TECHNOLOGY CENTERS THAT WORK (TCTW) – THE IMPACT ON CTE TEACHER SELF-EFFICACY

by

Martin P. Hanley

An Abstract
of a thesis submitted in partial fulfillment
of the requirements for the degree of
Educational Specialist
in the School of Professional Education and Leadership
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December, 2018
ABSTRACT

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The Technical Centers That Work (TCTW) initiative provides for and encourages instructional and leadership practices that improve student success. The unknown is the impact of TCTW on career and technical education (CTE) teacher self-efficacy. In this mixed-methods research project, CTE teachers at area career centers in Missouri were surveyed to determine their level of self-efficacy. Teachers in both TCTW affiliated and non-TCTW affiliated schools took part in the survey. There was found to be no significant impact of TCTW affiliation on CTE teacher self-efficacy. There was minimal impact of the understanding and implementation of the TCTW key practices. The impact was solely on the instructional training needs of the teachers. TCTW appears to provide the training that meets the needs of the CTE teachers.
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CHAPTER 1
NATURE AND SCOPE OF THE STUDY

Each year more Missouri area career centers spend the time and effort writing a grant proposal to become active in the Technology Centers That Work (TCTW) network that was developed by the Southern Regional Education Board (SREB, 2009). The SREB claims that the different key practices in TCTW are data-driven methods to help improve student learning and achievement (Southern Regional Education Board, 2009). Those claims can be relatively easily supported based on anecdotal data and empirical data provided by SREB. One question, though, is the impact of participation in the TCTW initiative on the actual career and technical education (CTE) teachers.

There was limited literature located for this study addressing the impact of TCTW and similar initiatives on the instructional staff in all areas, but specifically in the realm of self-efficacy. This led to the initial question that was instrumental in planning this research project: Does participating in the TCTW initiative improve students at the expense of CTE teachers, or does it help CTE teachers feel better about their craft and abilities?

Purpose of the Study

After reviewing the literature related to TCTW, the researcher refined the purpose of this research. The purpose of this study was to determine if participation in the TCTW initiative has a positive impact on CTE teachers’ self-efficacy. As mentioned, the key practices and goals of TCTW have been shown to improve student learning and achievement. While education strives to help students grow and achieve greater success, what is the balance of students’ growth and the teacher’s self-efficacy? Teaching can be challenging, especially for industry professionals transitioning to the world of career and technical education.
Many Missouri educators and school districts are being encouraged to participate in the TCTW initiative. Therefore, this study attempted to determine the potential impact on educators’ self-efficacy in the realms of student engagement, instructional strategies, and classroom management.

**Statement of the Research Questions**

This project addressed the following research question:

1. What is the impact of the TCTW initiative on teacher self-efficacy?

**Statement of the Hypotheses**

The following hypotheses were presented for this study:

H1: Participation in TCTW will improve the self-efficacy of CTE teachers.

H2: Self-efficacy of CTE teachers will increase each year of participation.

H3: Teaching self-efficacy will increase based upon years of CTE teaching.

H4: There will be a difference in teaching self-efficacy across teachers from different CTE program content areas.

H5: Teachers’ experience in TCTW will have an impact on the understanding and implementation of the Key Practices of the TCTW network.

H6: Teachers’ understanding and implementation of the Key Practices of the TCTW network will increase based upon years of experience in CTE teaching.

H7: There will be a difference in the understanding and implementation of the Key Practices of the TCTW network based on Teachers’ CTE program content areas.
Definitions of Terms

The following terms were defined to assist clarify terms related to career and technical education. Additionally, there are additional terms or concepts related to SREB that warrant definition.

**Area career center.** For the purpose of this study, an area career center is operationally defined as a school devoted to career and technical education. In Missouri, the area career centers are also referred to as shared-time centers, and were formally known as area vocational technical schools (AVTS). In this model, school districts in a relatively small geographic region send students to the area career center for specific instruction in career and technical education. The exact time and program structure is dependent upon the specific area career center.

**Career and technical education (CTE).** CTE is a branch of education focused on both academic and technical skills (Advance CTE, 2018). These programs are designed to help the learner be ready for college, careers, military service, or whatever direction life takes them.

**The Southern Regional Education Board (SREB).** The SREB is a nonprofit organization formed in 1948 as the first regional interstate concept for education (Southern Regional Education Board, 2018a).

**High Schools That Work (HSTW).** HSTW is a school improvement initiative created by the SREB in 1987 (Southern Regional Education Board, 2018b). The initiative focuses on staff development and leadership training.

**Project based learning (PBL).** Project based learning is a “systematic teaching method in which the prime focus is on learning through projects” (Mahasneh & Alwan, 2018, p. 512).

**Self-efficacy.** Self-efficacy is the personal belief that one can accomplish a task (Bandura, 1977).
Technology Centers That Work (TCTW). Technology Centers that Work is an education improvement initiative founded in 2007 based upon the High Schools That Work initiative but is focused on career and technical education (Southern Regional Education Board, 2009).

Scope of the Study

While it may be interesting to investigate the impact of TCTW on schools across the nation, this study will focus solely on schools in Missouri. This is primarily due to time constraints and the manageability of collecting data. Depending upon the results of this study, it would be theoretically possible to conduct a larger-scale study to reach all of the career and technical education schools in the nation, specifically those that are participating in the TCTW initiative.

Delimitations of the Study

The following delimitations were presented for this study:

1. This study only included CTE area career centers in Missouri.

2. There was no control over which teachers actually received the survey from their administrators.

3. Only CTE school administrators who were members in the Missouri Council of Career and Technical Administrators (MCCTA) organization were included in the study.

Limitations of the Study

The following limitations to the study are presented:

1. One hundred and twelve Missouri CTE teachers provided data for this study, representing approximately 14% of the CTE teaching population in Missouri’s area career centers based on the estimated population size incorporated by the researcher. While valuable
data were collected, these data may not represent all Missouri career center teachers’ perceptions.

2. The researcher estimated the population size of CTE teachers in Missouri’s area career centers. Actual population data for Missouri CTE teachers in area career centers may have been available from the Missouri Department of Elementary and Secondary Education.

Assumptions

The following assumptions were presented for this study:

1. It was assumed that all Missouri CTE administrators were active members of the Missouri Council of Career and Technical Administrators (MCCTA) professional organization.

2. It was assumed that using MCCTA email addresses would provide access to all CTE area career center directors, who would then open, read, and act upon the request.

3. It was assumed that all CTE area career center directors would take an active role in this research by forwarding the researcher’s email to their teaching staff, and that the teaching staff would complete the survey thus providing the needed data for this study.

Need and Significance of the Study

An increasing number of Missouri area career centers are participating in the TCTW initiative. Teachers are asked to attend conferences, participate in specific professional development opportunities, and make changes to the way they instruct students. This is all done in the name of student growth and achievement. All teachers, whether core academic or career and technical, hopefully share a common goal of student success. Many teachers will make the changes and implement new techniques and ideas in their classrooms. Many of them may do so even if they do not agree with the proposed changes.
No literature was located for this research that addresses the impact of TCTW on teachers. While it may be hypothesized that participating in the TCTW initiative will positively impact the teachers and their sense of self-efficacy. However, that claim cannot truly be made without investigating the data. Therefore, this study will allow the researcher to investigate the impact of TCTW on teacher self-efficacy.

