Relationship Between Teacher Self Efficacy and Teacher Behaviors and Academic Achievement

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Abstract

The purpose of this study was to identify the relationship between teacher self-efficacy (TSES) score and observable teacher instructional behaviors (CSAS) score and student academic achievement (SOL) score. This study addressed the following question: What is the relationship between teacher self-efficacy and teacher behavior and student academic achievement? More specifically, the researcher studied the relationship between teacher self-efficacy score and observable teacher instructional behaviors score, teacher self-efficacy scores and student academic performance score, and observable teacher instructional behaviors score and student academic performance score. Research on implications that TSE has on teacher behaviors adds to a relatively limited literature base that holds possibilities for leaders to elicit positive school change through improved instructional practices and higher student achievement.

To establish whether there was a relationship between TSE and observable teacher instructional behaviors, TSE and student academic achievement and observable teacher instructional behaviors and student academic achievement, this study used a quantitative analysis method that utilizes a simple linear regression model. The simple linear regression model isolated observable teacher behavior in model 1 and student academic achievement in model 2 and model 3 as the dependent variable. Control variables included limiting the study to 20 teachers who teach core curriculum subjects in grades 6-12 that also have an end of course Virginia Standards of Learning assessment (SOL).

The researcher identified regression relationships and their statistical significance and interpreted results to reach a conclusion that addressed each research question. The researcher highlighted potential relationships between teacher self-efficacy and student achievement, teacher self-efficacy and observable teacher instructional behaviors and observable teacher instructional behaviors and student achievement. This included a finding that the relationship between teacher self-efficacy and student achievement for the participants in this study was significant and positively correlated. The model indicated that TSE explained 42.1% of variations in student SOL scores. The regression relationship between TSE and student SOL scores revealed a positive correlation since the standardized coefficient was $0.463 > 0$. That is as the teacher's self-efficacy score increased then the student SOL scores improved.

Implications for practitioners included principals considering professional development opportunities that support increased teacher self-efficacy and promote stronger student engagement in the learning process and identifying non-instructional behaviors that teachers engage in that might negatively impact student achievement. Recommendations for future investigation were also suggested by the researcher and included expanding the study to increase the number of participants. Increasing the number of participants would allow for an increase in the total number of TSES scores, CSAS scores, and student achievement scores.

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General Audience Abstract

This study examined the relationship between teacher self-efficacy and observable teacher instructional behaviors and student academic achievement scores. The study included 10 secondary teachers who taught a core curriculum course to students in grades 6-12 that also included an end of course Virginia SOL test for students. All of the participants in this study were from the same medium-sized school district in Virginia.

The data analysis in this study determined that there was a statistically significant relationship between teacher self-efficacy and student achievement. Data analysis also determined a positive relationship between teacher self-efficacy and student achievement indicating that as the teacher's self-efficacy score increased the student achievement scores improved. The study described the relationship between teacher self-efficacy and observable teacher instructional behaviors for the participants in this study indicating TSE explained some of the variance in teacher instructional behaviors. The relationship between the variables was not statistically significant but they were positively correlated. That is, as the teacher's self-efficacy increased then the frequency of the teacher's observable instructional behaviors during the teaching process also increased.

The researcher determined that the relationship between teacher instructional behaviors and student achievement (SOL scores) for the participants in this study was not statistically significant. The model supported that teacher instructional behaviors explained a small amount of the variance in student achievement.

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Dedication

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Chapter One

Introduction

Self-efficacy is one of the constructs of the attitudinal domain, which is defined as how individuals judge and perceive their ability to perform a specific task (Dehbozorgi et al., 2022). It is rooted in self-regulation as an integral part of the social cognitive theory and includes one's perception that they can successfully accomplish given tasks and apply previously learned skills (Dehbozorgi et al., 2022). For years researchers have studied associations between teacher self-efficacy and student academic achievement. Shahzad (2017) concurred with Ashton and Webb (1986) that teachers with higher levels of self-efficacy are more skillful instructional practitioners, better organized, and are more successful in engaging students in the learning process through high quality questioning practices. Teachers with high self-efficacy are skillful in providing clear explanations to students so they can better solve complex academic problems. Conversely, teachers with low levels of self-efficacy are less receptive to constructive feedback and feel threatened to be questioned, have difficulty maintaining tasks and feel challenged in countering student affairs (Shahzad, 2017).

