EXPLORING THE IMPACT OF ONLINE TEAM-INITIATED PROBLEM SOLVING PROFESSIONAL DEVELOPMENT ON TEACHERS' PERCEPTIONS OF EFFICACY AND PROBLEM-SOLVING SKILLS

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DISSERTATION ABSTRACT

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Title: Exploring the Impact of Online Team-Initiated Problem Solving Professional Development on Teachers' Perceptions of Efficacy and Problem-Solving Skills

Data-based decision making (DBDM) is an integral component of a multi-tiered system of support (MTSS) framework. The data guide critical decisions, such as instructional and intervention strategies, resource allocation, policy development, intensity of supports, and potential disability identification. Using data in a systematic manner via a problem-solving process and aligning solutions and implementation practices are necessary skills for today's educators; however, training and professional development can be limited and/or resource intensive. One possible solution is to deliver problem-solving PD in an online or eLearning format.

This study used a quasi-experimental, pre-test post-test design to explore the impact of the Team-Initiated Problem Solving (TIPS) online professional development on individual teachers' self-assessment of their problem-solving skills, as well as their beliefs in both their personal teaching efficacy and the collective teaching efficacy of their colleagues within the school. Participants were 30 educators from four elementary schools within three states in the United States. The study included a treatment group (*n* = 17), all of whom were active team members in Tier 2 problem solving teams within

their school site. It also included a comparison group (n = 13) of participants from the same schools who were not part of the problem-solving team.

Data were collected via pre- and post-tests of the Teacher Sense of Efficacy Scale – Short Form, the Collective Teacher Efficacy Scale, and the TIPS Team Member Self-Assessment. A qualitative response was also included in the post-test to examine the impact the COVID-19 pandemic may have had on participant responses. Analyses were conducted to explore differences within each group, as well as between groups over time. Overall, there were positive changes in perceptions over time on all measures; however, differences were found to be not significant. Further, the COVID-19 pandemic had a large influence over the participants' responses; therefore, it is hard to definitively determine that the treatment condition contributed to the shift in perceptions. Recommendations for future research include repeating the study with a larger sample, focusing on Tier 1 problem solving teams, exploring differences between rural and urban settings, and evaluating the influence of coaching supports on outcomes.

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CHAPTER I

INTRODUCTION AND LITERATURE SYNTHESIS

Educators in today's schools are tasked with collecting data on each and every student as part of a requirement under the Every Student Succeeds Act (ESSA). Such data are intended not only to demonstrate a student's current skills and abilities in a particular area, but also to help educators identify and implement potential support and intervention strategies that will help students succeed through a multi-tiered system of support (MTSS) framework (Every Student Succeeds Act, 2015). To realize the potential of MTSS, educators need training and support to skillfully engage in effective and efficient problem-solving routines and practices (e.g., those that are proven to work and take little time to implement to achieve desired outcomes). Such training, though, requires a commitment of time, which is often a scarce resource in budget-strapped schools. One possible solution to address these needs is to deliver problem-solving PD in an online or eLearning format.

Data-based Decision Making within an MTSS Framework

The iterative practice of collecting and analyzing data and then using the information to make decisions is known as *data-based decision making* (Center on Response to Intervention, n.d.). Data-based decision making (DBDM) is an integral component of a multi-tiered system of support (MTSS) framework, as the data guide critical decisions, such as instructional and intervention strategies, resource allocation, policy development, intensity of supports, and potential disability identification.

Using data in a systematic manner via a problem-solving process and aligning solutions and implementation practices are necessary skills for educators. Every educator

must have some basic knowledge of inquiry, data collection, data interpretation, and application to instructional planning and delivery (Mandinach & Jimerson, 2016). Unfortunately, most educators receive little to no pre-service or in-service training in data literacy, data-based instruction, data use, or decision-making processes (Albritton & Truscott, 2014; Mandinach & Gummer, 2013; Mandinach & Gummer, 2016; Means et al., 2011; Schildkamp & Poortman, 2015). Further, the likelihood of educators using data for decision making is affected by how confident they feel about their knowledge and skills in data analysis and data interpretation (Means et al., 2011; Schildkamp & Poortman, 2015).

Several factors have been found to influence school data teams' use of data: data characteristics (e.g., access and availability of high-quality data); school organizational characteristics (e.g., shared goals, leadership, training and support, stakeholder involvement); and individual and team characteristics (e.g., data literacy, pedagogical content knowledge, organizational knowledge, attitude, and collaboration) (Schildkamp & Poortman, 2015). These factors can be maximized when a school or data team adheres to an established problem-solving model and engages in ongoing, collaborative professional development opportunities to hone their individual and collective skills related to data use.

Team-Initiated Problem Solving Model

One model of data-based decision making with evidence of effectiveness is the Team-Initiated Problem Solving (TIPS) model (Newton et al., 2009; Newton et al., 2012; Todd et al., 2011). The model emphasizes the establishment of meeting foundations, which include assigned roles and using a standardized meeting minute template and

structured meeting practices to run meetings efficiently. It also includes a set of sequential steps to guide the data analysis and interpretation process, which are based on Deno's conceptional foundation of data-based problem solving (Deno, 1989, 2005). The model includes developing a precise problem statement, setting a goal, developing functional and contextually relevant solutions, and monitoring the associated action plan for both fidelity and desired effects. This routine is iterative and continuously informed throughout each step and process by data and information.

Professional development for the TIPS model typically consists of a one-day (6-hour) workshop for the school-wide behavior support team and an additional one-day (6-hour) training for an external coach on how to provide follow-up coaching and feedback regarding implementation of the model (Todd et al., 2011). In the past, this training has all been delivered in person. Several empirical studies reported improvements in how teams collect and use data for decision making after the TIPS training occurred via this delivery method (Newton et al., 2012; Todd et al, 2011).

This model, although effective, can be resource intensive, as it is an expensive endeavor to pay substitute teachers to cover classroom time for team members. Further, it is mostly available to schools in urban or suburban settings, as they tend to have access to more resources, including high-quality professional development and substitute teachers. This leaves out a large group of schools and educators in rural settings who could also benefit from improving problem solving skills and practices. Thus, providing TIPS professional development via an online delivery method could reach more educators and impact more students.

Theoretical Foundations

In addition to the TIPS Problem Solving model (as described above), several other theoretical models guide this study.

Online Learning for Teacher Professional Development

Online learning is not new to the field of education, as it has been used in both K-12 and higher education settings. An estimated 2.7 million K-12 students enrolled in online courses during the 2014-15 school year, representing approximately 5% of the total student population (Evergreen Education Group, 2017). Within higher education, approximately 6.4 million students enrolled in at least one distance course in the fall of 2016, representing 31.6% of all students (Seaman, Allen, & Seaman, 2018). According to the U.S. Department of Education ([USDOE], 2018), 48 states and the District of Columbia currently offer and support online learning opportunities for K-12 students.

In the spring of 2020, a global pandemic forced the closure of most schools and districts around the country for several months, which turned the idea of school (as we knew it) completely on its head. A desire to continue delivering instruction, while also maintaining health and safety precautions for staff and students, resulted in many schools and districts rethinking the traditional model of schooling and redesigning it into a model of comprehensive distance learning. The redesign was instituted at all levels of the school system, from the students through to the adults. Thus, staff were required to quickly shift their role to encompass the use of technology for teaching, collaboration with peers, and for their own professional learning.

The question of whether online delivery is an effective method of providing professional development to educators has been explored in recent years, with mixed

results. Overall, in comparing face-to-face and online PD, several studies, including a meta-analysis, found no significant differences in learner outcomes (Fishman et al., 2013; Gaumer Erickson et al., 2012; Means et al., 2009). This finding does not mean online delivery is not effective: An alternative perspective is that online PD is an equally effective delivery method as face-to-face, and that desirable outcomes are not dependent on PD modality (Fishman et al., 2013).

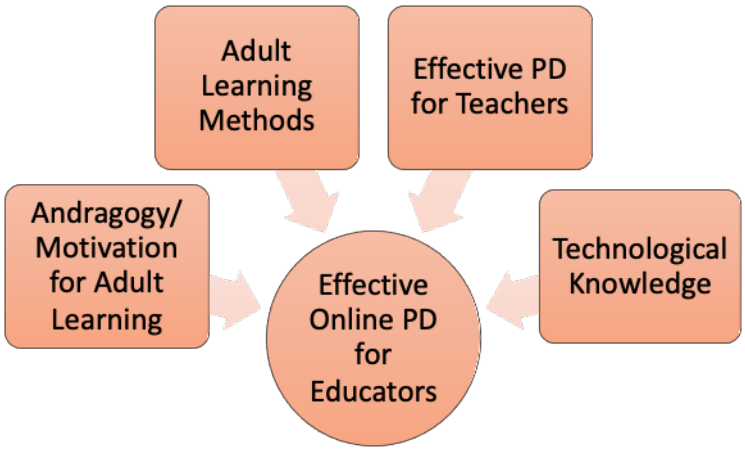
Given these findings, the benefits and advantages of online learning may be enough to warrant using it instead of face-to-face trainings to deliver professional development content to educators. For example, online modules can be flexibly delivered and accessed, offered over multiple sessions, and allow educators to work at their own pace (Dede et al., 2009; Fishman et al., 2013). Online instruction can provide access to powerful resources not locally available, which can be especially beneficial to rural educators and may serve as a mechanism to develop teacher expertise (Dede et al., 2009; Gaumer Erickson et al., 2012). Further, online PD can be a method for establishing ongoing, job-embedded support for educators that is conducted in real-time (Dede et al., 2009).

Effective Online Teacher Professional Development

By building on a foundation of several learning theories and constructs, the impact and effectiveness of online learning can be improved. Figure 1 provides a visual representation of a combined conceptual framework. Each theory and construct is independent, yet they work collectively to contribute to the overall effectiveness of online learning for educators.

Figure 1

A conceptual framework for effective online PD for educators



Andragogy/Motivation for Adult Learning. Andragogy, the study of teaching adults, suggests that teaching adults is different than teaching children. According to Knowles, Holton, and Swanson (2012), there are six core adult learning principles: (a) adults prefer to know the reason or rationale for learning something; (b) adults have previous experience, which provides the basis for new learning; (c) adults are self-directed, autonomous, independent, and prefer to guide their own learning plan; (d) adults are more interested in learning when the subject is perceived as being relevant or having immediate value; (e) adult learners prefer task-oriented learning and problem-solving activities, rather than just being delivered content, and (f) adults are driven by and respond better to intrinsic motivators, meaning they will learn if they want to learn. Using the principles of andragogy, online learning environments can be tailored to support and maximize benefits for adult learners (Blondy, 2007; Conaway & Zorn-Arnold, 2015).

Adult Learning Methods. In their meta-analysis, Trivette et al. (2009) identified six practices that contribute most to changes and improvements in learner knowledge,

skill, attitudes, and beliefs: (a) introducing information, (b) illustration/demonstration, (c) practicing, (d) evaluation, (e) reflection, and (f) mastery. The authors argue that the most effective practices are those that actively involve learners in using, processing, and evaluating their knowledge and skills. In a subsequent study, Dunst and Trivette (2012) found that professional development outcomes are optimized when the adult learning practices are used with a small number of learners who are exposed to instruction for more than 20 hours over multiple occasions.

Online delivery offers a mechanism to deliver content in a manner that is reflective of these practices. Introduction and demonstration of the content can be offered through various modalities (e.g., readings, videos, lessons). Learners can practice and apply their knowledge through interactive modules and lessons, while discussion boards and activities that promote peer collaboration allow participants to reflect on their learning. Mastery can be demonstrated through electronic assessments and evaluations.

Effective Professional Development for Teachers. An additional theoretical construct that can influence online learning is Desimone's (2009) research analysis of effective professional development for educators. Within the analysis, the author proposed five core features of professional development that contribute to both an increase in teacher knowledge and skills, as well as changes in attitudes and beliefs. They suggested that teacher PD should (a) be focused on subject-matter content; (b) be consistent with teacher beliefs and/or aligned with school, district, or state policies and reforms; (c) actively engage the adult learner through observation, interactive feedback or discussion, and/or reviewing student work products; (d) be spread over an extended period of time and include at least 20 hours of contact time; and (e) encourage collective

participation from the same school, grade, or department to improve professional discourse and application of the content.

When incorporated into PD, these features can influence changes in instructional practice and ultimately improve student learning outcomes. Surrette and Johnson (2012) conducted a meta-analysis exploring a body of research related to the integration of these core features within online PD programs. Their research suggests that online teacher PD programs are effective at facilitating active learning, collective participation, and engaging teachers in content-focused activities.

Technological Knowledge. The fourth and final construct is technological knowledge. This construct is borrowed from the Technology, Pedagogy, Content Knowledge (TPCK) framework proposed by Koehler and Mishra (2009), which integrates technology into the discipline of teaching. Technological knowledge goes beyond computer literacy and requires an understanding and deeper application of information technology for information processing, communication, and problem solving. This concept is identified as "fluency with information technology," which is a term coined by the Committee of Information Technology Literacy of the National Research Council (NRC, 1999). The committee abbreviated the term to "FIT" and identified being fluent as "FITness". Not only is technological knowledge important for the instructor or person delivering the professional development, it is also essential for the learner so they can access and best acquire the information to be learned via an online delivery method. Therefore, recognizing and assessing technical knowledge is a critical component of effective online professional development for educators.

Teacher Efficacy

Teacher efficacy is a construct borne out of the social-cognitive theory of self-efficacy (Bandura, 1977; 1986). It can be defined as a teacher's belief or judgment of their skills or capabilities in generating student outcomes of engagement or achievement, especially pertaining to students who are difficult to reach or unmotivated to learn (Tschannen-Moran & Woolfolk Hoy, 2001; Tschannen-Moran et al., 1998). Self-efficacy has to do with the *self-perception of competence* of a skill, rather than actual level of competence. People tend to over- or under-estimate their actual abilities, which likely influences their courses of actions and/or how well they use the skills they possess (Tschannen-Moran et al., 1998). A strong sense of efficacy has been shown to relate to a range of positive teaching behaviors, such as experimenting with a variety of teaching methods to meet the needs of students (Guskey, 1988; Stein & Wang, 1988), greater levels of planning and organization (Allinder, 1994), as well as persistence and resilience in the face of challenges (Tschannen-Moran et al., 1998). In a broader sense, higher teacher efficacy is related to the overall organizational climate and educational effectiveness of the school (Hoy & Woolfolk, 1993; Tschannen-Moran et al., 1998).