Perhaps in addressing the research question, other area career centers and teachers might see value in participation. In addition to the overall impact of TCTW, other pertinent areas of study could include the usefulness of the TCTW Key Practices for teachers and the usability of the common professional development themes in TCTW for CTE teachers. An overall picture of these questions may help administrators and teachers determine the feasibility of participation in TCTW for their school.
CHAPTER 2
REVIEW OF RELATED LITERATURE

The Southern Regional Education Board’s (SREB) Technology Centers That Work (TCTW) initiative is derived from the SREB High Schools That Work (HSTW) program. The HSTW program is the largest school improvement program in the nation (Southern Regional Education Board, 2018b). This program has seen a number of schools and educators improve their instructional practices. Due to the success of the HSTW program, SREB created the TCTW initiative in 2007 (Southern Regional Education Board, 2009). The initiative took the principles of HSTW and adjusted them for career and technology shared-time centers. The overall goal and belief of the TCTW initiative is that students can and will succeed in highly rigorous career and technical classes with academic integration if the instructional programs and the school are designed to support that growth and achievement (Southern Regional Education Board, 2009). SREB claims schools and stakeholders will benefit from participation in the TCTW initiative (Southern Regional Education Board, 2009). The exact benefit is specific to the different roles.

It is reasonable to assume student achievement increases by participating in more enriching programs. The TCTW claim that “teachers gain confidence in their abilities to help all students complete challenging studies” (Southern Regional Education Board, 2009, p. 12) is essentially teacher self-efficacy. In determining the relationship between TCTW and teacher self-efficacy, we must first look at teacher efficacy in general.

An Understanding of Teacher Self-Efficacy

Before investigating Missouri CTE teacher self-efficacy, understanding the concept of self-efficacy and why it would be important to a career and technical education (CTE) teachers is important. According to Bandura (1977), “efficacy expectation is the conviction that one can
successfully execute the behavior required to produce the outcomes” (p. 193). Essentially, as efficacy increases, the belief that one can impact the outcome will also increase. Bandura’s (1977) research suggested that by seeing others perform a task with success, a person may also believe that she/he too can perform a similar task with success. Bandura (1977) also suggested that performing a related task successfully increases the likelihood the person will believe they can succeed in a different task. This explains much of education, especially education involving a hands-on or demonstration component. When students see the behavior or action, they are able to replicate it. Bandura (1977) did suggest the outcomes need to be concrete rather than ambiguous for this to be the case. If efficacy does work in the way Bandura’s research suggests, this concept could translate well to educators and educator practice.

In looking at teacher efficacy, Bandura (1997) noted four different sources of efficacy: mastery experiences, vicarious experiences, social persuasion, and physiological and affective states. Each of these sources should be included in any attempts to increase efficacy in general. Tschannen-Moran, Hoy, and Hoy (1998) included the four sources in their initial research on a better instrument and scale to measure teacher efficacy. Yoo’s (2016) research of the impact of professional development on teacher efficacy, pointed out different ways to impact these four sources. The research originally conducted by Bandura has been corroborated many times over by these researchers and others (Tschannen-Moran, Hoy, & Hoy, 1998; Yoo, 2016). Therefore, theoretically, the TCTW standards and practices could also impact the four sources.

**Teacher Self-Efficacy’s Impact on Instruction**

Teacher self-efficacy has long been viewed has having an impact on student success (Kim & Seo, 2018). Some authors have suggested a correlation between self-efficacy and student success due to the willingness of highly efficacious teachers to be open to ideas, try new
strategies, and generally seek to better help their students (Achurra, 2012; Kim & Seo, 2018). Other authors suggested that self-efficacy does not translate into improved performance. Vancouver, Thompson, Tischner, and Putka (2002) investigated two different research studies that seem to support that direction. Through their studies, they suggested there may be a negative relationship between self-efficacy and performance over time (Vancouver et al., 2002). The overall concept behind their premise was that “high self-efficacy led to overconfidence in one’s abilities” (Vancouver et al., 2002, p. 507). Estes (2008) found something similar, that high self-efficacy combined with more years of experience resulted in lower instructional effectiveness. The difference, Estes (2008) noted, was that persons with higher efficacy and experience were more resistant to innovation. While there may be some doubt about the relationship between efficacy and student performance (Beck, 2014; Estes, 2008), that doubt was many times caused by the method of testing student achievement through standardized testing (Estes, 2008). This is of particular importance in the field of career and technical education where the focus is upon student performance rather than student test-taking strategies.

When investigating different measures of testing student achievement and teacher effectiveness, the perception by teachers of their effectiveness may lead to student growth (Beck, 2014). It has also been suggested that when teachers believe they can impact students despite external forces, there is an impact on student growth (Cayirdag, 2017). In fact, Cayirdag (2017) stated that “teachers who got their students to become deeply interested in a subject made the most difference” (p. 1969). It is this kind of interest and success that appears to be the most important in career and technical education.

Part of the reason teacher self-efficacy appears to be important is because it may have a direct impact on instructional practices (Shoulders & Krei, 2015). When students are deeply
interested and engaged due to the teacher’s practices, they will succeed (Cayirdag, 2017; Shouders & Krei, 2015). In addition to instructional practices and engagement, classroom management is a critical component to student success. Both Estes (2008) and Shoulder and Krei (2015) suggested that high self-efficacy among teachers leads to greater classroom management skills. This fits in well with the TCTW goals of improving classroom management, adding to the teaching practices and improving student engagement (Southern Regional Education Board, 2009). This also aligns with other research regarding self-efficacy and teacher knowledge. Wyatt (2016) found there was a relationship between self-efficacy and practical knowledge of the teacher. Wyatt’s (2016) new conceptual model links practical knowledge directly with self-efficacy and shows that as one factor grows, so does the other. In other words, as teachers become more proficient in their craft, they will be more efficacious which leads to greater proficiency in a very cyclical manner.

Kim and Seo (2018) found a similar correlation in relating teacher self-efficacy to student success especially in regards to the areas of instructional strategies and student engagement. This is due to the fact that teachers feel a greater sense of control in these two areas (Kim & Seo, 2018). Classroom management appears to be more linked to the students rather than the teachers. This is an interesting departure from the TCTW model that emphasizes all three (Southern Regional Education Board, 2009).

As the impact that self-efficacy has upon instruction and student success is investigated, research suggests that teachers with a high sense of efficacy are more likely to work toward success believing they will succeed (Vancouver et al., 2002). Wyatt (2016) confirmed this by concluding that self-efficacy was “linked intimately with knowledge growth” (p. 132). Ultimately, if improving student engagement, classroom management, and teaching strategies,
teachers must be assisted in gaining new skills and, thereby, increasing their self-efficacy. This ultimately may impact the teacher’s effectiveness.

Additional research on the impact of self-efficacy over time suggests there is a long-term effect of self-efficacy (Künsting, Neuber, & Lipowsky, 2016). Künsting et al. suggested self-efficacy in teachers seems to remain stable over time (Künsting et al., 2016). This is positive news as it shows an efficacious teacher will likely continue to be so over their tenure as a teacher. This means the impact of self-efficacy could continue impacting students for many years. In addition to the longevity of the self-efficacy, Künsting et al.’s study also found that over a decade of practice, self-efficacious teachers were continuing to grow in terms of teaching strategies, student engagement, and classroom management (Künsting et al., 2016).

**Teacher Self-Efficacy and Professional Development**

The challenge to discover is how this research relates to TCTW. Since TCTW is primarily focused on professional development and implementation of new strategies (Southern Regional Education Board, 2009), it is hypothesized by many that there should be a relationship between teaching skills and efficacy that Wyatt (2016) noted. Related, Estes (2008) stated:

School leaders must be prepared to provide the quality, long-term professional development that will allow teachers to critically reflect on their effectiveness in the classroom. The teacher will then need to be provided with training in the instructional strategies that will meet their needs and improve their instructional effectiveness (p. 100).

Achurra (2012) agreed with this concept in stating teachers “must have the knowledge and skills needed to help students achieve the desired learning outcomes” (p. 376). The knowledge and skills Achurra spoke of may be developed through professional development opportunities. This also aligns with Wyatt’s (2016) statement that for self-efficacy to grow “in relation to the various
dimensions of practical knowledge relevant to any particular task, critical reflection is needed” (p. 128).