The purpose of this study was to identify the relationship between teacher self-efficacy and teacher behaviors and student academic achievement. A study by Woolfolk and Hoy (1990) found relations between teacher efficacy (i.e., confidence in positively managing the classroom) and student achievement (Poulou et al., 2019). Generally, teachers with higher self-efficacy are more likely to manage the classroom effectively (Tschannen-Moran, Woolfolk, & Hoy, 2007), show higher instructional quality (Holzberger, Philipp, & Kunter, 2013), use more differentiated instruction and constructivism (Suprayogi, Valcke, & Godwin, 2017), develop challenging

lessons (Deemer, 2004), use classroom management and instructional methods to encourage student autonomy, and keep students on task (Chao et al., 2017; Miller et al., 2017).

A study conducted by Tournaki and Podell (2005) looked at the influence of teacher's predictions about student performance and teacher behaviors. Published records of more than 300 teachers revealed that teachers with high efficacy had more accurate predictions about their students and when they predicted incorrectly they sought to understand why their prediction was not accurate; whereas teachers with low efficacy mostly made inaccurate predictions about their students (Shahzad, 2017). Finally, a study of 80 teachers and 150 high school students conducted by Mojavezi (2012) included administering a TSE scale to gauge the teacher's sense of self-efficacy and a questionnaire to score students' motivational level. The researchers' findings supported Bandura's observations (1994) that teachers who have a high sense of self-efficacy about their classroom competence can motivate their students and improve their cognitive development (Shahzad, 2017).

History

Public school educators continue to face mounting pressures of accountability that demand steady improvements in student achievement (Lubiner, 2015). District leaders continue to search for effective pedagogical strategies, intervention programs and practical professional development that is easily applicable to the classroom, to support principals in leading school staff to improve student data metrics (Angelle & Teague, 2014). A critical component of a principal's success is their ability to increase academic achievement for all students while simultaneously narrowing gaps for lower performers. Factors associated with

student achievement include student demographics, classroom teacher variables, and school level influences such as principal leadership, climate and culture. Socioeconomic status (SES) has been examined as one of the most influential factors affecting student achievement and is also a widely argued rationale for school underachievement (Fancera & Bliss, 2011).

Across the nation there are many examples of academic excellence in PreK-12 public school education. This includes schools serving students who present multiple risk factors such as (generational poverty, learning and emotional disabilities, English Language Learners, disrupted schooling and race and ethnicity) yet achieve high levels of academic success (Kearney et al., 2012). For years, educational leaders have been intrigued by the phenomenon of 90-90-90 schools. A 90-90-90 school is a school that has a student demographic population of 90% poverty, 90% ethnic minority and 90% proficient or advanced on state standardized tests (Kearney et al., 2012). Successful 90-90-90 schools have implemented a PLC model where teachers work collaboratively in curriculum teams to identify and prioritize learning standards, develop meaningful assessments and engage in ongoing data review so they can ascertain the varying levels of student understanding. Teachers also engage students in the teaching and learning process by regularly sharing progress data with students and modifying instructional lessons (Kearney et al., 2012).

Schools that have a positive culture where teachers feel confident in their abilities to help students achieve and the students hold positive perceptions of their teachers is tantamount to school success. A principal's ability to engage staff in developing a collective responsibility and positive response to student needs is found in the constructs of perceived collective efficacy (Dockery, 2011). Kearney et al. (2012) cited Scheurich and Skrla (2003) noted,

"The success of our society will soon be directly dependent on our ability as educators to be successful with children of color, with whom we have not been very successful in the past" (p. 5). The future success of our nation is dependent on the ability of public education to meet the needs of all learners, close the achievement gap, and improve the quality of education in our local communities (Darling-Hammond et al., 2004). There is a need for additional empirical evidence that enables school leaders to focus on explicit behaviors that maximize TSE and increase learning outcomes for all students.