Within the literature related to teacher professional development, positive self-efficacy beliefs have been found to increase the likelihood that teachers are willing to attend, participate in, and transfer skills learned during an in-service training to the classroom (Bray-Clark & Bates, 2003; Coladarci, 1992). Specifically in the area of online learning, teacher self-efficacy outcomes were found to increase as a result of engaging in online PD experiences, yet the differences were not statistically significant (Fishman et al., 2013; Yoo, 2016).

Gaps in Literature

In a traditional MTSS model, teams of educators work together to problem solve. Thus, problem-solving research has primarily focused on teams as the unit of change. Teams are comprised of individuals, and the collective success of the team is dependent on the ability of each individual to engage in the problem-solving practices. Therefore, investigating the confidence levels in skills and abilities of the individuals can provide valuable information about how the team can work more effectively together.

Successful implementation of the TIPS problem solving model relies on the collective functioning of the team members. To encourage and guide the efforts of the team, PD training for TIPS has typically been delivered to the team as a whole and in a face-to-face format. With the current state of education and widespread school closures from the global pandemic, it is highly unlikely that resources can be devoted to providing the necessary training to team members in this way. For team members to access the material and content, online delivery is the most efficient option; however, there is no evidence that TIPS professional development has been delivered effectively via an online delivery method. Although the personalization and engagement of the learning experience may change, online delivery has the potential to be just as effective as face-to-face. It can be accessible to and engage more educators, as well as provide a safer alternative for everyone involved by limiting potential exposure to air-borne pathogens, such as the virus that causes COVID-19.

Lastly, little is known of the impact of engaging in problem solving PD (either online or face-to-face) on teacher efficacy. The hope is that improvement in individual problem solving can be extended beyond the team into the broader school context,

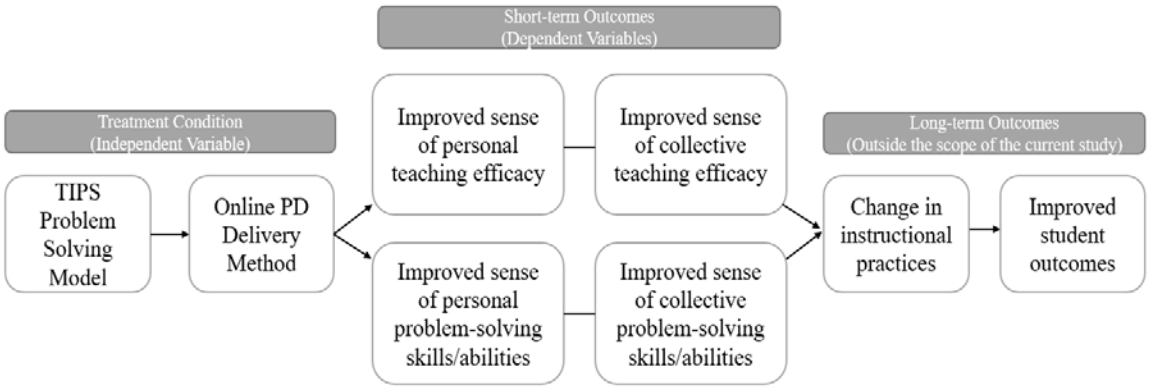
thereby improving teachers' beliefs in their own personal teaching efficacy, as well as their sense of collective efficacy with their peers. Ultimately, the goal is to improve educators' ability to make decisions so they can better support students.

Current Study

The purpose of the current study is to examine the impact of online delivery of the TIPS model on teachers' assessment of their personal and collective problem-solving skills and efficacy. Figure 2 provides a visual roadmap of the theory of action for the current study.

Figure 2

Current study theory of action



Within the scope of this study, the following four research questions were explored:

1. Does engaging in an online problem-solving PD change teachers' beliefs of individual self-efficacy?
2. Does engaging in an online problem-solving PD change teachers' beliefs of collective efficacy?

3. Does engaging in an online problem-solving PD change individual teachers' confidence related to using the TIPS problem solving model steps?
4. Does engaging in an online problem-solving PD change individual teachers' confidence in the school team's ability to follow/use the TIPS problem solving model steps?

CHAPTER II

METHODS

This dissertation used data collected as part of a larger TIPS Ed Tech study, funded by the Institute of Education Sciences. The main study uses a multiple-baseline design whereby school-level Tier 2 problem solving teams are given access to two technology components: online professional development of the TIPS problem solving model and a meeting minute application tool (TIPS MApp) to organize crucial information and guide decision-making efforts of the team. The main study uses the problem-solving team as the unit of analysis and investigates their skills related to problem solving and use of the TIPS MApp through observations of team meetings via online recordings.

Design

This study used a quasi-experimental, pre-test post-test design to explore the impact of the TIPS online professional development on individual teachers' self-assessment of their problem-solving skills, as well as their beliefs in both their personal teaching efficacy and the collective teaching efficacy of their colleagues within the school.

Participants and Sampling Procedures

Fifty-four participants were initially recruited for the study, representing a convenience sample of educators employed in one of four elementary schools. Due to attrition, the final total number of participants was 30.

The treatment group consisted of approximately 4-5 people at each school who were active members of the Tier 2 problem solving team. The treatment group initially

consisted of 25 participants, but once the data sets were refined (see Data Analysis section), the final treatment group included 17 people. The treatment group included one general education teacher, two school administrators, three special educators, four related service providers (e.g., counselors, school psychologists, etc.), four district PBIS coaches, and three people identified as "other". Most treatment group participants had graduate degrees (n = 14), with a handful having a bachelor's degree (n = 3). Most of the group were females (n = 16), with one male. The number of years in the field of education for the treatment group ranged from 5 to 33, with an average of 15.12 years. Treatment group participants ranged from less than one year to five years on the Tier 2 problem solving team, with an average of 2.59 years. Six of the treatment group members reported prior knowledge of or experience with the TIPS model, while 11 members did not. Information about the group demographics can be found in Table 1.

An additional group of approximately 3-4 people were identified at each school to serve as a comparison group. These participants did not receive the treatment. The comparison group initially consisted of 29 participants, but once the data sets were refined (see Data Analysis section), the final comparison group had only 13 people. The comparison group included eight general education teachers, two special educators, one related service providers, and two people identified as "other". Most comparison group participants had graduate degrees (n = 8), with a handful having a bachelor's degree (n = 5). Most of the group were females (n = 12), with one male. The average number of years in the field of education for the treatment group was 11.46 years. One of the treatment group members reported prior knowledge of or experience with the TIPS model, while all other group members did not. Information about the group demographics can be found in

Table 1. All participants who completed the surveys at both time points were given gift cards for their participation.

Table 1

Participant Demographics

Variable		Frequency (Percent)	
		Treatment	Comparison
Highest educational degree			
	Bachelor's	3 (17.6%)	5 (38.5%)
	Graduate	14 (82.4%)	8 (61.5%)
Current role			
	Administrator	2 (11.8%)	0 (0%)
	Student support	4 (23.5%)	1 (7.7%)
	Special educator	3 (17.6%)	2 (15.4%)
	Teacher	1 (5.9%)	8 (61.5%)
	Other	3 (17.6%)	2 (15.4%)
Gender			
	Female	16 (94.1%)	12 (92.3%)
	Male	1 (5.9%)	1 (7.7%)
TIPS Knowledge			
	Yes	6 (35.3%)	1 (7.7%)
	No	11 (64.7%)	12 (92.3%)

The sample included representation from three states, with three of the schools located in the western United States (Oregon and Wyoming). The remaining school was in the eastern United States (Pennsylvania). Three of the schools were suburban and one school was rural. Schools and Tier 2 problem solving teams were recruited through presentations at local and regional conferences as well as informational webinars. Requirements for participation included having access to a Positive Behavioral Interventions and Supports (PBIS) coach and a Tier 2 problem solving team in place. To be included in the study, each school needed to have recently completed the SW-PBIS Tiered Fidelity Inventory (TFI; Algozinne et al., 2014).

Data Collection

All participants (treatment and comparison group) completed surveys just prior to the treatment group engaging in the online problem-solving professional development (PD) and again after the treatment group's completion of the online PD. Originally, participants were to complete the second survey approximately two to three months after the treatment group had completed the PD, but due to the COVID-19 school closures, two of the schools completed their second survey 8 - 10 months after the PD had been completed. Surveys were completed via the Qualtrics survey platform. For treatment group participants, the pre-treatment survey link was embedded within the online learning management system (Obaverse), and the post-treatment survey link was sent out via email by the site-based PBIS coach. For comparison group participants, a survey link was embedded within a recruitment email sent out by the site-based PBIS coach, and I sent the post-treatment survey link via email in my role as researcher. Data collection occurred across two school years (2019-20 and 2020-21), with a pause over summer break (approximately mid-June through mid-August 2020) due to the school shutdown as a result of the COVID-19 pandemic.

Measures

For this study, three primary measurement tools were used: *Teacher Sense of Efficacy Scale – Short Form* (Tschannen-Moran & Hoy, 2001), *Collective Teacher Efficacy Scale* (Tschannen-Moran & Barr, 2004), and the *TIPS Team Member Self-Assessment.*

Teacher Sense of Efficacy Scale (TSES) – Short Form. The Teacher Sense of Efficacy Scale (TSES) asks teachers to assess their capability concerning instructional

strategies, student engagement, and classroom management (Tschannen-Moran & Hoy, 2001). It is designed to help gain a better understanding of the challenges that teachers face. The TSES is comprised of 12 items within three subscales: Instructional Strategies, Student Engagement, and Classroom Management. Participants respond to each of the items using a 9-point Likert scale, ranging from (1) *None at all* to (9) *A Great Deal*. Participants are asked to respond to the items by considering their "*current* ability, resources, and opportunity to do each of the following in your present position" (Tschannen-Moran & Woolfolk Hoy, 2001, emphasis in the original). A sample of items can be found in Figure 3, and the full survey can be found in Appendix A. The TSES takes approximately 5 minutes to complete.

Figure 3

Teacher Sense of Efficacy Scale Sample

Format: Short Form – 12 Items 9-point scale anchored at None at All, Very Little, Some Degree, Quite A Bit, A Great Deal	**Sample Items** • How much can you do to control disruptive behavior in the classroom? • How much can you do to motivate students who show low interest in school work? • How much can you do to help your students value learning? • How much can you do to get children to follow classroom rules? • How much can you assist families in helping their children do well in school? • How well can you implement alternative teaching strategies in your classroom?
Subscales: *Efficacy in Student Engagement* *Efficacy in Instructional Strategies* *Efficacy in Classroom Management*	

This measure has evidence of reliability and validity for measuring teachers' self-reported efficacy. To evaluate construct validity of the instrument, the authors conducted a factor analysis using responses from 410 participants. Within their analysis, they found

three moderately correlated factors, which they organized into the three subscales of the instrument: *Efficacy in Student Engagement*, *Efficacy in Instructional Practices,* and *Efficacy in Classroom Management*. Factor loadings ranged from 0.50 to 0.78, with eigenvalues of 10.38, 2.03, and 1.62, respectively (Tschannen-Moran & Woolfolk Hoy, 2001). Reliabilities for the subscales were 0.91 for instruction, 0.90 for management, and 0.87 for engagement, and intercorrelations between the subscales were 0.60, 0.70, and 0.58, respectively (Tschannen-Moran & Woolfolk Hoy, 2001).

Collective Teacher Efficacy Scale. Collective efficacy is "the collective self-perception that teachers in a given school make an educational difference to their students over and above the educational impact of their homes and communities" (Tschannen-Moran & Barr, 2004, p. 190). The Collective Teacher Efficacy Scale is an assessment of the teacher's perception of the school's collective capacity for student discipline, as well as for instructional practices. It is comprised of 12 items within two subscales: *Collective Efficacy in Instructional Strategies* and *Collective Efficacy in Student Discipline.* Participants respond using a 9-point Likert scale, ranging from (1) *None at all* to (9) *A Great Deal*. Participants are asked to respond to the items by considering their "*current* ability, resources, and opportunity of the teaching staff in your school to do each of the following" (Tschannen-Moran & Barr, 2004, emphasis in the original). A sample of items can be found in Figure 4, and the full survey can be found in Appendix B. Approximate time to complete is 5 minutes.

This measure has been demonstrated to have adequate technical adequacy. To evaluate construct validity of the instrument, the authors conducted a factor analysis using data from a study of 66 middle schools. They found two moderately correlated

Figure 4

Collective Teacher Efficacy Scale Sample

Format: 12 Items 9-point scale anchored at None at All, Very Little, Some Degree, Quite A Bit, A Great Deal	**Sample Items** • How much can teachers in your school do to produce meaningful student learning? • How much can your school do to get students to believe they can do well in schoolwork? • How much can teachers in your school do to promote deep understanding of academic concepts? • To what extent can teachers in your school make expectations clear about appropriate student behavior? • To what extent can school personnel in your school establish rules and procedures that facilitate learning • How well can teachers in your school respond to defiant students?
Subscales: *Collective Efficacy in Instructional Strategies* *Collective Efficacy in Student Discipline*	

factors, which resulted in the two subscales of the instrument: *Collective Efficacy in Instructional Strategies* and *Collective Efficacy in Student Discipline*. Factor loadings ranged from 0.67 to 0.78 in the instructional strategies subscale, and 0.64 to 0.78 in the student discipline subscale. (Tschannen-Moran & Barr, 2004). Reliability for the 12-item Collective Teacher Belief Scale was found to be 0.97. The instructional strategies subscale was found to have a reliability of 0.96, and the student discipline subscale was found to have a reliability of 0.94 (Tschannen-Moran & Barr, 2004).

TIPS Team Member Self-Assessment. The TIPS Team Member Self-Assessment (TMSA), a survey designed specifically for this study, asks individual team members to assess both their personal and their team's ability to implement the components of the TIPS model. It is a 21-question survey, consisting of eight

demographic questions and 13 general items. Each question has two parts, as participants are asked to rate their level of confidence in both their own (personal) and their team's ability to implement the various problem-solving components of TIPS. Response options use a 10-point Likert scale, ranging from (1) *Not at all confident* to (10) *Highly confident*. A sample of items can be found in Figure 5, and the full survey can be found in Appendix C. Approximate time to complete is 5 minutes.