In a separate study investigating the impact of professional development on teacher efficacy, Yoo (2016) noted “professional development effort does have a positive effect on teacher efficacy” (p. 91). This applied to both in-person and online professional development. In Yoo’s study, teachers participated in training, using the four sources of self-efficacy: Mastery experiences, vicarious experiences, social persuasion, and physiological and affective states (Bandura, 1997). Yoo’s (2016) study used classroom strategies for those mastery experiences, observation for the vicarious experiences, appropriate feedback for the social persuasion, and coaching for the physiological and affective states.

**Self-Efficacy and Teacher Retention**

Another facet of teacher self-efficacy relates to how long teachers will remain in the classroom. As presented previously, research suggests that those teachers who are highly efficacious will still be so after at least a decade in the classroom (Künsting et al., 2016). In addition to the impact on student learning, there is potential that self-efficacy may have an impact on teacher retention. This is critical to CTE, and shared-time centers specifically, because it can be challenging to find qualified teachers willing to leave industry to move to a classroom.

Pedota (2015) addressed the retention problem in stating some of the reasons teachers leave: Anxiety, frustration, and stress. Those factors alone can be daunting to overcome. Pedota suggested “teachers who exhibit high self-efficacy, and use it in their daily routines with their students, are more likely to have students who achieve and are more likely to remain in the profession” (Pedota, 2015, p. 54). Ware and Kitsantas (2007) supported this same belief with a study that suggested a significant correlation between teacher self-efficacy and commitment to
the profession. Ware and Kitsantas’ (2007) research also suggested a correlation between the collective efficacy of the school and the longevity of the teachers.

**The Impact of PBL and Other TCTW-Style Practices on Teacher Self-Efficacy**

While there was no literature located for this study specifically relating TCTW and teacher self-efficacy, there was literature reviewed that related some of the individual key practices of TCTW to self-efficacy. Mahasneh and Alwan (2018) investigated the impact of project-based learning (PBL) style teaching on the self-efficacy of student teachers. PBL, while implemented in other initiatives, is one of the key practices of TCTW (Southern Regional Education Board, 2009). SREB personnel stated that TCTW schools use PBL to deepen understanding (Southern Regional Education Board, 2009). In addition to deepening student understanding, researchers suggested that PBL appears to have a statistically significant correlation to improved teacher self-efficacy (Mahasneh & Alwan, 2018). Mahasneh and Alwan reported a 22% improvement in instructional strategies and classroom management, 25% increase in student engagement, and a 24% increase between the control and experimental groups. The combined benefits of student growth and improved teacher self-efficacy suggest reasons to implement PBL in the classrooms.

In addition to PBL, Pedota (2015) investigated ten different strategies to promote teacher self-efficacy: Climate of support, high expectations, effective communication, quick response to concerns, greater differentiation, better use of data, deemphasize grades, classroom management skills, parental involvement, and celebrate success. Many of those items are included in the TCTW goals and strategies. Pedota (2015) stated that each of these strategies improves student success and teacher self-efficacy.
The Impact of TCTW on CTE Teacher Self-Efficacy

There was no literature directly related to the impact of TCTW on a CTE teacher’s self-efficacy. Therefore, the problem addressed by the researcher was if participating in the TCTW initiative improves students at the expense of teachers, or does it help teachers feel better about their craft and abilities?

Summary of the Review of Related Literature

Five themes of literature were presented in this review: An Understanding of Teacher Self-Efficacy, Teacher Self-Efficacy’s Impact on Instruction, Teacher Self-Efficacy and Professional Development, Self-Efficacy and Teacher Retention, and the Impact of PBL and Other TCTW-Style Practices on Teacher Self-Efficacy. Based on the literature, one may hypothesize that it appears TCTW involvement will improve teacher self-efficacy, and also student success as participation in the TCTW initiative provides professional development and teaching improvement strategies (Southern Regional Education Board, 2009). Whether or not these professional development offerings impact teacher self-efficacy remains to be seen.
CHAPTER 3
METHODOLOGY

This study was designed to investigate the impact of TCTW participation on the self-efficacy of CTE teachers. This chapter restates the Purpose of the Study, the Research Question, the Hypotheses, while presenting the Population and Sample, the Research Design, the Data Collection Instrument, The Data Collection Methodology, and the Data Analysis Methodology.

Purpose of the Study

After reviewing the literature related to TCTW, the researcher refined the purpose of this research. The purpose of this study was to determine if participation in the TCTW initiative has a positive impact on career and technical education teachers’ self-efficacy. As mentioned, the key practices and goals of TCTW have been shown to improve student learning and achievement. While education strives to help students grow and achieve greater success, what is the balance of students’ growth and the teacher’s self-efficacy? Teaching can be challenging, especially for industry professionals transitioning to the world of career and technical education.

Many Missouri educators and school districts are being encouraged to participate in the TCTW initiative. Therefore, this study attempted to determine the potential impact on educators’ self-efficacy in the realms of student engagement, instructional strategies, and classroom management.

Statement of the Research Question

This project addressed the following research question:

1. What is the impact of the Technology Centers That Work initiative on teacher self-efficacy?
Statement of the Hypotheses

The following hypotheses were presented for this study:

H₁: Participation in TCTW will improve the self-efficacy of CTE teachers.

H₂: Self-efficacy of CTE teachers will increase each year of participation.

H₃: Teaching self-efficacy will increase based upon years of CTE teaching.

H₄: There will be a difference in teaching self-efficacy across teachers from different CTE program content areas.

H₅: Teachers’ experience in TCTW will have an impact on the understanding and implementation of the Key Practices of the TCTW network.

H₆: Teachers’ understanding and implementation of the Key Practices of the TCTW network will increase based upon years of experience in CTE teaching.

H₇: There will be a difference in the understanding and implementation of the Key Practices of the TCTW network based on Teachers’ CTE program content areas.

Population and Sample

As of 2007, there were 57 area career centers in the state of Missouri (Missouri Department of Elementary and Secondary Education, 2007). Based upon a rough estimate of 15 teachers per area career center, it was estimated that approximately 850 CTE teachers would comprise the population of this study.

Based on the estimated population size of 850 CTE teachers, Krejcie and Morgan’s (1970) population and sample size table recommended a normally distributed sample size of 265 Missouri CTE teachers, which would be representative of the estimated population size of 850 CTE teachers. Therefore, the researcher pursued a targeted sample size of 265 (n = 265) based on the estimated population of 850 (N = 850).
**Research Design**

The research component was a mixed-methods design. Fetters, Curry and Creswell (2013) suggest that integrating both the qualitative and quantitative data will enhance the value of the research. The qualitative data provides some contextualized clues related to the quantitative data (Creswell & Garrett, 2008). Additionally, it is suggested that mixed-methods design “offers the best chance to obtain useful answers” (Johnson & Onwuegbuzie, 2004, p. 18).

There are multiple styles of mixed-methods that could be used. A convergent design is one where both the qualitative and quantitative data are collected at the same time (Fetters et al., 2013). This was the design used for this study to allow for data to be collected at one time rather than sequentially. This was done to limit the number of times teachers needed to provide data to the researcher. Additionally, quantitative survey components have a history of being used for determining teacher self-efficacy. The addition of the qualitative data allowed for increased contextualization as discussed by Creswell and Garrett (2008).

**Data Collection Instrument**

The researcher utilized a researcher-modified form of the survey created by Tschannen-Moran and Hoy (Tschannen-Moran & Hoy, 2001). In their study, the authors stated that their survey was “superior to previous measures of teacher efficacy” (Tschannen-Moran & Hoy, 2001, p. 801). In a later study, the authors provided data that suggested their survey predicted teacher self-efficacy with an accuracy rate of 93% (Tschannen-Moran & Hoy, 2007).