Statement of the Problem

Since the No Child Left Behind Act (NCLB) of 2001 public education has seen an increased emphasis on school accountability and student achievement. Under NCLB, formalized reporting methods were developed to provide feedback to schools about their success or failure, resulting in states implementing rigid testing measures (No Child Left Behind [NCLB], 2002). School districts were required to review and address performance gaps in testing while also reporting Adequate Yearly Progress (AYP) to the state. AYP included a process of racializing student performance data which was something school districts were not used to doing; at least not publicly. Schools were assigned performance ratings based on the proficiency scores of students within various racial subgroups, socioeconomic status, disability and English Learner status. Although the NCLB mandate was well intended it caused extreme controversy among leaders in education due to harsh punitive consequences schools faced for not making AYP from one year to the next (Dee & Jacob, 2011).

Repeated failure to make AYP oftentimes resulted in a reconstitution of school staff and student enrollment loss due to school choice vouchers (Dee & Jacob, 2011). The harshest penalties included reductions in funding and closing the school (Dee & Jacob, 2011). Unfortunately, students of color who live in poverty are the ones who have been negatively impacted the most by stiff sanctions (Diem & Welton, 2021). Under the Obama administration an emphasis on school accountability continued when the Race to the Top Act was passed which awarded Local Education Agencies for implementing school reform policies and Every Student Succeeds Act (ESSA) which provided states with more autonomy and flexibility with student accountability yet still saw a continuation of mandated standardized testing.

School leaders might consider best ways to ensure that all students are provided with an education that stimulates academic growth and fosters social emotional well-being. Oftentimes, students of color and with disabilities are inappropriately labeled as difficult (Lubiner, 2015). Highly effective teachers are able to connect with all students, especially the Black, Latinx and Indigenous learners who have traditionally been the most marginalized and staff must take full ownership for student success or lack thereof (Evans, 2009). Principals and staff might consider making a connection between school success and each teachers' knowledge, skills, and dispositions which permit them to effectively deliver high quality instruction while connecting to all students. There also needs to be a collective belief among leadership and staff that they can persevere over difficult challenges that arise that may negatively impact teaching and learning and other daily school operations (Evans, 2009).

As a result of the COVID 19 global pandemic, teaching has become increasingly more daunting (Banihashem et al., 2023). Studies reported teachers and students experienced low

motivation, low well-being, decreased engagement, and high work pressure. Moreover, in a post-pandemic era, teachers continue to experience stress and report feelings of being overwhelmed and burned out (Banihashem et al., 2023). The (Joint Legislative Audit and Review Commission [jlarc] 2022) cited the following data in the November 2022 report; (1) teachers leaving the workforce increased by 12%, (2) student chronic absenteeism increased by 9%, (3) 72% of teachers report low morale, (4) 67% of teachers report that they are less satisfied with their job, and (5) Virginia fourth grade math and reading scores decreased more than the national average. Based upon these newfound problems that are affecting education it is imperative for principals seek ways to increase self-efficacy in teachers to meet students progressively complex learning and social-emotional needs (Joint Legislative Audit and Review Commission [jlarc] 2022).

Students benefit when school staff are confident that they can generate actions and implement effective strategies to achieve desired outcomes (Dehbozorgi et al., 2022). When addressing educational inequities so that students who present learning challenges can be fully supported, principals and instructional staff might consider their responsibility for ensuring all students achieve. Teachers need to see themselves as competent enough to effectively teach poor students, students of color, and underperforming students in ways that will result in increased student engagement, higher academic performance and decreased disruptive behavior (Love & Kruger, 2005). Research in the area of Collective Teacher Efficacy suggests that by targeting CTE principals can successfully improve student achievement regardless of Socioeconomic Status and other student level indicators (Dockery, 2011).