Figure 5

TIPS Team Member Self-Assessment Sample

Format: 21 items – 8 demographic items; 13 general items 10-point scale anchored at (1) Not at all Confident and (10) Highly Confident	**Sample Items** *How confident are you in your (personal) or your team's ability to…* • Collaborate to establish team foundations for effective and efficient problem solving. • Identify and precisely define one or more student social and/or academic problems. • Use quantitative data to identify/define the problem. • Select a solution (intervention) for resolving the problem. • Compare the current state of the problem against the goal and make a decision about what actions should be taken next.
Subscales: *Precise Problem Identification & Data Use* *Problem Solving Process*	

The survey was modeled after the Decision Observation, Recording, and Analysis (DORA) II data collection protocol and instrument (Newton et al., 2012). The DORA II is regularly used as an observation tool within the TIPS research. It allows data collectors to record information about both the foundational aspects of a problem-solving team meeting as well as the team's engagement in the problem-solving process. The DORA training manual identifies nine questions that can be answered through the use of the

observation tool. Those questions formed the basis for the TIPS Team Member Self-Assessment.

Prior to this dissertation study, I conducted an initial study of the validity and reliability of a slightly modified version of this instrument for a course project, which included participation from 21 educators within one district in central Oregon. To evaluate construct validity of the instrument, I conducted an exploratory factor analysis for both the *Personal* and *Team* variables. The *Personal* variable is a conglomeration of all the items, but it is focused specifically on the personal responses. The *Team* variable is similar, but for the team responses. Two moderately correlated factors were found: *Precise Problem Identification/Data Use* and *Problem-Solving Process*. For the Personal variable, factor loadings ranged from 0.75 to 0.90 in the Precise Problem Identification/Data Use subscale, and 0.74 to 1.00 in the Problem-Solving Process subscale. For the Team variable, factor loadings ranged from 0.68 to 0.81 in the Precise Problem Identification/Data Use subscale, and 0.81 to 0.97 in the Problem-Solving Process subscale. Reliability for the 11-item TIPS Team Member Self-Assessment (modified) was found to be 0.91. The Precise Problem Identification/Data Use subscale was found to have a reliability of 0.93, and the Problem-Solving Process subscale was found to have a reliability of 0.93.

Procedures

The following procedures were used for participant recruitment, providing access to the treatment condition, and data collection.

Participant Recruitment. A recruitment flyer was shared at local and national conferences to solicit interest in the study. The site-based PBIS coach and school

administrator were identified as the primary contact for each school involved in the study. Active consent was secured from site-based coaches and team members prior to data collection via paper and pencil forms.

A comparison group was recruited via the site-based coaches from each of the schools involved in the study. Coaches shared the recruitment flyer and letter with school personnel, targeting the school personnel who were not involved in the treatment condition. As much as possible, the comparison group participants were matched to team members involved in the study regarding role and position within the school. Active consent was gathered from the comparison group members via an electronic consent form prior to data collection.

Treatment Condition. The TIPS online professional development modules serve as the independent variable in this study. Participants accessed the PD modules via Obaverse, an online learning platform developed by the College of Education at the University of Oregon. Due to the multiple-baseline design of the main study, the schools were randomly assigned into three cohorts (Cohort 1 = 2 schools, Cohort 2 = 1 school, Cohort 3 = 1 school), and the intervention was delivered to each cohort in a staggered manner, with at least one month between starting points. It should be noted that the actual sample and timing of the study differed from the intended design due to attrition and recruitment challenges related to the COVID-19 pandemic and the strain of moving to comprehensive distance learning. As a result, access to the online PD modules was spread over two separate school years, and cohorts 2 and 3 ended up with a single school. Cohort 1 schools accessed the modules at the end of the 2019-20 school year, and Cohort 2 and 3 schools were given access in the fall of the 2020-21 school year. For the purpose

of this study, the cohort in which a particular school was recruited for the main study from which our data were drawn is irrelevant because cohort designation is not part of the current study's design.

The TIPS online PD modules consist of 13 learning modules. The module series includes two overview modules, seven modules specific to the TIPS model, three role-specific modules, and a resources module. The module names, associated topic areas, and content descriptions can be found in Table 2. Each participant in the treatment condition engaged with the learning modules. The first nine modules (*Curriculum Overview, Overview of TIPS, Meeting Foundations, Identify Problem, Identify Goal for Change, Identify Solution, Implement with Fidelity, Monitor and Evaluate, Make Decisions*) were completed by each team member, with the final three modules completed only by those team members assigned to that specific role (*Minute Taker, Facilitator, Data Analyst*). Each of the first nine modules required one hour or less to complete, with a total completion time of approximately 5 hours. The additional role-related modules required about 15-30 minutes to complete. Although the modules can be completed in a group setting, each participant was required to complete the modules and submit responses for the associated activities individually in order to track online completion data for each person involved in the study.

Measures. For utility and efficiency, the three measurement instruments were combined into a single survey. The combined survey was delivered via the Qualtrics survey platform, where participants could complete it online (via computer or mobile device). A pre-test and post-test version of the survey was developed for each group (treatment and comparison). A brief demographic questionnaire was included in the pre-test version of the survey for both groups. Consent information and agreement was included in the

Table 2

TIPS Professional Development Modules

Module Name	Topic Area	Content Description
Curriculum Overview	General	Overview of the Curriculum and Learning Objectives.
Overview of TIPS	General	Overview of the TIPS Process and core elements of the model.
Meeting Foundations	TIPS Process	Introduction to the meeting foundations as an effective approach to making meetings more efficient and consistent.
Identify Problem	TIPS Process	Identify and create precise problem statements using available data sources.
Identify Goal for Change	TIPS Process	Setting appropriate student and implementation fidelity goals and how to measure the success of those goals.
Identify Solution	TIPS Process	Identify and personalize solutions for an individual student's needs and develop an action plan for implementation.
Implement with Fidelity	TIPS Process	Tracking and monitor implementation fidelity of a student solution.
Monitor and Evaluate	TIPS Process	Using data and reports to monitor and evaluation implementation fidelity and student outcomes.
Make Decision	TIPS Process	Set up decision guidelines for when to maintain, modify, or terminate a plan.
Minute Taker	Role Related	The responsibilities and required skills of the minute taker before, during, and after the meeting.
Facilitator	Role Related	The responsibilities and required skills of the facilitator before, during, and after the meeting.
Data Analyst	Role Related	The responsibilities and required skills of the data analyst before, during, and after the meeting.
Resources	Resources	Files, links, and resources to support TIPS implementation

comparison group's electronic surveys. A qualitative question was added to each section of the post-test survey for both groups to solicit information from participants about whether their experiences during the pandemic had any influence on their survey responses. Specifically, the participants were asked, "Many educators have experienced changing circumstances as a result of the pandemic. In thinking about your responses to this section, how do you think the pandemic has influenced your responses on this survey?" An example of the combined survey format and design via the Qualtrics survey platform can be found in Appendix D. A complete repository of qualitative responses can be found in Appendix E.

For the treatment group, participants accessed the pre-test survey via a link embedded into the Obaverse learning platform. The pre-test survey was included as a stand-alone activity in the learning platform, and participants were required to complete the activity before beginning a sequence of learning modules. The post-test survey link was sent to participants via a direct email. The intention was to collect post-survey data approximately two months after completion of the online modules, but as was described earlier, the move to comprehensive distance learning due to the COVID-19 pandemic delayed responses. At schools 1 and 2, dates for completing the post-survey ranged from 8 to 10 months after the online PD had been completed. At schools 3 and 4, dates for completing the post-survey ranged from 2 to 4 months after the online PD had been completed.

For the comparison group, participants accessed both surveys (pre and post) via a link embedded within a direct email sent out by the site-based coaches. All comparison group surveys were completed during the same windows of time as the treatment group.

Data Analysis

Prior to data analysis, the data from each group and each survey completion (pre and post) were downloaded from the Qualtrics platform. The pre- and post- data files from each group were matched via participant email addresses and/or computer IP addresses to ensure the same participant responses were included in the final dataset. Each submission that did not have a matched response was eliminated from the final dataset. Additionally, any survey submissions that had missing data for more than 5 survey questions were removed from the dataset. This refinement resulted in the final participant count of 17 treatment group responses and 13 comparison group responses.

A Repeated Measures Analysis of Variance (RM-ANOVA) and Mixed Effects ANOVA were conducted to analyze the data. To explore whether or not engaging in the online problem-solving PD changes teachers' beliefs of individual self-efficacy (RQ1), within-group differences were analyzed for each group over the two time periods (pre and post) on each of the three dimensions of teacher efficacy (*Efficacy in Instructional Strategies*, *Efficacy in Classroom Management*, and *Efficacy in Student Engagement*). To explore whether or not engaging in the online problem-solving PD changes teachers' beliefs of collective efficacy (RQ2), within-group differences were analyzed for each group over the two time periods (pre and post) on both collective efficacy dimensions (*Collective Efficacy in Instructional Strategies* and *Collective Efficacy in Student Discipline*). To explore whether or not engaging in the online problem-solving PD changes individual teachers' personal confidence on using the TIPS problem solving model (RQ3) and the teachers' confidence in the team's ability to use the TIPS problem solving model (RQ4), within-group difference in both groups was analyzed over the two

time periods (pre and post) on both subscales (*Precise Problem Identification/Data Use* and *Problem-Solving Process*). For all research questions, differences between the treatment and comparison groups were examined. For all analyses, sphericity was assumed due to only having two time points. Finally, differences in demographic information (e.g., years of professional experience, school role, and previous experience with TIPS) were explored using simple descriptive statistics. An alpha of 0.05 was used for each of the analyses. All analyses were conducted using SPSS 27.0 for Windows.

CHAPTER III

RESULTS

In this chapter, I provide the results of my analyses, organized by research question.

Research Question 1: Does engaging in an online problem-solving PD change teachers' beliefs of individual self-efficacy?

Treatment Group

A repeated measures analysis of variance (RM-ANOVA) was completed for the TSES survey on the treatment group for pre- and post-survey completion, and results are presented in Table 3. For all analyses, linear terms were positive but not significant. The main effect of time on the TSES Overall Score was not significant, $F(1, 16) = 1.00$, $p = 0.33$, partial $\eta^2 = 0.06$. The main effect of time on the TSES *Efficacy in Student Engagement* subscale was not significant, $F(1, 16) = 1.32$, $p = 0.28$, partial $\eta^2 = 0.08$. The main effect of time on the TSES *Efficacy in Instructional Strategies* subscale was not significant, $F(1, 16) = 1.14$, $p = 0.30$, partial $\eta^2 = 0.07$. The main effect of time on the TSES *Efficacy in Classroom Management* subscale was not significant, $F(1, 16) = 0.55$, $p = 0.47$, partial $\eta^2 = 0.03$.

Comparison Group

A repeated measures analysis of variance (RM-ANOVA) was completed for the TSES survey on the comparison group for pre- and post-survey completion, and results are presented in Table 4. The main effect of time on the TSES Overall Score was positive, but not significant, $F(1, 12) = 0.04$, $p = 0.84$, partial $\eta^2 = 0.00$. The main effect

Table 3

RM-ANOVA Results (Treatment) (n = 17)

	Mean		*SD*		*F (1, 16)*	η^2
	Pre	*Post*	*Pre*	*Post*		
TSES Overall	6.69	7.22	1.91	1.17	1.00	0.06
Efficacy in Student Engagement subscale (Items 2, 4, 7, 11)	6.46	7.06	1.91	1.25	1.32	0.08
Efficacy in Instructional Strategies subscale (Items 5, 9, 10, 12)	6.91	7.49	1.97	1.17	1.14	0.07
Efficacy in Classroom Management subscale (Items 1, 3, 6, 8)	6.69	7.12	1.33	1.91	0.55	0.03
CSES Overall	6.84	7.34	1.69	1.00	1.97	0.11
Collective Efficacy in Instructional Strategies subscale (Items 1 – 6)	7.03	7.69	1.77	0.97	3.45	0.18
Collective Efficacy in Student Discipline subscale (Items 7 - 12)	6.64	6.99	1.67	1.08	0.84	0.05
TIPS TMSA (Personal) Items Overall	9.14	9.08	0.66	0.62	0.92	0.01
Precise Problem Identification/Data Use Subscale (Items 3, 4, 5)	9.31	9.18	0.66	0.66	0.70	0.04
Problem-Solving Process Subscale (Items 1, 7, 8, 9, 10, 12, 13)	9.03	9.03	0.81	0.62	0.00	0.00
TIPS TMSA (Team) Items Overall	9.01	9.09	1.10	1.01	0.19	0.01
Precise Problem Identification/Data Use Subscale (Items 3, 4, 5)	9.27	9.14	0.87	0.91	0.92	0.05
Problem-Solving Process Subscale (Items 1, 7, 8, 9, 10, 12, 13)	8.87	9.09	1.27	1.02	1.24	0.07

*Statistically significant at the $p<0.05$ level

Table 4

RM-ANOVA Results (Comparison)(n = 13)

	Mean		*SD*		*F (1, 12)*	η^2
	Pre	*Post*	*Pre*	*Post*		
TSES Overall	7.12	7.17	0.94	1.14	0.04	0.00
Efficacy in Student Engagement subscale (Items 2, 4, 7, 11)	7.04	7.13	1.11	1.24	1.42	0.12
Efficacy in Instructional Strategies subscale (Items 5, 9, 10, 12)	6.90	6.87	1.02	1.29	0.01	0.00
Efficacy in Classroom Management subscale (Items 1, 3, 6, 8)	7.42	7.52	1.02	1.25	0.17	0.01
CSES Overall	6.95	7.46	1.03	0.99	2.39	0.17
Collective Efficacy in Instructional Strategies subscale (Items 1 – 6)	7.37	7.63	1.11	0.94	0.57	0.47
Collective Efficacy in Student Discipline subscale (Items 7 - 12)	6.53	7.28	1.05	1.16	4.89*	0.29
TIPS TMSA (Personal) Items Overall	7.85	8.64	1.71	0.96	3.71	0.24
Precise Problem Identification/Data Use Subscale (Items 3, 4, 5)	8.18	8.85	1.47	1.13	2.11	0.15
Problem-Solving Process Subscale (Items 1, 7, 8, 9, 10, 12, 13)	7.72	8.56	1.91	1.01	3.65	0.23
TIPS TMSA Team Items Overall	8.35	8.68	1.62	0.92	0.99	0.08
Precise Problem Identification/Data Use Subscale (Items 3, 4, 5)	8.82	8.97	1.33	1.01	0.26	0.03
Problem-Solving Process Subscale (Items 1, 7, 8, 9, 10, 12, 13)	8.19	8.60	1.72	0.96	1.13	0.09

*Statistically significant at the $p<0.05$ level

of time on the TSES *Efficacy in Student Engagement* subscale was also positive and not significant, $F(1, 12) = 1.42$, $p = 0.71$, partial $\eta^2 = 0.12$. The main effect of time on the TSES *Efficacy in Instructional Strategies* subscale was negative and not significant, $F(1, 12) = 0.01$, $p = 0.92$, partial $\eta^2 = 0.00$. The main effect of time on the TSES *Efficacy in Classroom Management* subscale was positive but not significant, $F(1, 12) = 0.17$, $p = 0.69$, partial $\eta^2 = 0.01$.