Following the research modification of the Tschannen-Moran and Hoy instrument, the data collection instrument was further modified into an electronic survey distributed using Google Forms (see Appendix A). The majority of the survey questions align with the short-form survey created by Tschannen-Moran and Hoy (2001). There were additional questions added to
focus the instrument on this study’s purpose. These questions and the reason for including them are listed in the following section. The majority of these new questions were based upon one or more of the Key Practices or goals of TCTW (Southern Regional Education Board, 2009).

**Modifications to the Data Collection Instrument**

The following modifications were made to the data collection instrument to help address the research focus of this study.

**TCTW Key Practice related questions that were added to the survey.** While these questions are numbered in this section for reference, they were not numbered on the actual online survey.

1. How good are you at setting consistent high standards?
2. How well can you teach your students industry related math and communication?
3. How good are you at creating challenging and relevant assignments?
4. How real-world are your projects?
5. How often do your projects involve critical thinking skills?
6. Where do you feel you need the most training? (This question was used to gain an understanding of the various needs of teachers and allow comparison of these needs to what is provided by TCTW.)
7. How would that additional training help you as an instructor? (This question allowed for a qualitative look at the interest in training among CTE teachers. It allowed for further comparison between the standards espoused by TCTW and the personalized needs of CTE teachers.)
8. What does “high expectations” mean to you? (This question helped provide a qualitative analysis of expectations between the different Missouri area career centers).
The following three questions were added to collect demographic data:

9. Years in TCTW Participation (The selected-response options were none, 1-2, 3-5, and 6+ years. These options were selected due to the five-year time frame of the Missouri DESE TCTW grant.) (Missouri Department of Elementary and Secondary Education, 2018).

10. Years in CTE Teaching (The options were 1-3, 4-8, and 9 or more. These options were selected because Tschannen-Moran and Hoy (2007) used a 1-3 year qualifier for new teachers and 4 or more years for experienced teachers. To ensure similar reliability to their study, a match of Tschannen-Moran and Hoy’s (2007) novice teacher with further break down of career teachers was selected.)

11. CTE Program Area (The category options were Business/Marketing, Health Sciences, Automotive, Construction/Architecture, Project Lead The Way®, Graphics/Printing, Computer Specific, Agriculture, Culinary/Hospitality, Welding, Humans Services/Education, and Other.

Data Collection Methodology

After obtaining IRB approval (see Appendix B), an email with the project’s consent form and link to the survey and was sent to area career center directors on October 7, 2018 at 12:30 pm, and was designed to be available through October 18, 2018. The intent was to provide teachers with the survey during the month of October with a return date of 7-10 days after the initial distribution.

The research participant’s emails were based on the Missouri Council of Career and Technical Administrators (MCCTA) email list. MCCTA is an association of career and technical administrators, which included area career center directors. It was assumed that every area career center director was a member of MCCTA at the time of this research.
In the email, CTE area career center directors were requested to disseminate the email to their teachers (see Appendix C). Staff members were reminded that the data were totally anonymous and would have no bearing on their contract status in any way. The first question was the informed consent agreement (see Appendix D). For those directors and participants who were interested in seeing the final combined data set, they will be given the opportunity to request a copy of the data. The survey link provided in the email redirected the participants to a Google Form so that anonymity and confidentiality could be assured and to automatically have the data populated in a spreadsheet for later data analysis. The survey was designed to take no more than 5-10 minutes of the teacher’s time.

A reminder email was sent on October 11, 2018, four days after the initial email. A second reminder was sent on October 17, 2018, six days later after the first reminder email. The survey closed on October 18, 2018, with a total of 112 research participants responding.

The literature varies on the response rate of online versus paper surveys. Response rates reported in literature were between 24% and 54% (Dommeyer et al., 2004; Hohwü et al., 2013; Madariaga et al., 2017; Nulty, 2008). Based upon that literature, the targeted response rate for this study was 30-40%. Nulty did suggest some options to help improve the response rate. These included, but were not limited to, providing the link in the e-mail, providing reminders, assurance of anonymity, and keeping the survey brief (2008). Consistent with Nulty’s recommendations, the survey instrument used in this study was anonymous and relatively short, and the electronic link was provided in the initial e-mail. Based upon the expected response rate of 30-40%, the participant sample size would have needed to be 255-340 teachers. However, the total response rate was 14% (n = 112).
**Data Analysis Methodology**

At the conclusion of the survey window, the data were then available in a Google Sheet to allow for initial data sorting and preliminary data analysis. These data were kept confidential as they were to be stored in an online system with password-protected access.

The data were analyzed by the demographical categories. The categories included three different ranges for years of participation in TCTW (none, 1-2 years, 3-5, and 6 or more) and three different ranges for teacher years of experience (1-3 years, 4-8 years, and 9 or more). The scale questions were used to determine self-efficacy levels and TCTW acceptance or buy-in. The self-efficacy questions were analyzed first by the whole scale and then broken into the three subscales of: classroom management (items 1, 6, 7, and 8), teaching strategies (items 5, 9, 10, and 12) and engagement (items 2, 3, 4, and 11). The data for teaching strategies and student engagement were items of special interest as those are focus items for TCTW (Southern Regional Education Board, 2009).

An analysis of variance (ANOVA) was completed for the self-efficacy data. In addition to the self-efficacy data, a similar analysis was conducted on the TCTW-specific questions. These data elements were compared to one another to determine if there was an impact from TCTW and what that impact might be. An *a priori* alpha level of 0.05 was established for the data analysis (*α* = .05).

The short answer questions were analyzed and compared across the demographic groupings. Responses were analyzed for themes based upon the different demographic categories and self-efficacy sub-categories. While the exact structure of the survey did not match what Boeije (2002) used, the steps of this analysis were similar: Comparison in the individual
response, comparison between similar demographics, and comparison between dissimilar demographics.

Summary

The purpose of this chapter was to provide an overview of the research methodology. The researcher restated the Purpose of the Study, the Research Question, and the Hypotheses. In addition, the researcher presented the Population and Sample which included an estimate of the population size as well as references to how the sample size was selected, and the Research Design, which included literature support of why a mixed method approach was chosen. In addition, the author provided information on the Data Collection Instrument, Modifications to the Data Collection Instrument, the Data Collection Methodology, and an overview of the Data Analysis.
CHAPTER 4
RESULTS

This study was designed to investigate the impact of TCTW participation on the self-efficacy of CTE teachers. This chapter presents the data and analysis of those data in the following sections: Demographic Results, Self-Efficacy Data Analysis Rating Scale Explanation, Self-Efficacy Based on Years in TCTW, Self-Efficacy Based on Years of CTE Teaching Experience, Self-Efficacy Based on CTE Content Area, TCTW Related Questions Based on Years of TCTW Experience, TCTW Related Questions Based on Years of CTE Experience, TCTW Related Questions Based on CTE Content Area, and Qualitative Data.

Demographic Results

Of the 112 total research participants who originally agreed to participate in this study, two of the participants declined to complete the survey. Therefore, those responses were not included in the tabulation of data. Additionally, four of the participants did not answer all of the questions, so those responses were not included in the statistical analysis calculations but were included in the demographic data.

The research participants were asked to share their experience in TCTW, their years of CTE teaching experience, and their CTE program area. All of these questions were optional. Only seven of the participants did not provide a CTE program area. There were some content areas provided by the research participants that were combined into a broader category. For example, one participant provided “auto collision” as the CTE content area, and the researcher placed this respondent and the associated data with the “Automotive” group. Three research participants did not provide their experience with TCTW. Therefore, those data were included with the response group that had “no TCTW experience.” Only one research participant did not
provide their years of experience. Therefore, those data were included with the “9 years or more” category.