Justification of the Study

School district leaders continue to seek effective solutions for raising student achievement (Brinkman et al., 2020). As a result of the COVID 19 pandemic, students experienced two years of disrupted education (Banihashem et al., 2023). Beginning in March of 2020, public schools across the nation closed their doors for in-person learning. Students spent the remainder of the 2019-2020 school year receiving their instruction virtually. Virtual instruction was a mode of teaching and learning that students and teachers were unfamiliar with, and many educational leaders were ill-equipped to provide teachers with adequate training on how to effectively deliver instruction in this format (Brinkman et al., 2020). This crisis left teachers feeling stressed over the challenge of transitioning their instructional pedagogy from brick and mortar classrooms to their living rooms, via a computer. To complicate matters, many teachers had to simultaneously support the needs of their own children who were also learning online alongside them as they attempted to teach students in newly created virtual classrooms. Teachers voiced concerns about a lack of student engagement (refusing to turn on cameras and microphones) which made it difficult to build and maintain positive classroom cultures. An additional stressor for teachers and students were the constantly changing conditions for teaching and learning. When schools finally opened for in-person instruction during the 2020 - 2021 school year, many staff and students faced abrupt, temporary closures due to outbreaks in classrooms or the school or because COVID transmission rates in the community reached specified levels (Brinkman et al., 2020).

Across the nation, when school resumed in the fall of 2020 the majority of students in the Commonwealth of Virginia went back to school under either a hybrid model that included 2 days of in-person instruction per week or they continued to remain in a virtual learning model. Many districts in Virginia did not reopen their schools and return students to full time in-person learning until the winter of 2021 and some as late as April of 2021. Ongoing increases and decreases in infection and transmission rates continued to impact school divisions through the pandemic, resulting in constant changes to the learning models schools were able to provide. What's more, the pandemic traumatized teachers and principals professionally and personally (Brinkman et al., 2020). Teachers reported high stress and low job satisfaction and by June of 2022, K-12 public education experienced what is now known as the Great Resignation.

As school districts across the nation prepared to open schools in the fall of 2022 many experienced teacher vacancies of unprecedented proportions. The national teacher shortage was so severe that Arizona Governor, Doug Ducey signed Senate Bill 1159, which allows candidates who do not currently possess a Bachelor's degree to enter a teacher preparatory program and begin training to become a teacher. A large school district in Northern Virginia announced more than 700 teacher vacancies less than 1 month prior to student's return on August 22, 2022. This crisis has caused district leaders to react in ways that would have been unthinkable prior to the pandemic. Decisions included requiring teachers to teach outside of their certified curriculum area, pulling school and central office administrators into classrooms, reclassifying instructional assistants into teachers and combining students from multiple classes into a single large class and providing instruction in large spaces such as lecture halls and auditoriums.

Purpose of the Study

The purpose of this study was to identify the relationship between teacher self-efficacy (TSES) score and observable teacher instructional behaviors (CSAS) score and student academic achievement (SOL) scores. This study addressed the following question: What is the relationship between teacher self-efficacy and teacher behavior and student academic achievement? Research on the implementation and results of school improvement initiatives can be helpful to district leaders seeking to create and replicate effective professional development while avoiding pitfalls. Research on implications that TSE has on teacher behaviors adds to a relatively limited literature base that holds possibilities for leaders to elicit positive school change through improved instruction and higher student achievement (Pfitzner, 2016).

More research is needed to show the connection between principals' school improvement efforts and their specific impact on teacher practice and student learning (Poekert, 2012). Due to the significant disruption in learning students experienced from COVID 19, high quality instruction is more critical than ever before. For example, students who entered 5th grade in September of 2021 had not experienced a normal school year since they were in 2nd grade. Disruptions to learning have caused educational leaders to consider how to best deal with learning loss. As a result, many school district leaders and principals have incorporated learning recovery into their goals of raising student achievement. TSE is more important now than ever before because efficacious staff members engage in productive

teaching behaviors. However, a review of the research identifying other consequences related to TSE and productive behaviors are either limited or do not exist (Donohoo, 2018).

Research Questions

This study sought to address the following question: What is the relationship between teacher self-efficacy and teacher behavior and student academic achievement? In response to the purpose of the study, the following research questions will be addressed related to the relationship between teacher self-efficacy and teacher behavior and student academic achievement.

1. What is the relationship between teacher self-efficacy and teacher behavior?
2. What is the relationship between teacher self-efficacy scores and student academic performance (SOL pass rate)?
3. What is the relationship between teacher behavior scores and student academic performance (SOL pass rate)?