Between Groups

A two-way mixed effects analysis of variance (ANOVA) was performed, with the TSES Overall Score and each TSES subscale as the within-subjects factors and Group Status (Treatment or Comparison) as the between-subjects factor. Results are presented in Table 5.

The Treatment group's TSES Overall Score ($M = 6.69$, $SD = 1.91$) was smaller than the Comparison group's TSES Overall score ($M = 7.12$, $SD = 0.94$) at Time 1 [Pre]. Both groups showed an increase in TSES Overall Score for Time 2 [Post], specifically Comparison group ($M = 7.17$, $SD = 1.14$) and Treatment group ($M = 7.22$, $SD = 1.17$). However, results indicated that the interaction effect of Group Status and time on the TSES Overall Score was not significant, $F(1, 28) = 0.25$, $p = 0.62$, partial $\eta^2 = 0.01$. Levene's test indicated that the assumption of homogeneity of variance was not violated for either time point, $F(1, 28) = 2.69$, $p = 0.11$ [Pre] and $F(1, 28) = 0.37$, $p = 0.55$ [Post]. Differences of mean responses from pre to post (within and between groups) are shown in Figure 6.

For the *Efficacy in Student Engagement* subscale, the Treatment group's scores ($M = 6.46$, $SD = 1.91$) were smaller than the Comparison group's scores ($M = 7.04$, $SD =$

Table 5

Two-Way Mixed Effects ANOVA (Group Status x Time)

	Treatment (n = 17)				*Comparison (n = 13)*				*F (1, 28)*	η^2
	Mean		*SD*		*Mean*		*SD*			
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*		
TSES Overall	6.69	7.22	1.91	1.17	7.12	7.17	0.94	1.14	0.25	0.01
Efficacy in Student Engagement subscale (Items 2, 4, 7, 11)	6.46	7.06	1.91	1.25	7.04	7.13	1.11	1.24	0.61	0.02
Efficacy in Instructional Strategies subscale (Items 5, 9, 10, 12)	6.91	7.49	1.97	1.17	6.90	6.87	1.02	1.29	0.61	0.02
Efficacy in Classroom Management subscale (Items 1, 3, 6, 8)	6.69	7.12	1.33	1.91	7.42	7.52	1.02	1.25	1.86	0.06
CSES Overall	6.84	7.34	1.69	1.00	6.95	7.46	1.03	0.99	0.90	0.00
Collective Efficacy in Instructional Strategies subscale (Items 1 – 6)	7.03	7.69	1.77	0.97	7.37	7.63	1.11	0.94	0.12	0.00
Collective Efficacy in Student Discipline subscale (Items 7 - 12)	6.64	6.99	1.67	1.08	6.53	7.28	1.05	1.16	0.05	0.00
TIPS TMSA (Personal) Items Overall	9.14	9.08	0.66	0.62	7.85	8.64	1.71	0.96	7.59*	0.21
Precise Problem Identification/Data Use Subscale (Items 3, 4, 5)	9.31	9.18	0.66	0.66	8.18	8.85	1.47	1.13	6.33*	0.18
Problem-Solving Process Subscale (Items 1, 7, 8, 9, 10, 12, 13)	9.03	9.03	0.81	0.62	7.72	8.56	1.91	1.01	6.59*	0.19
TIPS TMSA (Team) Items Overall	9.01	9.09	1.10	1.01	8.35	8.68	1.62	0.92	2.08	0.07
Precise Problem Identification/Data Use Subscale (Items 3, 4, 5)	9.27	9.14	0.87	0.91	8.82	8.97	1.33	1.01	0.78	0.03
Problem-Solving Process Subscale (Items 1, 7, 8, 9, 10, 12, 13)	8.87	9.09	1.27	1.02	8.19	8.60	1.72	0.96	1.95	0.07

*Statistically significant at the $p<0.05$ level

1.11) at Time 1 (Pre). Both groups showed an increase in *Efficacy in Student Engagement subscale* for Time 2 [Post], specifically Treatment group (M = 7.06, SD = 1.25) and Comparison group (M = 7.13, SD = 1.24). Levene's test indicated that the assumption of homogeneity of variance was not violated for either time point, $F(1, 28) = 1.59$, $p = 0.22$ [Pre] and $F(1, 28) = 0.11$, $p = 0.75$ [Post]. However, results indicated that the interaction effect of Group Status and time on the TSES *Efficacy in Student Engagement* subscale was not significant, $F(1, 28) = 0.61$, $p = 0.44$, partial $\eta^2 = 0.02$.

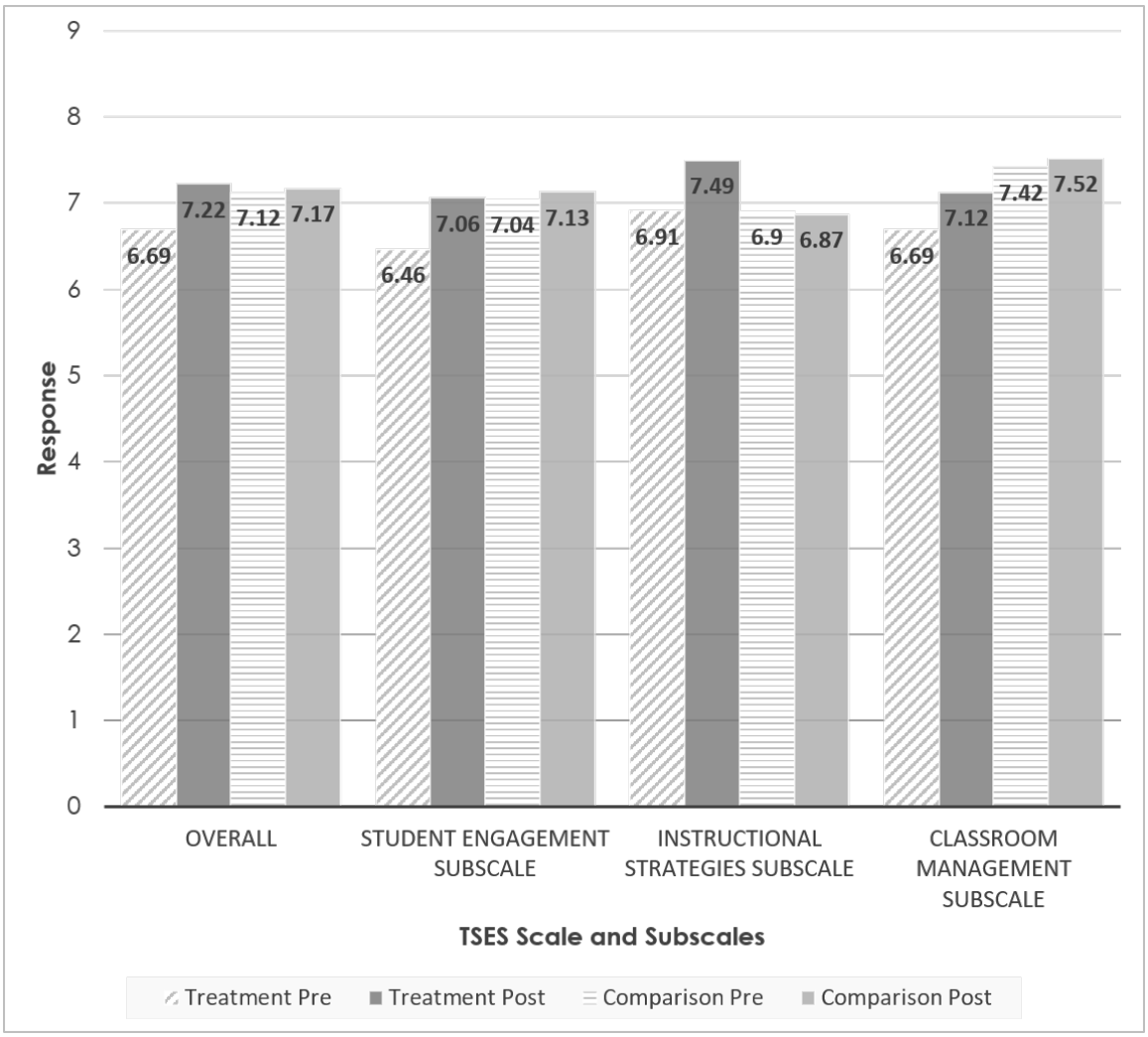
For the *Efficacy in Instructional Strategies* subscale, the Treatment group's results (M = 6.91, SD = 1.97) were relatively similar to the Comparison group's results (M = 6.90, SD = 1.02) at Time 1 [Pre]. The treatment group demonstrated an increase in *Efficacy in Instructional Strategies* subscale (M = 7.49, SD = 1.17) and the Comparison showed a slight decrease (M = 6.87, SD = 1.29) for Time 2 [Post]. Levene's test indicated that the assumption of homogeneity of variance was not violated for either time point, $F(1, 28) = 2.78$, $p = 0.11$ [Pre] and $F(1, 28) = 0.00$, $p = 0.96$ [Post]. Results indicated that the interaction effect of Group Status and time on the TSES *Efficacy in Instructional Strategies* subscale was not significant, $F(1, 28) = 0.61$, $p = 0.44$, partial $\eta^2 = 0.02$.

For the *Efficacy in Classroom Management* subscale, the Treatment group's results (M = 6.69, SD = 1.33) were smaller than the Comparison group's results (M = 7.42, SD = 1.02) at Time 1 [Pre]. Both groups showed an increase in *Efficacy in Classroom Management subscale* for Time 2 [Post], specifically Treatment group (M = 7.12, SD = 1.91) and Comparison group (M = 7.52, SD = 1.25). Levene's test indicated that the assumption of homogeneity of variance was not violated for either time point, $F(1, 28) = 2.60$, $p = 0.12$ [Pre] and $F(1, 28) = 0.31$, $p = 0.58$ [Post]. Results indicated that

the interaction effect of Group Status and time on the TSES *Efficacy in Classroom Management* subscale was not significant, $F(1, 28) = 1.86$, $p = 0.18$, partial $\eta^2 = 0.062$.

Figure 6

Teacher Sense of Efficacy Scale



Note. This figure demonstrates the differences from pre to post for each group on the *Teacher Sense of Efficacy Scale*. The patterned shades indicate the pre-treatment results and the darker shade, post-treatment results. If applicable, statistical significance is indicated with an asterisk.

Research Question 2: Does engaging in an online problem-solving PD change teachers' beliefs of collective efficacy?

Treatment Group

A repeated measures analysis of variance (RM-ANOVA) was completed for the CSES survey on the treatment group for pre- and post-survey completion (see Table 3). For all analyses, linear terms were positive but not significant. The main effect of time on the CSES Overall Score was not significant, $F(1, 16) = 1.97$, $p = 0.18$, partial $\eta^2 = 0.11$. The main effect of time on the CSES *Collective Efficacy in Instructional Strategies* subscale was not significant, $F(1, 16) = 3.45$, $p = 0.08$, partial $\eta^2 = 0.18$. The main effect of time on the CSES *Collective Efficacy in Student Discipline* subscale was not significant, $F(1, 16) = 0.84$, $p = 0.37$, partial $\eta^2 = 0.05$.

Comparison Group

A repeated measures analysis of variance (RM-ANOVA) was completed for the CSES survey on the treatment group for pre- and post-survey completion (see Table 4). For all analyses, the linear term was positive, but it was only significant for the final analysis related to the effect of time on the CSES *Collective Efficacy in Student Discipline* subscale. The main effect of time on the CSES Overall Score was not significant, $F(1, 12) = 2.39$, $p = 0.15$, partial $\eta^2 = 0.17$. The main effect of time on the CSES *Collective Efficacy in Instructional Strategies* subscale was not significant, $F(1, 12) = 0.57$, $p = 0.47$, partial $\eta^2 = 0.05$. The main effect of time on the CSES *Collective Efficacy in Student Discipline* subscale was significant, $F(1, 12) = 4.89$, $p = 0.05$, partial $\eta^2 = 0.29$.