Over 50% of the research participants indicated they had nine or more years of CTE experience. The remainder of the research participants provided data that suggested they were almost evenly divided between early career CTE teachers (one to three years experience) and mid-career teachers (four to eight years experience). Thirty-seven of the research participants (34%) indicated they had no experience with TCTW. Construction / Architecture teachers were the most represented with 13% of the research participants identifying as teaching in that program area. Automotive and Agriculture teachers were the next most prevalent CTE content areas with 10% and 11% identifying in those areas, respectively. Participant responses indicated that Cosmetology, Culinary/Hospitality, and Manufacturing teachers made up a very small percentage of research participants, with only one or two participants identifying with those CTE program areas (see Table 1).

**Self-Efficacy Data Rating Scale and Analysis Explanation**

The data were analyzed based on the total scale first, and it was anticipated the three subscales of teacher self-efficacy (student engagement, instructional strategies, and classroom management) would be analyzed. The rating scale used a nine-point rating scale (1 = Nothing, 9 = A Great Deal).

**Self-Efficacy Based on Years in TCTW**

A one-way ANOVA was conducted on the self-efficacy ratings of the respondents across years of TCTW experience. The original hypothesis predicted a change in self-efficacy based upon TCTW experience. The results failed to support this prediction (F = .470, df = 3/102, p >
.05, \( \eta^2 = .014 \)), Since there was no significance across the grouping, no further follow up data analyses were conducted.

Table 1

Demographic Characteristics of Participants (n = 110)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of CTE Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 – 3 Years</td>
<td>23</td>
<td>21</td>
</tr>
<tr>
<td>4 – 8 Years</td>
<td>30</td>
<td>27</td>
</tr>
<tr>
<td>9 or More Years</td>
<td>57</td>
<td>52</td>
</tr>
<tr>
<td>Years of TCTW Participation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2 Years</td>
<td>28</td>
<td>25</td>
</tr>
<tr>
<td>3-5 Years</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>6 or More Years</td>
<td>24</td>
<td>22</td>
</tr>
<tr>
<td>No Experience or Unknown</td>
<td>37</td>
<td>34</td>
</tr>
<tr>
<td>CTE Program Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Alternative Education/Basic Skills</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Automotive</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Business/Marketing</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Computer Specific</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Construction/Architecture</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Cosmetology</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Criminal Justice</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Culinary/Hospitality</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Graphics/Printing</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Human Services/Education</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Project Lead The Way</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Public Safety</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Welding</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>None Selected</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

Self-Efficacy Based on Years in CTE Teaching

A one-way Analysis of Variance (ANOVA) was also conducted on the self-efficacy ratings of the research participants across years of CTE experience. The original hypothesis
predicted a change in self-efficacy based upon CTE experience. The results of the analysis of variance did not support that prediction \((F = 2.396, df = 2/103, p > .05, \eta^2 = .044)\). Since there were no statistically significant findings across the variables, no additional statistical analyses were conducted in this area.

**Self-Efficacy Based on CTE Content Area**

A one-way Analysis of Variance (ANOVA) was conducted on the self-efficacy ratings of the respondents across content areas. As with TCTW and CTE experience, the original hypothesis was there would be a change in self-efficacy beliefs based upon the content area of the teacher. The results of the analysis of variance did not support the hypothesis \((F (15/89) = .737, p > .05, \eta^2 = .117)\). Since there were no statistically significant findings across the variables, no additional statistical analyses were conducted in this area.

**TCTW Related Questions Based on Years of TCTW Experience**

The responses to each of the five TCTW related questions were then compared across years of experience. The questions were:

1. How good are you at setting consistent high standards?
2. How well can you teach your students industry related math and communication?
3. How good are you at creating challenging and relevant assignments?
4. How real-world are your projects?
5. How often do your projects involve critical thinking skills?

The original hypothesis predicted that years in TCTW would impact the belief and understanding of the TCTW Key Practices. The ANOVA failed to find statistical significance for questions one – four \((p = .715; p = .409; p = .310; p = .399)\). Question 5, which was related to critical thinking skills in projects did suggest statistical significance \((p = .044; \text{See Table 2})\). A
follow-up analysis on question five failed to suggest any additional statistical significance ($p > .05$). Some of the examples of critical thinking projects from the survey short answer questions included developing blueprints and using them to complete a welding project, creation of lesson plans, designing and constructing automated factory machinery and diagnosing and repairing engines. Those responses showed how the teachers were implementing the TCTW Key Practices.

Table 2

Data Analysis of TCTW Related Questions Based on Years of TCTW Experience

<table>
<thead>
<tr>
<th>Question</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>F</th>
<th>df</th>
<th>p</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>109</td>
<td>7.67</td>
<td>1.248</td>
<td>.540</td>
<td>3/105</td>
<td>.715</td>
<td>.015</td>
</tr>
<tr>
<td>2</td>
<td>110</td>
<td>7.33</td>
<td>1.491</td>
<td>.968</td>
<td>3/106</td>
<td>.409</td>
<td>.027</td>
</tr>
<tr>
<td>3</td>
<td>110</td>
<td>7.58</td>
<td>1.176</td>
<td>1.283</td>
<td>3/106</td>
<td>.310</td>
<td>.035</td>
</tr>
<tr>
<td>4</td>
<td>109</td>
<td>8.21</td>
<td>1.019</td>
<td>1.649</td>
<td>3/105</td>
<td>.399</td>
<td>.045</td>
</tr>
<tr>
<td>5</td>
<td>110</td>
<td>7.90</td>
<td>1.180</td>
<td>1.393</td>
<td>3/106</td>
<td>.044*</td>
<td>.038</td>
</tr>
</tbody>
</table>

* = Statistically significant at the a priori level of $\alpha = .05$

TCTW Related Questions Based on Years of CTE Teaching Experience

Similar tests were conducted on the five additional question responses based upon years of experience in CTE (Table 3). In each case, the ANOVA did not show any significance for questions 2 - 5 ($p = .580; p = .677; p = .648; p = .883$). Question one, which was related to setting high standards was approaching statistical significance ($p = .067$).

Table 3

Data Analysis of TCTW Related Questions Based on Years of CTE Experience

<table>
<thead>
<tr>
<th>Question</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>F</th>
<th>df</th>
<th>p</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>109</td>
<td>7.67</td>
<td>1.248</td>
<td>4.123</td>
<td>2/106</td>
<td>.067</td>
<td>.072</td>
</tr>
<tr>
<td>2</td>
<td>110</td>
<td>7.33</td>
<td>1.491</td>
<td>2.184</td>
<td>2/107</td>
<td>.580</td>
<td>.039</td>
</tr>
<tr>
<td>3</td>
<td>110</td>
<td>7.58</td>
<td>1.176</td>
<td>.178</td>
<td>2/107</td>
<td>.677</td>
<td>.003</td>
</tr>
<tr>
<td>4</td>
<td>109</td>
<td>8.21</td>
<td>1.019</td>
<td>.034</td>
<td>2/106</td>
<td>.648</td>
<td>.001</td>
</tr>
<tr>
<td>5</td>
<td>110</td>
<td>7.90</td>
<td>1.180</td>
<td>.264</td>
<td>2/107</td>
<td>.883</td>
<td>.005</td>
</tr>
</tbody>
</table>

* = Statistically significant at the a priori level of $\alpha = .05$
TCTW Related Questions Based on CTE Content Area

A one-way analysis of variance (ANOVA) was conducted on the five additional question responses based upon the content area (Table 4). In this case, questions 1, 2, 3, and 5 were not significant ($p = .145; p = .202; p = .962; p = .096$). The results on question four, “how real-world are your projects?” were statistically significant ($p = .035$). A follow-up analysis on question four failed to suggest any additional statistical significance ($p > .05$), which was not reported based on sample size.