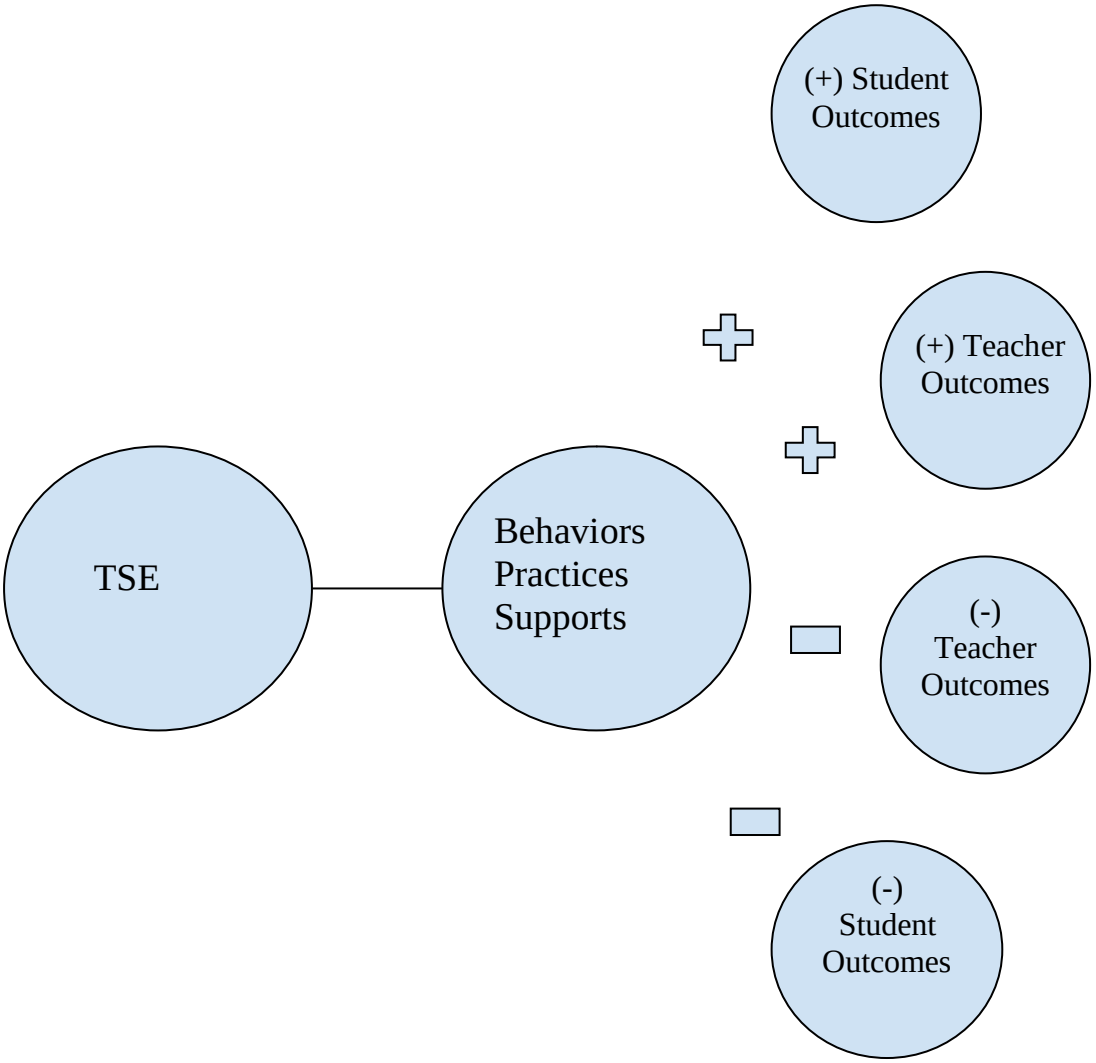
Theoretical Framework

A central feature in Bandura's (1977, 1986, 2001) social cognitive theory is the conception of the self-efficacy construct, which provides the theoretical framework for this study. Eden (2016) noted that Bandura defines self-efficacy as the "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments." (Bandura, 1977, p. 3). Additionally, Bandura (1997) has provided evidence supporting his theory that self-efficacy beliefs have strong predictive power and also have an influence on behaviors