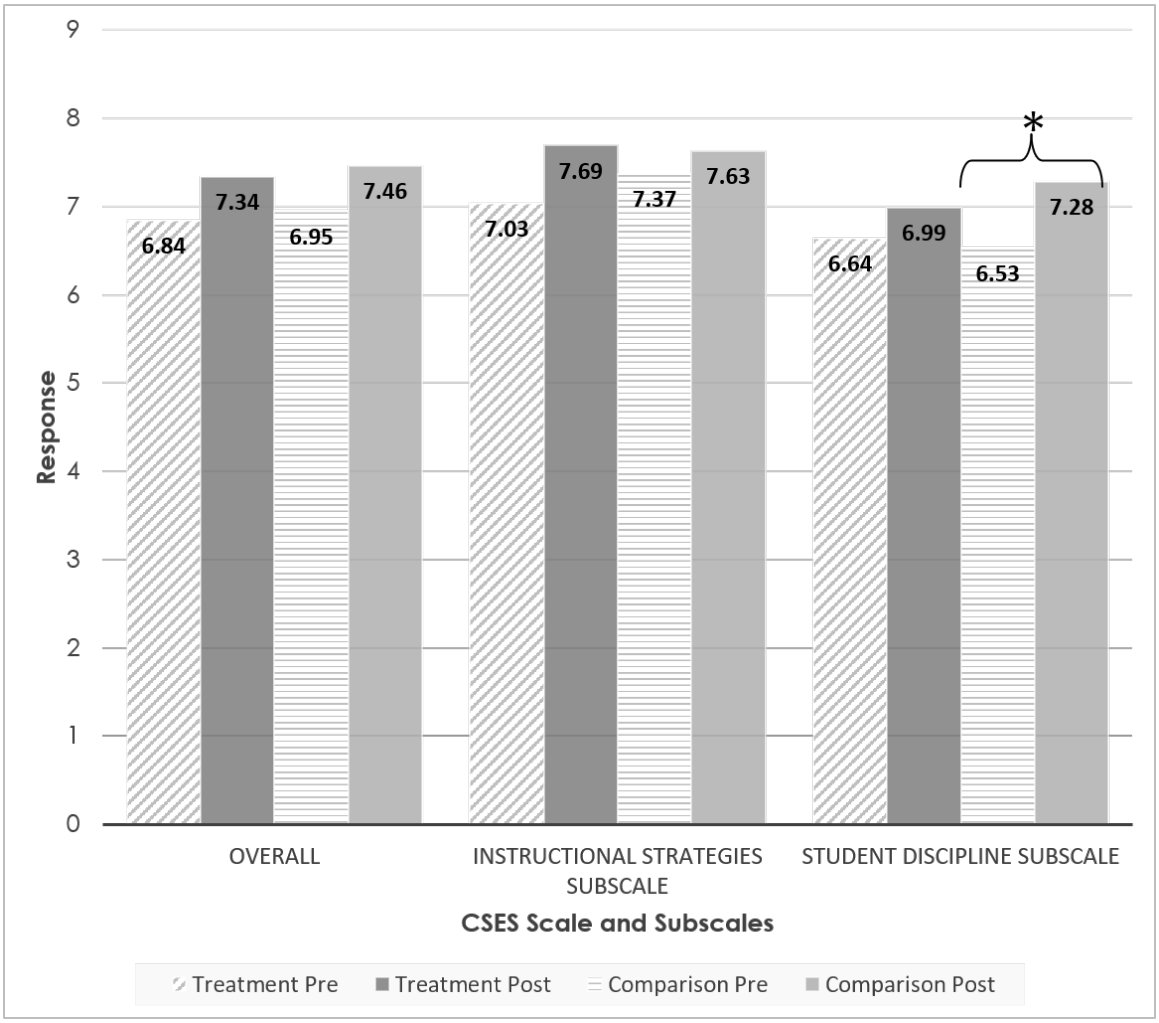
Between Groups

A two-way mixed effects analysis of variance (ANOVA) was performed with the CSES Overall Score and each CSES subscale as the within-subjects factors and Group Status (Treatment or Comparison) as the between-subjects factor (see Table 5). Levene's test indicated that the assumption of homogeneity of variance was not violated for either time point, $F(1, 28) = 0.27$, $p = 0.61$ [Pre] and $F(1, 28) = 0.06$, $p = 0.80$ [Post]. The Treatment group's CSES Overall Score ($M = 6.84$, $SD = 1.69$) was slightly smaller than the Comparison group's CSES Overall score ($M = 6.95$, $SD = 1.03$) at Time 1 [Pre]. Both groups showed an increase in CSES Overall Score for Time 2 [Post], specifically Treatment group ($M = 7.34$, $SD = 1.00$) and Comparison group ($M = 7.46$ $SD = 0.99$). However, results indicated that the interaction effect of Group Status and time on the CSES Overall Score was not significant, $F(1, 28) = 0.90$, $p = 0.77$, partial $\eta^2 = 0.00$. Differences of mean responses from pre to post (within and between groups) are shown in Figure 7.

For the *Collective Efficacy in Instructional Strategies* subscale, the Treatment group's results ($M = 7.03$, $SD = 1.77$) were slightly lower than the Comparison group's results ($M = 7.37$, $SD = 1.11$) at Time 1 [Pre]. Levene's test indicated that the assumption of homogeneity of variance was not violated for either time point, $F(1, 28) = 0.31$, $p = 0.58$ [Pre] and $F(1, 28) = 0.01$, $p = 0.94$ [Post]. Both groups showed an increase in *Collective Efficacy in Instructional Strategies* subscale for Time 2 [Post], specifically Treatment group ($M = 7.69$, $SD = 0.97$) and Comparison group ($M = 7.63$, $SD = 0.94$). Results indicated that the interaction effect of Group Status and time on the CSES

Figure 7

Collective Sense of Efficacy Scale



Note. This figure demonstrates the differences from pre to post for each group on the *Collective Sense of Efficacy Scale*. The patterned shades indicate the pre-treatment results and the darker shade, post-treatment results. If applicable, statistical significance is indicated with an asterisk.

*Statistically significant $p<0.05$

Collective Efficacy in Instructional Strategies subscale was not significant, $F(1, 28) = 0.121$, $p = 0.730$, partial $\eta^2 = 0.004$.

For the Collective *Efficacy in Student Discipline* subscale, the Treatment group's scores (M =6.64, SD = 1.67) were higher than the Comparison group's results (M = 6.53, SD = 1.05) at Time 1 [Pre]. Levene's test indicated that the assumption of homogeneity of variance was not violated for either time point, $F(1, 28) = 0.16$, p = 0.69 [Pre] and $F(1, 28) = 0.46$, p = 0.51 [Post].Both groups showed an increase in *Collective Efficacy in Student Discipline subscale* for Time 2 [Post], specifically Treatment group (M = 6.99, SD = 1.08) and Comparison group (M = 7.28, SD = 1.16). Results indicated that the interaction effect of Group Status and time on the CSES *Collective Efficacy in Student Discipline* subscale was not significant, $F(1, 28) = 0.05$, $p = 0.82$, partial $\eta^2 = 0.002$.

Research Question 3: Does engaging in an online problem-solving PD change individual teachers' confidence related to using the TIPS problem solving model steps?

Treatment Group

A repeated measures analysis of variance (RM-ANOVA) was completed for the TIPS TMSA (Personal) survey on the treatment group for pre- and post-survey completion, and results are presented in Table 3. For all analyses, the linear term was negative and not significant. The main effect of time on the TIPS TMSA (Personal) Overall Score was not significant, $F(1, 16) = 0.92$, $p = 0.77$, partial $\eta^2 = 0.01$. The main effect of time on the TIPS TMSA *Precise Problem Identification/Data Use* subscale was not significant, $F(1, 16) = 0.70$, $p = 0.42$, partial $\eta^2 = 0.04$. The main effect of time on the

TIPS TMSA *Problem-Solving Process* subscale was not significant, $F(1, 16) = 0.00$, $p = 0.99$, partial $\eta^2 = 0.00$.

Comparison Group

A repeated measures analysis of variance (RM-ANOVA) was completed for the TIPS TMSA (Personal) survey on the comparison group for pre- and post-survey completion, and results are presented in Table 4. For all analyses, the linear term was positive and not significant. The main effect of time on the TIPS TMSA (Personal) Overall Score was not significant, $F(1, 12) = 3.71$, $p = 0.08$, partial $\eta^2 = 0.24$. The main effect of time on the TIPS TMSA *Precise Problem Identification/Data Use* subscale was not significant, $F(1, 12) = 2.11$, $p = 0.17$, partial $\eta^2 = 0.15$. The main effect of time on the TIPS TMSA *Problem-Solving Process* subscale was not significant, $F(1, 12) = 3.56$, $p = 0.84$, partial $\eta^2 = 0.23$.

Between Groups

A two-way mixed effects analysis of variance (ANOVA) was performed with the TIPS TMSA (Personal) Overall Score and each TIPS TMSA (Personal) subscale as the within-subjects factors and Group Status (Treatment or Comparison) as the between-subjects factor (see Table 5). Results indicated that the interaction effect of Group Status and time on the TIPS TMSA (Personal) Overall Score was significant, $F(1, 28) = 7.59$, $p = 0.01$, partial $\eta^2 = 0.21$. Levene's test indicated that the assumption of homogeneity of variance was not violated for either time point, $F(1, 28) = 3.63$, $p = 0.07$ [Pre] and $F(1, 28) = 2.51$, $p = 0.12$ [Post]. The Treatment group's TIPS TMSA (Personal) Overall Score ($M = 9.14$, $SD = 0.66$) was higher than the Comparison group's TIPS TMSA (Personal) Overall score ($M = 7.85$, $SD = 1.71$) at Time 1 [Pre]. The Treatment group demonstrated

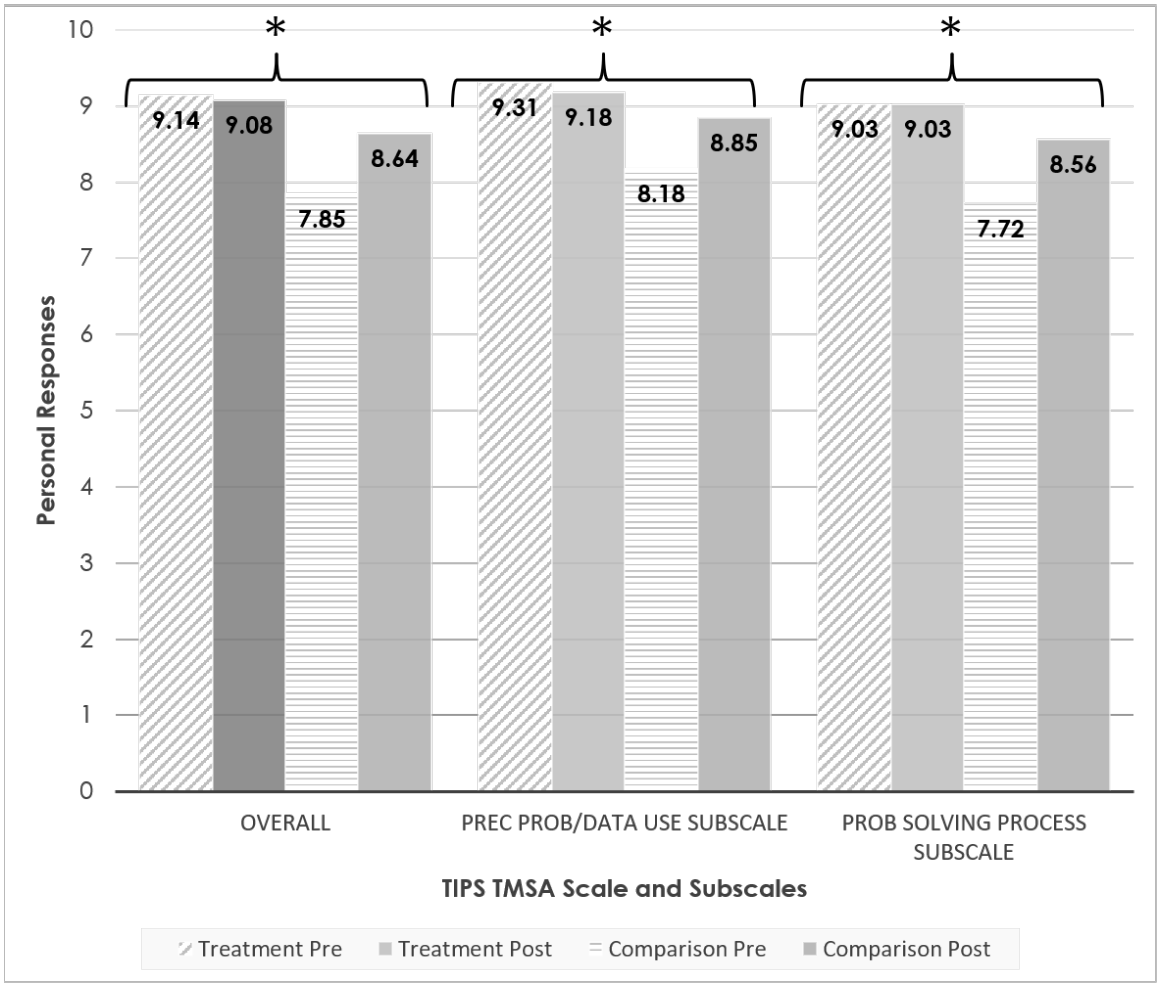
a slight decrease in the TIPS TMSA (Personal) Overall (M = 9.08, SD = 0.62), and the Comparison group showed an increase (M = 8.64, SD = 0.96) for Time 2 [Post]. Differences of mean responses from pre to post (within and between groups) are shown in Figure 8.

For the TIPS TMSA *Precise Problem Identification/Data Use* subscale, the Treatment group's scores (M = 9.31, SD = 0.66) were larger than the Comparison group's scores (M = 8.18, SD = 1.47) at Time 1 [Pre]. The Treatment group showed a slight decrease (M = 9.18, SD = 0.66), while the Comparison group demonstrated an increase in the TIPS TMSA *Precise Problem Identification/Data Use* subscale (M = 8.85, SD = 1.13) for Time 2 [Post]. Results indicated that the interaction effect of Group Status and time on the TIPS TMSA *Precise Problem Identification/Data Use* subscale was significant, $F(1, 28) = 6.33$, p = 0.02, partial $\eta^2 = 0.18$. Levene's test indicated that the assumption of homogeneity of variance was violated for Time 1 [Pre], $F(1, 28) = 5.85$, p = 0.06, but not violated for Time 2 [Post], $F(1, 28) = 3.57$, p = 0.07. Because Levene's test was violated for Time 1, there is an opportunity for bias in those results due to violation of the assumption of homogeneity of variance.