Table 4

Data Analysis of TCTW Related Questions Based on CTE Content Area

<table>
<thead>
<tr>
<th>Question</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>F</th>
<th>df</th>
<th>p</th>
<th>$\eta^2$</th>
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<tbody>
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<td>7.67</td>
<td>1.248</td>
<td>.930</td>
<td>15/92</td>
<td>.145</td>
<td>.139</td>
</tr>
<tr>
<td>2</td>
<td>110</td>
<td>7.33</td>
<td>1.491</td>
<td>1.633</td>
<td>15/93</td>
<td>.202</td>
<td>.219</td>
</tr>
<tr>
<td>3</td>
<td>110</td>
<td>7.58</td>
<td>1.176</td>
<td>.520</td>
<td>15/93</td>
<td>.962</td>
<td>.082</td>
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<tr>
<td>4</td>
<td>109</td>
<td>8.21</td>
<td>1.019</td>
<td>1.036</td>
<td>15/92</td>
<td>.035**</td>
<td>.153</td>
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<tr>
<td>5</td>
<td>110</td>
<td>7.90</td>
<td>1.180</td>
<td>.762</td>
<td>15/93</td>
<td>.096</td>
<td>.116</td>
</tr>
</tbody>
</table>

** = Statistically significant at the $a$ priori level of $\alpha = .05$; Follow up analysis was not reported due to small sample size

Qualitative Data Analysis

In addition to the quantitative data collected and analyzed, research participants were asked to provide different examples of projects and explain, in their own words, some of the key practices and attitudes of the TCTW network. These included critical thinking lessons, real world lessons, areas of desired training, and setting / meeting high expectations.

With regards to setting / meeting high expectations, 39% of the research participants stated high expectations was defined as “achieving more than one thinks they can.” 33% of the participants related high expectations to job readiness or meeting industry standards.

Participation in TCTW did not appear to have an impact on this area of high expectations. One
research participant wrote “To me, high expectations is beyond competency. They need to be comfortable and knowledgeable to the point they can lead or teach the topic. This is what is expected of high quality employees.” On a similar note, another research participant wrote “Setting the bar for students to achieve and holding them accountable for their actions that either help them or hurt them from reaching that goal.” Again, this is an example of work ready skills. One of the more intriguing responses was simply “productive struggle,” which may also be clarified as the concept of pushing oneself beyond what they believe they are capable of performing.

In investigating the qualitative data that addressed the types of training needed and how it would impact their classrooms and instruction time, the responses were based mostly around classroom management, job related skills, assessment, academic integration, project-based learning, teaching strategies, and technology. These qualitative data were consistent among most research participants, which provided little differentiation based upon TCTW participation. One interesting pattern was that experienced teachers with nine or more years of experience, provided the most negative comments regarding any type of additional training (n = 3). One of these research participants stated, “Too much instruction overloads teachers.” The most negative item in that group was a request for instruction on how to navigate the Missouri Department of Elementary and Secondary Education (DESE) website. These two comments were in contrast with another research participant’s desire and request to learn “anything” because it would make them a better teacher. Conversely, there were no negative comments regarding additional training from any other teacher experience category.

Regarding research participants’ views on real world projects and projects that require critical thinking skills, all but three participants had similar responses in both categories. The real
world projects were related to the projects that required critical thinking. This was, again, not dependent upon TCTW participation. There was very little differentiation in these areas in years of CTE teaching. There were a number of very interesting projects that ranged from managing and running a business to building a house to building a solar powered vehicle.

**Summary**

The purpose of this chapter was to provide the data and analysis of those data. The analysis included quantitative data analysis for CTE teacher self-efficacy related to years in the TCTW network, CTE content area, years the area career center was in the TCTW network, CTE teaching experience, and their CTE content area. Additional qualitative analysis was also presented.
CHAPTER 5
DISCUSSION

This study was designed to investigate the impact of TCTW participation on the self-efficacy of CTE teachers. This chapter presents the discussion of this research in the following sections: Findings, Conclusions, Discussion, Implications, Recommendations and Areas of Future Study, and Summary.

Findings

The original hypotheses suggested that participation in the TCTW network, years of CTE teaching experiences, and teaching in a specific CTE program content area would have an impact on teacher self-efficacy. However, teacher self-efficacy in all three areas was not impacted by teachers in a TCTW career center.

The original hypotheses also suggested that each of these three characteristics of teacher self-efficacy would impact understanding and implementation of some of the TCTW Key Practices. However, the data suggested that participation in a TCTW career center only impacted teacher self-efficacy related to using student projects incorporating critical thinking skills. In addition, CTE program content areas included one researched variable (incorporating real-world project) that suggested an increase in teacher self-efficacy, while years of CTE teaching experience did not appear to increase a teacher’s self-efficacy.

Specific to the original seven research hypotheses and based on the data collected and analyzed, the following findings are presented:

1. Participation in TCTW did not improve the self-efficacy of CTE teachers.

2. Self-efficacy of CTE teachers did not increase with each year of TCTW participation.
3. Teaching self-efficacy did not increase based upon teachers’ years of CTE teaching.

4. There was a difference in teaching self-efficacy across teachers from different CTE program content areas related to teachers incorporating real-world projects.

5. Teachers’ experience in TCTW did have an impact on the understanding and implementation of the Key Practices of the TCTW network when related to teachers using critical thinking strategies.

6. Teachers’ understanding and implementation of the Key Practices of the TCTW network did not increase based upon years of experience in CTE teaching.

7. There was a difference in the understanding and implementation of the Key Practices of the TCTW network based on Teachers’ CTE program content areas.

Conclusion

Based on the data collected and analyzed to address this study’s research question “What is the impact of the Technology Centers That Work initiative on teacher self-efficacy?” the following conclusion is presented:

1. While data from this study suggest the TCTW program has limited impact on CTE teachers’ self-efficacy, there are other benefits to the TCTW program, including developing students’ critical thinking skills, meaningful teacher professional development activities, and encouraging real-world projects to increase student learning.

Discussion

When investigating the study’s quantitative data, the data suggest that participating in a TCTW career center has very little impact on the level of self-efficacy in CTE teachers. Teaching and participating in a TCTW career center does not appear to increase or decrease the
level of self-efficacy in the CTE teachers who teach there. In general, teachers who participated in this research reported an initial reasonably high level of self-efficacy with a mean self-efficacy score of 84.66. This mean self-efficacy level did not vary much after the teachers gained more years in CTE teaching experience. Participation in the TCTW network (teaching in a TCTW career center) also did not increase those teachers’ self-efficacy.

Participation in the TCTW network also did not appear to impact the understanding and implementation of some of the key practices of TCTW. The only exception to this was the understanding and ability to creating projects that involve a level of critical thinking. This related to project-based learning as one of the Key Practices of TCTW. Even if the teacher was not implementing project-based learning in the classroom, an increase in the ability to create critical thinking-based lessons and projects is good for the students’ success.

The research participants’ qualitative data provided insight into teachers requiring different levels of critical thinking projects. Some of the projects included “building ‘tiny homes’ so ‘problem avoiding’ before problems arise,” “trauma assessments,” creation of lesson plans for elementary students, and planning and constructing different machines and structures. The other significant finding was that CTE program content areas appeared to impact the ability to create real-world projects.