such as setting goals, effort toward goals and persistence when faced with challenges (Eden, 2016). Figure 1. provides a conceptual framework of TSE, behaviors and outcomes. The conceptual framework suggests that there is a relationship between TSE and teacher behaviors and together they positively or negatively impact teacher decision making, teacher outcomes and student achievement outcomes. Although many factors could mediate the relationship between TSE and teacher behavior and their impact on student achievement, controlling for facility conditions, socioeconomic status, level of resources and training and instructional service model e.g. special education versus advanced academics could establish a significant relationship between TSE and teacher behavior.

Figure 1

Conceptual Framework



Definition of Terms

For the purpose of this study the following terms and definitions are used.

Collective Efficacy (CE): Collective efficacy is defined as the standardized score derived from the 12 item Goddard Collective Efficacy Scale (CES), short form. *"A group's shared belief in the conjoint capabilities to organize and execute the courses of action required to produce given levels of attainment."* (Goddard et al., 2000).

Professional Learning Communities (PLCs): Professional learning communities are defined as educators committed to working collaboratively on an ongoing process of collective inquiry and action research to engage in continuous improvement processes designed to get increased outcomes for students (DuFour et al. 4. 2006).

Socioeconomic Status (SES): The possession of normatively valued social and economic resources of an individual or group which is determined by a combination of social and economic factors such as income, amount and kind of education, type of occupation and place of residence (Antonoplis, 2022).

Teacher Self Efficacy (TSE): Self-efficacy as the "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments." (Bandura, 1977, p. 3).

Virginia Standards of Learning (SOL): – The established minimum expectations for what students should know and be able to do at the end of each grade or course in English, mathematics, science, history/social science and other subjects (Virginia Department of Education, 2022).

Limitations

There are factors that may limit the usefulness of this study. The design used in this study seeks to explore relationships between TSE and teacher behaviors and thus no causality can be inferred between TSE and student achievement. Eden (2016) referenced that a strictly unidirectional causal relationship between TSE development and student achievement is unrealistic as predicted by theory (e.g., Tschannen-Moran et al., 1998).

Additional limitations might include the study population, response rate, type of course and grade level taught by the participant. Socioeconomic status of each school might also be considered. This study took place in a mid-sized suburban district in a mid-Atlantic US state and generalizability to larger school districts should be approached with caution. The researcher conducted the study in the district in which they were employed therefore bias should be considered. The teacher instructional behavior score should be considered because the study was open to any teacher in the identified schools who met the study criteria. Participation rates included teachers of core courses across multiple curriculum areas and grade levels which could create inconsistencies in the observation results. The student achievement score should also be considered because some of the observed classes included students that did not take the Standards of Learning (SOL) exam. Finally, the SES status of each of the participating schools may not be exact. Research suggests that high schools may have underreported free and reduced meal percentages as high school aged students are less likely to self-select into this category because of perceived stigma.

Delimitations

Delimitations are a result from the specific choices that are determined by the researcher. Coker (2022) cited “The delimitations of a study are those characteristics that arise from the limitations in the scope of the study (defining the boundaries) and by the conscious exclusionary and inclusionary decisions made during the development of the study plan” (Simon & Goes, 2013) (p. 3).

The study found the following delimitations:

- To ensure the consistency of TSES and teacher behavior data collected, the study was limited to one middle school and high school within the same feeder pattern in a mid-sized school district in Virginia. The use and comparison of TSES and teacher behavior scores is only meaningful if the scores are calculated using the same methodology (US Accountability Office, 2009).
- A small sample size of 10-20 teachers who are assigned to two schools within the same feeder pattern and within the same school district will support the mitigation of variance for:
    - Socioeconomic status of students (students generally attend the school that is zoned for their neighborhood and zip code).
    - Physical condition of the facility
        - Building operations
        - Classroom conditions and comfortability of facility
            - Age of the school building
            - Heating and cooling temperatures