For the TIPS TMSA *Problem-Solving Process* subscale, the Treatment group's scores (M =9.03, SD = 0.81) were higher than the Comparison group's scores (M = 7.72, SD = 1.91) at Time 1 [Pre]. The Treatment group's scores stayed relatively stable (M = 9.03, SD = 0.62), and the Comparison group demonstrated an increase in the TIPS TMSA *Problem-Solving Process* subscale (M = 8.56, SD = 1.01) for Time 2 [Post]. Results indicated that the interaction effect of Group Status and time on the TIPS TMSA *Problem-Solving Process* subscale was significant, $F(1, 28) = 6.59$, $p = 0.02$, partial η^2 =

Figure 8

TIPS Team Member Self-Assessment (Personal Ratings)



Note. This figure demonstrates the differences from pre to post for each group on the *TIPS Team Member Self-Assessment (Personal)*. The patterned shades indicate the pre-treatment results and the darker shade, post-treatment results. If applicable, statistical significance is indicated with an asterisk.

*Statistically significant $p<0.05$

0.19. Levene's test indicated that the assumption of homogeneity of variance was violated for Time 1 [Pre], $F(1, 28) = 3.95$, $p = 0.06$, but not violated for Time 2 [Post], $F(1, 28) = 2.52$, $p = 0.12$. Because Levene's test was violated for Time 1, there is an opportunity for bias in those results due to violation of the assumption of homogeneity of variance.

Research Question 4: Does engaging in an online problem-solving PD change individual teachers' confidence in the school team's ability to follow/use the TIPS problem solving model steps?

Treatment Group

A repeated measures analysis of variance (RM-ANOVA) was completed for the TIPS TMSA (Team) survey on the treatment group for pre- and post-survey completion (see Table 3). For all analyses, the results were not significant, although each linear term differed in direction. The main effect of time on the TIPS TMSA (Team) Overall Score was not significant, $F(1, 16) = 0.186$, $p = 0.672$, partial $\eta^2 = 0.011$.The linear term was positive. The main effect of time on the TIPS TMSA *Precise Problem Identification/ Data Use* subscale was not significant, $F(1, 16) = 0.92$, $p = 0.35$, partial $\eta^2 = 0.05$. The linear term in this case was negative. The main effect of time on the TIPS TMSA *Problem-Solving Process* subscale was not significant, $F(1, 16) = 1.24$, $p = 0.28$, partial $\eta^2 = 0.07$. The linear term was positive.

Comparison Group

A repeated measures analysis of variance (RM-ANOVA) was completed for the TIPS TMSA (Team) survey on the comparison group for pre- and post-survey completion (see Table 4). For all analyses, the linear term was positive and not

significant. The main effect of time on the TIPS TMSA (Team) Overall Score was not significant, $F(1, 12) = 0.99$, $p = 0.34$, partial $\eta^2 = 0.08$. The main effect of time on the TIPS TMSA *Precise Problem Identification/Data Use* subscale was not significant, $F(1, 12) = 0.32$, $p = 0.58$, partial $\eta^2 = 0.03$. The main effect of time on the TIPS TMSA *Problem-Solving Process* subscale was not significant, $F(1, 12) = 1.13$, $p = 0.31$, partial $\eta^2 = 0.09$.

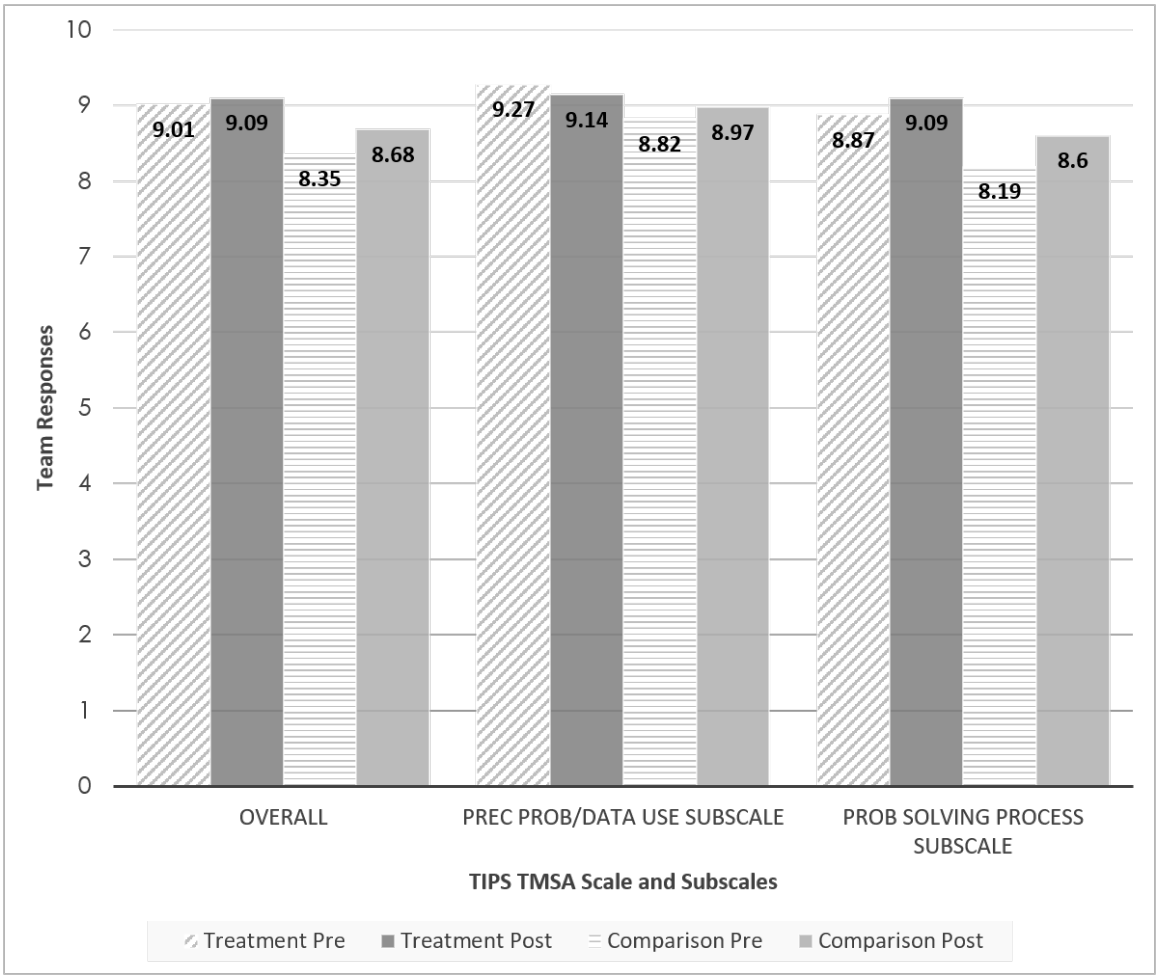
Between Groups

A two-way mixed effects analysis of variance (ANOVA) was performed with the TIPS TMSA (Team) Overall Score and each TIPS TMSA (Team) subscale as the within-subjects factors and Group Status (Treatment or Comparison) as the between-subjects factor (see Table 5). Results indicated that the interaction effect of Group Status and time on the TIPS TMSA (Team) Overall Score was not significant, $F(1, 28) = 2.08$, $p = 0.16$, partial $\eta^2 = 0.07$. Levene's test indicated that the assumption of homogeneity of variance was not violated for either time point, $F(1, 28) = 2.62$, $p = 0.12$ [Pre] and $F(1, 28) = 0.00$, $p = 0.95$ [Post]. The Treatment group's TIPS TMSA (Team) Overall Score ($M = 9.01$, $SD = 1.10$) was higher than the Comparison group's TIPS TMSA (Team) Overall score ($M = 8.35$, $SD = 1.62$) at Time 1 [Pre]. Both groups showed an increase in TIPS TMSA (Team) Overall Score for Time 2 [Post], specifically Comparison group ($M = 8.68$ $SD = 0.92$) and Treatment group ($M = 9.09$, $SD = 1.01$). Differences of mean responses from pre to post (within and between groups) are shown in Figure 9.

For the TIPS TMSA *Precise Problem Identification/Data Use* subscale, the Treatment group's scores ($M = 9.27$, $SD = 0.66$) were larger than the Comparison group's scores ($M = 8.82$, $SD = 1.33$) at Time 1 [Pre]. The Treatment group showed a slight

Figure 9

TIPS Team Member Self-Assessment (Team Ratings)



Note. This figure demonstrates the differences from pre to post for each group on the *TIPS Team Member Self-Assessment (Team)*. The patterned shades indicate the pre-treatment results and the darker shade, post-treatment results. If applicable, statistical significance is indicated with an asterisk.

*Statistically significant $p<0.05$

decrease (*M* = 9.14, *SD* = 0.91) and the Comparison group demonstrated an increase in the TIPS TMSA *Precise Problem Identification/Data Use* subscale (*M* = 8.97, *SD* = 1.01) for Time 2 [Post]. Results indicated that the interaction effect of Group Status and time on the TIPS TMSA *Precise Problem Identification/Data Use* subscale was not significant, $F(1, 28) = 0.78$, $p = 0.38$, partial $\eta^2 = 0.03$. Levene's test indicated that the assumption of homogeneity of variance was violated for Time 1 [Pre], $F(1, 28) = 5.82$, $p = 0.02$, but not violated for Time 2 [Post], $F(1, 28) = 0.00$, $p = 0.97$. Since Levene's test was violated for Time 1, there is an opportunity for bias in those results due to violation of the assumption of homogeneity of variance.

For the TIPS TMSA *Problem-Solving Process* subscale, the Treatment group's scores (*M* = 8.87, *SD* = 1.27) were higher than the Comparison group's scores (*M* = 8.19, *SD* = 1.72) at Time 1 [Pre]. Both groups showed an increase in TIPS TMSA *Problem-Solving Process* for Time 2 [Post], specifically Treatment group (*M* = 9.09, *SD* = 1.02) and Comparison group (*M* = 8.60 *SD* = 0.96). Results indicated that the interaction effect of Group Status and time on the TIPS TMSA *Problem-Solving Process* subscale was not significant, $F(1, 28) = 1.95$, $p = 0.17$, partial $\eta^2 = 0.07$. Levene's test indicated that the assumption of homogeneity of variance was not violated for either time point, $F(1, 28) = 1.34$, $p = 0.26$ [Pre] and $F(1, 28) = 0.45$, $p = 0.51$ [Post].

CHAPTER IV

DISCUSSION

Summary of Major Findings

In this section, I present a summary of major findings organized by topic area associated with each research question.

Teacher Sense of Efficacy. For the treatment group, there were increases in all teacher self-efficacy outcomes from pre to post; however, none of the results were statistically significant. These results align with findings from previous research related to online PD and teacher efficacy, namely teachers' engagement with professional development does have a positive effect on teacher efficacy and personal beliefs; however, the differences were not significant (Fishman et al., 2013; Yoo, 2016). Although the results of these analyses were not significant, some interesting patterns and themes emerged which are worth noting. These differences from pre to post might have been due more to the unique circumstances in which schools were operating during the COVID-19 pandemic, than because of engaging with the online PD modules. One treatment group participant noted:

> I think this year of all years has been a challenge, and growth year, in educators being even more creative and flexible in coming up with new ways to engage students in their learning and providing those fundamental routines and structures to help students know what the expectations are and get the reinforcement to be a part of their learning community.

For the comparison group, there were increases in the mean TSES scores overall, as well as in the *Student Engagement* and *Classroom Management* subscales. None of

these results were statistically significant, however. Within the comparison group's answers to the qualitative question, responses were mixed. One participant noted that "The answers changed somewhat, but many of the strategies work the same in the classroom as they do online. Teaching online is more challenging and keeping the students engaged is definitely more difficult." Another participant stated, "classroom management and morale is influenced by the pandemic due to at-home learning."

Despite there being differences in the mean scores on the TSES Overall and associated subscales, none of the differences were statistically significant between the two groups. Of note, the treatment group only consisted of one person who identified themselves as a teacher, whereas the comparison group included eight people who identified as teachers. This difference in scoring in these areas could be due to varying perspectives. For example, classroom teachers have had to endure many of the challenges associated with the pandemic, including delivering instruction to students in either an exclusively online or hybrid format. This shift was a substantial departure from traditional classroom instructional practices and required a significant amount of effort, persistence, and resilience from classroom teachers. The participants in the comparison group had a relatively strong sense of efficacy to begin with, which prior research suggests might help them to get through challenges (Tschannen-Moran et al., 1998). Therefore, their perspective is likely to show less growth over time.

As noted earlier, a strong sense of efficacy has been shown to relate to a range of positive teaching behaviors, such as experimenting with various instructional methods (Guskey, 1988; Stein & Wang, 1988), greater levels of planning and organization (Allinder, 1994), and persistence and resilience in the face of challenges (Tschannen-

Moran et al., 1998). The treatment group may have had a more positive perspective because they were not as immersed in the day-to-day classroom practices as those in the comparison group, and they have an overall high positive regard for their colleagues who have been in those positions.

Collective Efficacy. For the treatment group, there were increases in all collective efficacy outcomes from pre to post; however, none of the results were statistically significant. As stated earlier, the perspectives of the treatment group may differ from the perspectives of the comparison group due to the difference in identified role within the school setting. The increase in the *Collective Efficacy in Instructional Strategies* subscale could be due to the positive regard that this group places on the teaching profession and their colleagues, especially during the challenges associated with the pandemic. For example, one participant wrote, "I think the pandemic has given us an opportunity to reflect on, and evaluate, the foundational importance of relationships with students, families and our colleagues and how those relationships have a direct correlation to academic and behavior gains." The increase in teacher scores on the *Collective Efficacy in Student Discipline* subscale may be due to students presenting fewer or different types of behavior challenges than previously experienced and/or educators being able to respond in a different manner than they had previously. One participant noted "The pandemic has allowed some teachers to be a little more patient with students knowing there are other issues involved."

For the comparison group, there were increases in the mean CSES scores overall, as well as in both the *Collective Efficacy in Instructional Strategies* and *Collective Efficacy in Student Discipline* subscales. The difference in the *Collective Efficacy in*

Student Discipline subscale was the only one that was statistically significant. Although the *Collective Efficacy in Student Discipline* subscale scores were significantly more positive in the post-survey (+0.75), the qualitative responses from the comparison group were mixed. For example, one participant stated, "Classroom behavior is easier to control because you can mute disruptive students." Another participant noted:

> These answers would definitely be less positive if we were forced to go back to online learning. Teachers would still have the ability to help students learn, but not to the same high levels as in-person classes. Behavior is more difficult to manage while online too as is controlling the level of safety of a child while they are not in the same place as yourself.