Assuming that the research-based strategies taught and encouraged in the TCTW professional development sessions are helping increase student achievement, the non-impact of TCTW on the teachers in those same areas would suggest these professional development activities are helping increase student achievement. This suggests that participation in the TCTW network, while maybe not having any significant impact on teacher self-efficacy, does provide the tools needed to help teachers help their students’ achievement.
Perhaps the greatest reason for implementing TCTW in an area career center is not the impact or lack thereof on self-efficacy, but the meeting of training needs of teachers. TCTW seeks to help schools integrate academics, improved career skills, and to help teachers assess and teach these skills (Southern Regional Education Board, 2009). The additional instruction that CTE teachers need (regardless of their years of experience) and TCTW participation in those areas that TCTW seeks to provide. For career center professional development planning, TCTW appears to provide all of the necessary resources for quality professional development that meet the needs of CTE teachers in Missouri.

**Implications**

Overall, participation in the TCTW network does not appear to positively or negatively impact self-efficacy. An additional question to be addressed is whether or not participation in the TCTW network is worth the time and effort required. In reviewing the qualitative data, one may assume that participating in the TCTW network will provide a significant benefit to the area career center in terms of professional development planning. As researched previously, professional development can have an impact on teaching ability, teacher efficacy, and student achievement (Achurra, 2012; Estes, 2008; Yoo, 2016; Wyatt, 2016). The needs that this study’s research participants (teachers) expressed in the survey align with what the TCTW network provides.

This does not mean, however, that administrators will necessarily experience a dramatic increase in the self-efficacy of their teachers in the school district joins the TCTW network. There may be some improvement in self-efficacy, but that could be more in relation to professional development offerings (Achurra, 2012; Estes, 2008; Yoo, 2016; Wyatt, 2016) than to participation in the TCTW network. Overall, the benefit of participating in the TCTW network
to provide an understanding and implementation of projects using critical thinking skills and the alignment between teacher needs and TCTW offerings may be worth investigating.

**Recommendations and Areas for Future Study**

Based on the successful completion of this study, the researcher makes the following recommendations related to CTE career centers participating in the TCTW network:

1. CTE career centers should consider investigating the TCTW network. While this study’s data didn’t fully support increased teacher self-efficacy for TCTW teachers, an increased focus on real-world projects and incorporating more student critical thinking skills may be a benefit.

2. CTE career centers should consider investigating the TCTW network to possibly increase and improve their local professional development opportunities as well as taking advantage of the TTVTW national professional development opportunities.

In addition to the above TCTW-specific recommendations, the researcher makes the following recommendations for future research related to the TCTW:

1. The first area for future study is to attempt to improve the survey participation rate. With only 110 valid responses, this is roughly 13% of the CTE teachers in Missouri area career centers based on the research-calculated population size.

2. Rather than relying on career center directors to share the survey with their CTE staff members, participation rate could improve if the surveys were sent directly to CTE teachers.

3. Future studies could include replicating this research at the national level. This may allow for a better comparison of self-efficacy and TCTW goals from a wider population.

4. An increased sample size could provide additional research participants, thus comparing the different CTE program areas. In this study, only one culinary/hospitality teacher
responded, which did not allow appropriate representation from each content area for statistical comparison.

5. A further refinement of the survey instrument could also improve future results. The two questions relating to examples of lessons allowed for some teachers to provide examples outside of their program area. For example, a construction teacher responded with “calculating distance a tire rotates when changing sizes” as an example of a critical thinking problem. While this might have been critical thinking, it was not necessarily critical thinking in that teacher’s program area.

6. One final area of additional study would be to also survey non-CTE teachers with the same survey. This would allow for a comparison between the two groups and see exactly how self-efficacy may be impacted by different certification and training requirements.

7. The long-term impact of TCTW participation could also be an area for further investigation. This study examined TCTW participation into 1-2 years, 3-5 years, and 6 or more years which correlated to a Missouri grant cycle. It may be beneficial to further subdivide the “6 or more year” category to investigate any long-term impact of the TCTW network. In addition to examining the long-term impacts of TCTW network participation, it could also be beneficial to conduct a pre-involvement and post-involvement comparison of TCTW participation in different schools.

8. Perhaps one of the most intriguing areas of further study could be investigate self-efficacy in general among CTE teachers. One question that could be addressed is whether or not self-efficacy is a construct that matters in CTE.

9. Potentially revising the self-efficacy instrument to cater to CTE teachers could provide additional data. The standard self-efficacy survey, in many cases, asks how much impact
the CTE teacher feels they can have as opposed to how well they can perform. These are two very different questions. By changing or adding questions, a comparison of different motivational factors for CTE teachers could be performed.

**Summary**

TCTW participation may impact student achievement. In fact, it is likely to do so as teaching strategies and other skills are improved upon. That is the greatest benefit of participation in the TCTW network. The professional development needs of the teachers can be met through the professional development focuses of the TCTW network. Participation does not appear to have a major impact upon the self-efficacy of the teachers, but that does not mean that participation would be bad for the school. It simply means that participation improves teaching in different ways.
REFERENCES


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CTE Teachers and the Classroom

You are invited to participate in a web-based online survey on teacher self-efficacy and Technology Centers That Work. You do not have to be part of the TCTW network to participate in this survey. This is a research project being conducted by Martin Hanley, a student at the University of Central Missouri. It should take approximately 5 minutes to complete.

PARTICIPATION
Your participation in this survey is voluntary. You may refuse to take part in the research or exit the survey at any time without penalty. You are free to decline to answer any particular question you do not wish to answer for any reason.

BENEFITS
You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about teacher self-efficacy and different instructional practices.

RISKS
There are no foreseeable risks involved in participating in this study other than those encountered in day-to-day life.

CONFIDENTIALITY
Your survey answers will be sent to a link at in a Google Sheet where data will be stored in a password protected electronic format. This survey does not collect identifying information such as your name, email address, or IP address. Therefore, your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study.

CONTACT
If you have questions at any time about the study or the procedures, you may contact my research supervisor, Dr. Michelle Conrad via phone at 660-543-4332 or via email at mconrad@ucmo.edu.
you feel you have not been treated according to the descriptions in this form, or that your rights as a participant in research have not been honored during the course of this project, or you have any questions, concerns, or complaints that you wish to address to someone other than the investigator, you may contact Office of Sponsored Programs & Research Integrity, University of Central Missouri, Administration Building, Suite 315, Warrensburg, MO 64093 or via email at researchreview@ucmo.edu.

ELECTRONIC CONSENT: Please select your choice below. You may print a copy of this consent form for your records. Selecting the "Agree" option and pressing "Next" indicates that
\- You have read the above information
\- You voluntarily agree to participate
\- You are 18 years of age or older

* Required

* 

- Agree

- Decline

NEXT

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Survey Questions - Please be honest

This survey is designed to help us understand the different challenges CTE teachers face in their roles as educators. Please indicate your opinion about each of the statements below. Your answers are confidential.

Survey based upon survey created by Megan Tschannen-Moran and Anita Woolfolk Hoy. Items with an * were not on the original survey.

How much can you do to control behavior in the classroom?

1 2 3 4 5 6 7 8 9

Nothing ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ A Great Deal
How much can you do to motivate your students?
1 2 3 4 5 6 7 8 9
Nothing  ○ ○ ○ ○ ○ ○ ○ ○ ○ A Great Deal

How much can you do to help students believe they can succeed in school?
1 2 3 4 5 6 7 8 9
Nothing  ○ ○ ○ ○ ○ ○ ○ ○ ○ A Great Deal

How much can you do to help your students value learning?
1 2 3 4 5 6 7 8 9
Nothing  ○ ○ ○ ○ ○ ○ ○ ○ ○ A Great Deal

Do you create good questions to help your students learn and grow?
1 2 3 4 5 6 7 8 9
Nothing  ○ ○ ○ ○ ○ ○ ○ ○ ○ A Great Deal
How much can you do to get your students to follow classroom rules?

1 2 3 4 5 6 7 8 9

Nothing ○ ○ ○ ○ ○ ○ ○ ○ ○ A Great Deal

How much can you do to calm disruptive students?

