction, to provide higher quality and more effective remote instruction to their students, and to increase student learning and development. In turn, teachers could be able to support students and their families in learning about how to navigate technology and online learning platforms to be able to engage in remote learning.

The conceptual frameworks used in this study framed interpretation for the findings. The CTE teachers in this study struggled with implementing the constructivist approach which is grounded in experiential learning and in Danielson's (2007) framework for teaching and enhancing professional practice. The challenges for CTE teachers to provide engaging learning experiences were incompatible to the traditional CTE models. Therefore, professional development opportunities designed to transition a CTE classroom to an online CTE classroom is needed given that remote teaching is unknown for the upcoming school year.

While this research study ranked challenges for CTE teachers teaching in a pandemic and their perceived student challenges learning in a pandemic, the need to further understand the post effects of teaching and learning needs to be explored. The findings in this study predicate the need for future research that includes:

1. Explore a qualitative approach for in depth analysis of challenges in teaching in a pandemic among CTE teachers;
2. Determine professional development needs of CTE teachers post pandemic teaching;
3. Examine the social and emotional impact of teaching in a pandemic among CTE teachers;
4. Examine the burnout among CTE teachers teaching in a pandemic; and
5. Examine the commitment among CTE teachers post pandemic.

Since this manuscript was originally written and submitted, several researchers have focused on our research recommendations. One such researcher was DuPuis (2023). The researcher found that community college CTE instructors were able to use the virtual learning environment in a more successful and efficient manner

than high school CTE teachers. Academic achievement and motivation were higher for the CTE community college students. Bartlett et al. (2022) found that more professional development on engaging students online and ways to replicate the hands-on experience in online learning using augmented reality, virtual reality, and mixed reality design.

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