However other participants had a more negative view, indicating "...it is more difficult to address those students who remain at home" and "being on a virtual platform [is] much more challenging to enforce classroom rules."

Both groups demonstrated an increase in mean scores over time, yet the differences between the groups were not significant. Interestingly, on the *Collective Efficacy in Instructional Strategies* Subscale, the treatment group showed a greater increase than the comparison group. On the other hand, for the *Collective Efficacy in Student Discipline* subscale, the comparison group's increase was much larger than the increase experienced by the treatment group. These differences might be attributed to the contrasting roles identified within each group and their relative perspectives. Because the treatment group consisted primarily of educators whose roles typically are not in the classroom (e.g., administrator, related service provider, etc.), it is quite possible that they held a more positive outlook and view on the skills of their colleagues when it came to

instructional strategies. Alternatively, most of the comparison group was comprised of teachers, and they may have felt that their skills and abilities with respect to behavior and discipline were most impacted while teaching during the pandemic.

TIPS Problem Solving. For the treatment group, there were slight decreases in the overall mean, as well as within both subscales for the TIPS Team Member Self-Assessment (Personal ratings) from pre to post; however, none of the results were statistically significant. One explanation could be that because several treatment group participants had prior knowledge or experience with the TIPS model (six), they may have over-estimated their personal and the team's collective abilities before engaging with the PD modules. Thus, when they completed the post-survey to assess their skills, their responses shifted only slightly. According to Tschannen-Moran et al. (1998), "people tend to overestimate or underestimate their actual abilities, and these estimations may have consequences for the courses of action they choose to pursue or the effort they exert in those pursuits. Over- or underestimating capabilities may also influence how well people use the skill they possess" (p. 211). Another explanation could be that due to the pandemic and shifting priorities, the team members had difficulty engaging in the problem-solving practices on a consistent basis and building fluency with the processes. Several participants noted many external factors that influenced their responses during the post-survey completion. Having a consistent opportunity to meet as a team, limited access to behavior and discipline data typically used for screening and/or decision making, students presenting challenges that required alternative resources, and difficulty coordinating resources for students to help achieve identified goals were all factors that

were listed by participants in their qualitative responses. One participant summed up the experience by saying:

> The pandemic has absolutely influenced about 90% of my responses to this survey. The reasoning for this is that our teachers did not fill out as many major referrals while teaching virtually as they would have if we were learning in person; therefore, we were unable to have the data to work with and the number of students identified for Tier 2 dropped drastically. With more practice in these areas of identifying goals and solutions, I feel the responses will be higher in the future as we resume in-person learning.

For the comparison group, there were increases in means overall and within each subscale on the TIPS Team Member Self-Assessment, for both their personal ratings and their team ratings from pre to post; however, none of the results were statistically significant. The comparison group's qualitative responses during the post survey were much more positively focused and demonstrated more confidence in both their own and their team's abilities to problem solve and support students. These perceptions seem related to the unique circumstances of the pandemic. For example, one person stated,

> We've been dealing with more students lacking the necessary skills to do grade level work…So we have had to use data and problem solving to try to determine where the deficits are in many more students this year. Then we've had to implement far more interventions and catch students up between teaching core standards. I've really relied on my team and we've become much better at using data and working collaboratively to solve problems.

Another participant had a similar viewpoint:

> Since we were virtual for most of the school year, we had to implement so many new ideas while dealing with new issues. We were still able to come together as a group and collectively come up with solutions to both major and minor issues. We work so well together in sharing data and ideas that there really isn't anything we aren't capable of tackling.

There were distinct differences between the groups in their responses from pre to post on both the personal and team ratings of the TIPS Team Member Self-Assessment. The differences in personal ratings were statistically significant, while the differences in team ratings were not. Although the responses for the treatment group were higher than the comparison group on the pre-treatment survey, the comparison's groups responses were more similar to the treatment group's responses on the post-treatment survey. These differences were likely attributed to the same reasons stated previously.

Limitations of Study

As with any research study, there are limitations. Within this study, there were several limitations related to both internal and external validity.

History. During the beginning of the study, a widespread school closure occurred in many states due to a global pandemic. This circumstance and the movement to distance learning for schools for most of the school year throughout the majority of time when this study was being conducted was likely the biggest factor and influence on the results of this study. The school closures impacted the treatment group's initial access to the online PD modules. It also extended the timeframe for completion of the modules. In some cases, the post-surveys were completed by treatment participants almost one year

after initial survey completion, allowing for more time to assimilate the information and build confidence and fluency. In other cases, treatment participants only had eight weeks between pre- and post-survey completion, which gave them limited time to grasp the information and put it into practice. Further, attention and focus were shifted from the traditional practices and processes for a Tier 2 team to other areas of support needed within the school setting.

Testing. Although all surveys were administered at least two months apart from one another, one group had a much shorter period of time between administrations. This group may have remembered how they responded on the initial survey and skewed their responses toward the positive during post-survey completion.

Instrumentation. The intended outcomes of engaging with the TIPS PD content were to improve skills related to using with the TIPS problem solving process. The constructs of teacher efficacy and collective efficacy are only tangentially related to the skills and practices covered within the PD content. Thus, the two efficacy measures used in this study (*Teacher Sense of Efficacy Scale – Short Form* and *Collective Sense of Efficacy Scale*) do not provide a true alignment to the intended outcomes of the PD.

One measure within this study, the *TIPS Team Member Self-Assessment*, is more aligned with the intended outcomes of the PD and would be a more appropriate measurement tool, however it has not been formally validated. A similar version has shown strong reliability and validity; therefore, the technical adequacy of this instrument is anticipated to be similar. Although the measure was triangulated with other data sources that have strong technical adequacy (the *Teacher Sense of Efficacy Scale* and the

Collective Teacher Efficacy Scale), the results from this survey should be interpreted with caution until it is formally validated.

Further, each of the measures in this study used a Likert scale with a wide range (1-9 for each of the efficacy scales, and 1-10 for the TIPS TMSA). Because of the wide range and the small sample size, variance in responses from pre- to post- were minute and likely contributed to the insignificant results.

Attrition. Because of the forced closure of schools for an extended period due to the global pandemic, as well as the length of time of the study, attrition was a factor in this study. The original sample included over fifty participants, but by the end of the study, only 30 participants (60% of the original sample) remained across the two groups. Even though a small stipend was offered to those who completed surveys at both time periods, and several requests were made for completion of the post-surveys, these incentives failed to encourage nearly 40% of participants to contribute.

Sample Limitations. To increase the generalizability of findings, school teams were recruited from several states representing various regions of the country. Further, the schools selected represent varied geographical areas and types of urbanicity (i.e., rural, urban, and suburban). However, the sample was a convenience sample, and too small to generalize to a larger population.

Implications of the Findings

Overall, due to the extenuating circumstances of the pandemic, it is hard to say definitively that engagement with the online problem-solving PD modules resulted in positive shifts in perceptions of personal efficacy, collective efficacy, and/or problem-solving skills. Despite the influence of the pandemic, the results of this study are

consistent with previous research comparing face-to-face and online PD, indicating that there are no significant differences in learner outcomes (Fishman et al., 2013; Gaumer Erickson et al., 2012; Means et al., 2009). This finding does not mean online delivery of the TIPS problem-solving PD is not effective, though. It can be argued that it is an equally effective delivery method as face-to-face, and desirable outcomes are not necessarily dependent on PD modality (Fishman et al., 2013).

Opportunities for Future Research

There are several opportunities for future research, especially because the pandemic had such an impact on the results. One opportunity is to repeat the study with a larger sample and focus on Tier 1 problem solving teams, rather than Tier 2 problem solving teams. Tier 1 problem solving teams look more at system-wide concerns, and building fluency with the problem-solving process may have a broader impact on the overall data-based decision-making skills and collective efficacy of the team members. Further, Tier 1 teams are typically comprised of more general educators, so a comparison with a job-alike group would be more appropriate to explore differences between the groups. Another opportunity is to replicate the study and compare rural and suburban or urban settings. It would be helpful to know if there are benefits experienced specifically by rural educators. One other factor that was not explored in this study is whether the teams had access to coaching supports and if those supports had any influence or impact on the outcomes.

Another area of research to explore is the use of the TIPS Team Member Self-Assessment survey as a valid measure of team members' perceptions of their personal and team's problem-solving skills. As previously mentioned, the exact tool used in this

study has not been validated; therefore, engaging in a validation process would be useful. If found to have technical adequacy, the tool could be used as another resource for assessing problem-solving skills specific to the TIPS problem-solving model.

Another research opportunity is to explore the implications of engaging in online PD in a post-pandemic world. Although online PD can be more cost effective, readily available, and accessible to many, the question remains as to whether it is a preferred method by educators. Since educators are spending an increasing amount of time online to deliver instruction due to the pandemic, it would be interesting to consider whether engaging with PD via an online format is preferred or aversive.

Finally, future research could focus on more distal outcomes, primarily around benefits to students. Although there may not be a significant impact in participants' perceptions, students may benefit from the increased knowledge and experience of the participants.

Recommendations for the Field

Based on my professional experience and the lessons learned through the process of this study, I have several recommendations for consideration that may improve the outcomes associated with engaging in the online TIPS PD. Ensuring inclusion of what is known of effective PD, especially in the context of online learning, can bolster the impact of the online learning modules. The modules in the TIPS PD incorporated many of the suggested features from the research, namely introduction and demonstration of the content through various modalities, engaging educators in content-focused activities, and collective participation from the same school (Desimone, 2009; Trivette et al., 2009, Surrette & Johnson, 2012).

A few areas that could be improved are spreading module completion over an extended period of time of at least 20 hours, providing opportunities for active engagement through interactive discussion and/or ways for participants to reflect on their learning, and reviewing work products and sharing feedback (Desimone, 2009; Trivette et al., 2009, Surrette & Johnson, 2012). Further, identifying the technical knowledge required for completion of the online PD modules and assessing the associated skill sets of the participants can help provide a better match between participants and the PD delivery method and improve outcomes (Koehler and Mishra, 2009).

Finally, engaging in the online PD alone is not sufficient and outcomes could be improved by adding and focusing on coaching supports. The addition of coaching supports has been found to increase content knowledge, skill demonstration, and sustained use of evidence-based practices within the classroom (Joyce & Showers, 2002; Knight, 2009; Stormont, et al., 2015). Online PD could provide a mechanism for establishing ongoing, job-embedded feedback support that could be conducted in real time and actually change educators' practices long-term (Dede et al., 2009).

Conclusion

In conclusion, using data and engaging in a problem-solving process are necessary skills for today's educators, and the TIPS model provides an evidence-based model to help educators build fluency with these skills. This study explored the impact of delivering the professional development for TIPS in an online format on teachers' sense of personal and collective efficacy, as well as on their perceptions of their personal and team members' problem-solving skills. Although the results indicate there were no significant differences within the treatment or comparison groups, and only a few

significant differences between the groups, it does not mean the online delivery format for TIPS was not successful. An alternative conclusion is that the online delivery format is equally effective as the face-to-face format and can offer a viable substitute for future professional development offerings.

APPENDIX A

TEACHER SENSE OF EFFICACY SCALE – SHORT FORM

Teacher Beliefs

This questionnaire is designed to help us gain a better understanding of the kinds of things that create challenges for teachers. Your answers are confidential.

Directions: Please indicate your opinion about each of the questions below by marking any one of the nine responses in the columns on the right side, ranging from (1) "None at all" to (9) "A Great Deal" as each represents a degree on the continuum.

Please respond to each of the questions by considering the combination of your *current* ability, resources, and opportunity to do each of the following in your present position.

	None at all		Very Little		Some Degree		Quite A Bit		A Great Deal
1. How much can you do to control disruptive behavior in the classroom?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2. How much can you do to motivate students who show low interest in school work?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3. How much can you do to calm a student who is disruptive or noisy?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
4. How much can you do to help your students value learning?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
5. To what extent can you craft good questions for your students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6. How much can you do to get children to follow classroom rules?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
7. How much can you do to get students to believe they can do well in school work?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
8. How well can you establish a classroom management system with each group of students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
9. To what extent can you use a variety of assessment strategies?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
10. To what extent can you provide an alternative explanation or example when students are confused?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
11. How much can you assist families in helping their children do well in school?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
12. How well can you implement alternative teaching strategies in your classroom?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

APPENDIX B

COLLECTIVE TEACHER EFFICACY SCALE

Collective Teacher Beliefs

This questionnaire is designed to help us gain a better understanding of the kinds of things that create challenges for teachers. Your answers are confidential.

Directions: Please indicate your opinion about each of the questions below by marking any one of the nine responses in the columns on the right side, ranging from (1) "None at all" to (9) "A Great Deal" as each represents a degree on the continuum.

Please respond to each of the questions by considering the *current* ability, resources, and opportunity of the teaching staff in your school to do each of the following.

	None at all		Very Little		Some Degree		Quite A Bit		A Great Deal
1. How much can teachers in your school do to produce meaningful student learning?	①	②	③	④	⑤	⑥	⑦	⑧	⑨
2. How much can your school do to get students to believe they can do well in schoolwork?	①	②	③	④	⑤	⑥	⑦	⑧	⑨
3. To what extent can teachers in your school make expectations clear about appropriate student behavior?	①	②	③	④	⑤	⑥	⑦	⑧	⑨
4. To what extent can school personnel in your school establish rules and procedures that facilitate learning?	①	②	③	④	⑤	⑥	⑦	⑧	⑨
5. How much can teachers in your school do to help students master complex content?	①	②	③	④	⑤	⑥	⑦	⑧	⑨
6. How much can teachers in your school do to promote deep understanding of academic concepts?	①	②	③	④	⑤	⑥	⑦	⑧	⑨
7. How well can teachers in your school respond to defiant students?	①	②	③	④	⑤	⑥	⑦	⑧	⑨
8. How much can school personnel in your school do to control disruptive behavior?	①	②	③	④	⑤	⑥	⑦	⑧	⑨
9. How much can teachers in your school do to help students think critically?	①	②	③	④	⑤	⑥	⑦	⑧	⑨
10. How well can adults in your school get students to follow school rules?	①	②	③	④	⑤	⑥	⑦	⑧	⑨
11. How much can your school do to foster student creativity?	①	②	③	④	⑤	⑥	⑦	⑧	⑨
12. How much can your school do to help students feel safe while they are at school?	①	②	③	④	⑤	⑥	⑦	⑧	⑨

APPENDIX C

TIPS TEAM MEMBER SELF-ASSESSMENT SURVEY

Please indicate the degree to which you are confident in your (personal) or your Tier 2 team's ability to implement the components identified.