1 2 3 4 5 6 7 8 9

Nothing ○ ○ ○ ○ ○ ○ ○ ○ ○ A Great Deal

How well can you establish classroom management systems?

1 2 3 4 5 6 7 8 9

Nothing ○ ○ ○ ○ ○ ○ ○ ○ ○ A Great Deal

How well do you use a variety of assessment styles and techniques?

1 2 3 4 5 6 7 8 9

Nothing ○ ○ ○ ○ ○ ○ ○ ○ ○ A Great Deal
<table>
<thead>
<tr>
<th>Question</th>
<th>Scale</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>How well can you re-teach or explain concepts in a different way?</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>A Great Deal</td>
</tr>
<tr>
<td>How much can you assist families in helping their students who struggle in class?</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>A Great Deal</td>
</tr>
<tr>
<td>How well can you implement alternative methods in your class?</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>A Great Deal</td>
</tr>
<tr>
<td>How good are you at setting consistent high standards? (*)</td>
<td>1 2 3 4 5 6 7 8 9</td>
<td>A Great Deal</td>
</tr>
</tbody>
</table>
How well can you teach your students industry related math and communication? (*)

1 2 3 4 5 6 7 8 9
Nothing 〇 〇 〇 〇 〇 〇 〇 〇 〇  A Great Deal

How good are you at creating challenging and relevant assignments? (*)

1 2 3 4 5 6 7 8 9
Nothing 〇 〇 〇 〇 〇 〇 〇 〇 〇  A Great Deal

How real-world are your projects? (*)

1 2 3 4 5 6 7 8 9
Nothing 〇 〇 〇 〇 〇 〇 〇 〇 〇  A Great Deal

How often do your projects involve critical thinking skills? (*)

1 2 3 4 5 6 7 8 9
Nothing 〇 〇 〇 〇 〇 〇 〇 〇 〇  A Great Deal
CTE Teachers and the Classroom

Short Answer

Please answer these questions in regards to your role as an instructor rather than any other responsibility you may have.

Please provide one example of a project that involves critical thinking skills

Your answer

Please provide one example of a real-world project

Your answer

In what topic/skill do you need more training?

Your answer
How would that additional instruction help you as an instructor?

Your answer

What does "high expectations" mean to you?

Your answer

Back  Next

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Demographics

This section will just help us to organize the data.

Years of TCTW Participation

- None
- 1-2
- 3-5
- 6+
Years in CTE Teaching

- 1-3
- 4-8
- 9 or more

CTE Content Area

- Business/Marketing
- Health Sciences
- Automotive
- Construction/Architecture
- Project Lead The Way
- Graphics/Printing
- Computer Specific
- Agriculture
- Culinary/Hospitality
- Welding
- Human Services/Education
- Other:
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Thank you .. Please press submit to close the survey

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Your response has been recorded.

Submit another response

Your project has been approved by the Human Subjects Review Committee

1 message

UCM Research Review <researchreview@ucmo.edu>    Fri, Oct 5, 2018 at 10:53 AM
To: mph37380@ucmo.edu
Cc: mconrad@ucmo.edu

Dear Martin Hanley:

Your project 'TCTW: The Impact on Teacher Self-Efficacy' has been approved by the Human Subjects Review Committee. Please see the attachment for important guidelines.

Hanley_aVtrFSTDzp.docx
708K
Exempt Review  
10/5/2018  
Protocol Number: 1223  

Dear Martin Hanley:  

Your research project, 'TCTW: The Impact on Teacher Self-Efficacy', was approved by the University of Central Missouri Human Subjects Review Committee on 10/4/2018.  

**If an adverse event (such as harm to a research participant) occurs during your project, you must IMMEDIATELY stop the research unless stopping the research would cause more harm to the participant.** If an adverse event occurs during your project, notify the committee IMMEDIATELY at researchreview@ucmo.edu.  

The following will help to guide you. Please refer to this letter often during your project.  

- If you wish to make changes to your study, submit an “Amendment” through Blackboard under the “Amendment and Renewals” tab. **You may not implement changes to your study without prior approval of the UCM Human Subjects Review Committee.**  

- If the nature or status of the risks of participating in this research project change, submit an “Amendment” through Blackboard under the “Amendment and Renewals” tab. **You may not implement changes to your study without prior approval of the UCM Human Subjects Review Committee.**  

- When you have completed your collection of data, please submit the “Final Report” found on Blackboard under the “Final/Renewal Report” tab.  

If your protocol contained a consent form and the consent form was approved, you will receive an additional e-mail. The e-mail will contain a copy of your consent form with an approval stamp in the top right corner. Do not begin data collection until you receive a copy of your consent form with an approval stamp. Note: One year after your protocol's approval date, a request for renewal OR a final project report is required.  

If you have any questions, please feel free to contact me at researchreview@ucmo.edu.  

Sincerely,  

Kathy Schnakenberg  
Program Administrator/Research Compliance Officer  
Office of Sponsored Programs & Research Integrity  
University of Central Missouri  
cc: mconrad@ucmo.edu  

Equal Education and Employment Opportunity
My name is Martin Hanley, and I am the Director at Pike-Lincoln Technical Center in Eolia, MO. During the 2017-2018 school year, Pike-Lincoln became part of the SREB TCTW Network. At the same time, I needed to complete my Educational Specialist through the University of Central Missouri with a thesis project. Because of the interest in TCTW at the DESE level, looking at the impact of TCTW on our teachers seemed like a perfect topic for my thesis. I decided to look at teacher efficacy and the impact of TCTW on that. I have created a simple survey to gather the data to see the impact. Even if you are not part of the HSTW/TCTW network, the data that your staff members can provide is valuable as I look at the comparison between TCTW affiliated schools and non-TCTW affiliated schools.

If you could please share the survey link below with your staff, I would greatly appreciate it. The link will take them to a completely anonymous survey where they will be asked 17 Likert Scale questions, 5 short answer questions, and 3 demographic questions. The questions are related to how they feel about their practice of teaching in three areas: classroom management, instructional strategies and student engagement. This survey should take no more than five minutes to complete.

The survey is completely confidential and optional. The more respondents that I have, however, the better the data analysis will be. After I have completed the data analysis, I will be more than happy to share the data and the results with you and/or your staff.
To help ensure the timeliness of this project, I would like to have all responses in the next seven days.

The link to the survey is: https://tinyurl.com/CTESurveyHanley

Thank you for your participation,

Martin Hanley
Director, Pike-Lincoln Technical Center
Dear Martin Hanley:

The consent form for your project 'TCTW: The Impact on Teacher Self-Efficacy' has been approved by the Human Subjects Review Committee. Please see the attachment.

Hanley_Bc1k5fCGZV.pdf
164K
CTE Teachers and the Classroom

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CONTACT
If you have questions at any time about the study or the procedures, you may contact my research supervisor, Dr. Michelle Conrad via phone at 660-543-4332 or via email at moonrad@ucmo.edu. If

https://docs.google.com/forms/d/e/1FAIpQLSdQiy3Zjy9ogpCvCW9m6zZ/t/uc9o0Td0MvHqIyVViewform
CTE Teachers and the Classroom

you feel you have not been treated according to the descriptions in this form, or that your rights as a participant in research have not been honored during the course of this project, or you have any questions, concerns, or complaints that you wish to address to someone other than the investigator, you may contact Office of Sponsored Programs & Research Integrity, University of Central Missouri, Administration Building, Suite 315, Warrensburg, MO 64093 or via email at researchreview@ucmo.edu.

ELECTRONIC CONSENT: Please select your choice below. You may print a copy of this consent form for your records. Selecting the "Agree" option and pressing "Next" indicates that
• You have read the above information
• You voluntarily agree to participate
• You are 18 years of age or older

* Required

*

☐ Agree

☐ Decline

NEXT

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