1. Collaborate to establish team foundations for effective and efficient problem solving.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

2. Fulfill assigned role(s) as a member of the team.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

3. Attend team meetings regularly and on time.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

4. Identify and precisely define one or more student social and/or academic problems.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

5. Use quantitative data to identify/define the problem.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

6. Establish a goal for the defined problem.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

7. Select a solution (intervention) for resolving the problem.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

8. Identify additional data to be gathered to determine whether the goal has been met.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

9. Determine a date by which the goal is to be achieved.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

10. Create a plan for monitoring fidelity of solution implementation.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

11. Achieve solution implementation integrity.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

12. Compare the current status of the problem against the goal and make a decision about what actions should be taken next.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

13. Succeed at solving the student problem(s) that has/have been targeted for reduction/ elimination.

	1 = Not at all confident									10 = Highly confident
Your (personal)	1	2	3	4	5	6	7	8	9	10
Tier 2 Team	1	2	3	4	5	6	7	8	9	10

APPENDIX D

QUALTRICS SURVEY FORMAT

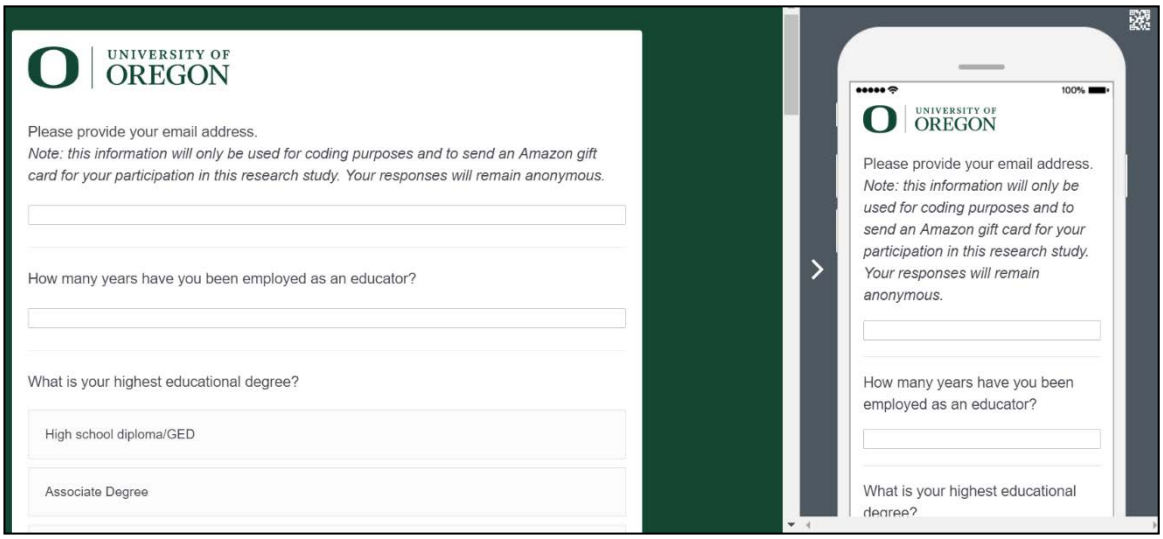


Figure D1. TIPS Ed Tech Pre-Module Survey (Treatment Group) format and design via Qualtrics survey platform.

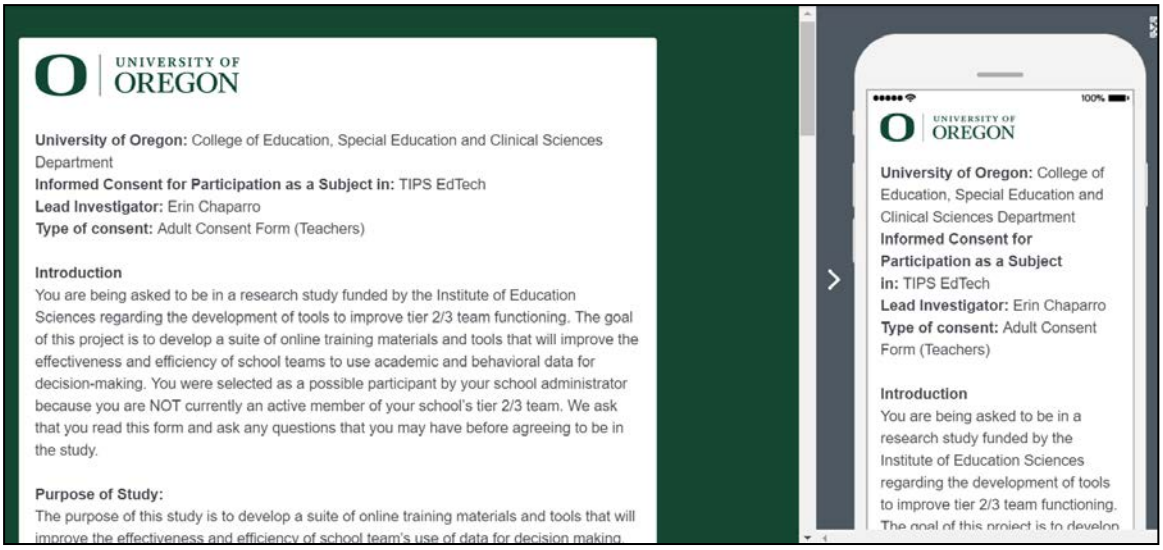


Figure D2. TIPS Ed Tech Pre-Module Survey (Comparison Group) format and design via Qualtrics survey platform

APPENDIX E

QUALITATIVE RESPONSES

Many educators have experienced changing circumstances as a result of the pandemic. In thinking about your responses to this section, how do you think the pandemic has influenced your responses on this survey?

[Note: These responses were copied directly from the survey responses and spelling, grammar, and punctuation were unchanged.]

TSES Qualitative Responses

Treatment Group

- I think this year of all years has been a challenge, and growth year, in educators being even more creative and flexible in coming up with new ways to engage students in their learning and providing those fundamental routines and structures to help students know what the expectations are and get the reinforcement to be a part of their learning community.
- I have many students who have home life's not conducive to learning, and parents who don't value it. I feel a bit discouraged about how much I can motivate students to value learning when they are in an environment while I'm teaching that doesn't value it (while teaching virtually).
- See answer prior in regards to continuing 100% virtual for the 2020-2021 school year thus far. Assisting families came to the front of our workload and expectations this school year more so than usual.
- I am not in the classroom, but as the administrator I can help in the classrooms. The experience has made me more aware of student emotional behaviors.
- The biggest challenge we have right now is getting families to show up at school - some have checked out over the past year and will not engage with us. Even home visits are not effective. Intensive behaviors from students who have been isolated for so long are also challenging, but we are managing them well.
- My job is not in the classroom so these questions were more difficult.
- again we are in school in person so right now it has not impacted us drastically, if we go to virtual school I will be able to impact students very little.
- The first few questions were 100% altered as a result of the pandemic. I felt like our hands were tied in so many areas of education and it completely took our behavior management strategies a few steps back; however, I am happy to report that we carried out many of the same Tier 1 incentives through our virtual learning as we would have if we were in person (i.e. virtual points, monthly blowouts, etc.)

- I am not a classroom teacher so questions were answered from that perspective. The pandemic has changed how we look at regular attendance in school at this time.

Comparison Group

- Hard to get parent feedback.
- I remain able to administer the assessments I've used in the past. This aspect has not changed much as a result of the pandemic. However, classroom management and morale is influenced by the pandemic due to at-home learning.
- There is less time to do some of the things listed above in hybrid learning.
- Again it is more difficult to address the students who remain online vs in person.
- It is really hard to control the behavior when you are not in the same room as the students. We are totally online, and I teach second grade. I have students that just walk away from the camera and don't come back for a while. I have others that disrupt and many that don't do the work because they think there is no consequence. Some of them don't even try to do well in the tests, they just guess at the multiple choice answers. It's very disheartening.
- I have been proactive in working with families. I message them daily and call weekly to be sure they are on board.
- Management of disruptive behavior has been much more difficult within the virtual platform.
- The answers have changes somewhat, but many of the strategies work the same in the classroom as they do online. Teaching online is more challenging and keeping the students engaged is definitely more difficult.
- Its made it easier for me to try and engage with students on a personal level
- I focus on fostering an a positive and enriching environment. I try to assure all students are taken care of by utilizing many different teaching strategies to cover all learning types.

CSES Qualitative Responses

Treatment Group

- I think the pandemic has given us an opportunity to reflect on, and evaluate, the foundational importance of relationships with student, families and our collegues and how those relationships have a direct correlation to academic and behavior gains.
- We remain fully virtual since the beginning of the 2020-2021 school year. Educators are being creative when it comes to virtual expectations and adapted to our school's virtual expectations for students and families.

- The pandemic has allowed some teachers to a little more patient with students knowing there are other issues involved.
- My response would not change. Teachers are the biggest influence on students behavior and learning.
- Our Tier 2 programs are so effective with students as shown by our data; however, this year we were unable to provide as many SAIG groups. We did continue CICO and our SITT Tier 2 programs virtually but it did not seem to have the same impact as it does if we were in person.
- Professional development for teachers to prevent and respond to student behavior has always been on the back burner in our district. Upon the reopening of schools, the district had several new initiatives (teacher evaluation system and continued curriculum work) and still did not take time to respond to the reintegration needs of students/teachers.

Comparison Group

- Classroom behavior is easier to control because you can mute disruptive students.
- Again it is more difficult to address those students who remain at home.
- The pandemic hasn't effected this part for me.
- Thoughts for this section have been based off of previous school years, as this year we have remained on the virtual platform so far.
- These answers would definitely be less positive if we were forced to go back to online learning. Teachers would still have the ability to help students learn, but not to the same high levels as in-person classes. Behavior is more difficult to manage while online too as is controlling the level of safety of a child while they are not in the same place as yourself.
- None at this time
- being on a virtual platform much more challenging to enforce classroom rules

TMSA Qualitative Responses

Treatment Group

- we have a mask mandate that can make some decisions about the reasons for student behavior hard.
- The pandemic has impacted the ability to be in-person for much of the year so that has shifted the way that meetings are conducted and information is shared.
- Thinking about the pandemic and our program this year, it is much more difficult to coordinate coaches who will work with CICO students, and that probably effected my scoring thinking of outside factors that may contribute to making reaching goals more difficult.

- Due to the pandemic, myself and the team had to be even more creative when designing and coming up with solutions to problems in both academic and social/emotional areas. Due to the fact that we were completely virtual the entire time, family connections were even more important than usual. Limitations were very evident when it came to fidelity, implementation and buy-in. The foundations provided through this experience helped scaffold this new endeavor.
- The pandemic has been a very touch situation for all of us in different ways. As I reflect on our situation, I think that with our district pushing to be in school in person has been a very positive thing. Granted there have been hard and frustrating days, but overall teachers attitudes are positive and students are willing to be here in person and wear masks. It could have been so much worse and we are lucky that we have the support of all stakeholders.
- I continue to try to be more minded.
- I believe my Tier 2 team has not changed our mindset about helping our students. Our biggest challenge has been parent involvement; we have a care & connection strategy in place.
- Moving to an all virtual meeting format was a challenge, but now that we have it dialed in, it's fine. The online training was super helpful, and the coaching support from Heather and Cherice has been top notch.
- I think that the pandemic has made us more urgent in getting the protocols in place.
- I do not feel it has influenced it at all, we are currently attending school in person and this has made all the difference, If we have to go virtual then the lack of contact would negatively affect our outcomes due to not being able to work with the students at a level that can create significant change in the areas of academic and behavioral concern.
- Our Tier 2 students look different online vs in school building and creating goals/interventions looks different as well.
- With students in CDL, we haven't had many referrals so it has been challenging to have quantitative data to build a problem statement around. A lot of the work we have done for students has been based off what we know about them and the needs they had when we were in the building full time.
- The pandemic has absolutely influenced about 90% of my responses to this survey. The reasoning for this is that our teachers did not fill out as many major referrals while teaching virtually as they would have if we were learning in person; therefore, we were unable to have the data to work with and the number of students identified for Tier 2 dropped drastically. With more practice in these areas of identifying goals and solutions, I feel the responses will be higher in the future as we resume in-person learning.
- There are many competing priorities at this time. Participation in an additional team meeting is a big ask in some cases, so regular attendance is compromised.

Comparison Group

- It has been easier to meet due to virtual meetings.
- Tier 2 responses have had to change immensely during the pandemic, which is making simple solutions more complex. It is a matter of having a strong team to implement and collaborate on solutions that fit the needs of our students going through this pandemic.
- I based ratings on past history. There has not been much to discuss at this level this year -- most issues have been related to home life, lack of resource, etc. So we're tackling those types of issues as they arise.
- The pandemic has challenged us to think outside the box and be creative with how we reach kids and meet their needs.
- I think we have overcome many obstacles to meet student needs. It is more difficult to address the behavior of students who remain online.
- I don't think the pandemic has changed my answers.
- The pandemic hasn't really influenced me more than any other year.
- As our school district has remained on a completely virtual platform for the first half of this school year, it has made implementation of Tier 2 strategies much more difficult; however, I believe our team has done a great job in trying to accommodate during this difficult time.
- We've been dealing with more students lacking the necessary skills to do grade level work. At the beginning of the year the majority of our 4th graders were below basic in both reading and math skills. So we have had to use data and problem solving to try to determine where the deficits are in many more students this year. Then we've had to implement far more interventions and try to catch students up before teaching core standards. I've really relied on my team and we've become much better at using data and working collaboratively to solve problems.
- Lack of opportunity to meet
- Not being able to meet in person - bounce ideas off each other- it is much harder to do in a virtual meeting
- Since we were virtual for most of the school year, we had to implement so many new ideas while dealing with new issues. We were still able to come together as a group and collectively come up with solutions to both major and minor issues. We work so well together in sharing data and ideas that there really isn't anything we aren't capable of tackling.

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