        - Classrooms windows and access to natural lighting
        - School building aesthetics
    - Resources available to teachers
        - Professional development and training opportunities for teachers
    - Principal leadership and support from the school's administration

The study consists of five chapters. Chapter One includes a study overview, historical background, statement of the problem, justification of the study, purpose of the study, research questions, theoretical framework, definitions of terms, limitations, delimitations, and organization of the study. Chapter Two includes a review of literature describing the relationship between teacher self-efficacy and teacher behaviors and impact on academic achievement. The literature review documented and identified prospective factors that could impact TSE and teacher behaviors including professional learning communities, collective teacher efficacy, behavior patterns and school climate. Chapter Three provided an overview of the methodology, research designs, data needed, site selection, sample population, data collection, instrument design and validation, and data gathering and analysis process. Chapter Four includes a presentation and analysis of the data, data analysis methodology and how the data was collected. Chapter Five includes a summary of major findings, conclusions, effects of the findings, a discussion of how the findings align with the relevant literature, recommendations for future research, and potential suggestions for school division leaders.

Chapter Two

Review of Literature

The topic of this literature review is teacher self-efficacy, teacher behaviors and student academic achievement. The purpose of this study was to examine the relationship between teacher self-efficacy and teacher behaviors and academic achievement. The significance of this study is to research and determine whether or not there is a relationship between TSE scores, teacher behavior scores and student academic achievement.

Improving student achievement and narrowing gaps has been a daunting and ongoing challenge for educational leaders, especially during an age of increased accountability. In order for teachers and their students to successfully navigate the teaching and learning process, it is critically important for district level leaders and principals to identify instructional best practices that yield the greatest academic outcomes (Francara & Bliss, 2011). Moreover, district leaders need to determine key areas to appropriately allocate resources that will improve instructional practices, support positive student outcomes and allow principals to improve their schools from good to great (Thornton et al., 2020). The global pandemic (COVID 19) has made school leadership more complex because of growing concerns of staff burnout, low morale, increased levels of anxiety among students and staff and learning loss (Brinkmann et al., 2021). As mounting pressures for accountability and school improvement are felt by district leaders, educational scholars are continuing to search for instructional strategies that principals can leverage to improve student achievement metrics (Francara & Bliss, 2011).

For decades, research studies in the area of school improvement have attempted to draw correlations between principal leadership, high quality instruction, positive student-

teacher relationships and improved student achievement (Thornton et al., 2020). Factors such as poverty and low socioeconomic status, lack of funding and negative student behaviors, including poor attendance and disengagement are used to explain away low student achievement, slow academic growth and extreme learning gaps (Francara & Bliss, 2011). Educational leaders need to revise the question of what works in schools to what works best in schools. This will allow them to draw comparisons among different ways of positively influencing student learning. Moreover, it will help them to understand the relationship between effective teacher collaboration and student achievement measures (Hattie, 2015). Previous studies support an association between CTE and positive teacher behaviors such as increased teacher leadership, communicating high expectations to students, and a deeper implementation of strategies to improve achievement metrics (Donohoo, 2018).

Student achievement is a key metric that is often used for measuring school effectiveness. Bandura (1993, 1997) argued that the collective efficacy of the teachers within a school is a powerful construct that is associated with student achievement, that varies greatly among schools (Goddard, Hoy, Hoy, 2000). Francara and Bliss, (2011) noted that in one study of a theoretical model of school achievement, which included school socioeconomic status (SES), academic press, and CTE, CTE was a stronger predictor of school achievement than SES (Hoy, Sweetland, & Smith, 2002). Thus, it is important for principals to encourage their teachers to understand they can effectively improve student learning outcomes regardless of the SES indicators of the school community or individual students in their classrooms (Francara & Bliss, 2011). Zee and Komen (2016) cited "Most reviews and critiques of the Teacher Self Efficacy (TSE) literature have predominantly focused on key conceptual and methodological issues

surrounding research on teachers' capability beliefs, or have proposed alternative paradigms and frameworks to broaden and clarify this construct" (e.g., Henson, 2002; Klassen et al., 2011; Labone, 2004; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998; Wheatley, 2005; Woolfolk Hoy, Hoy, & Davis, 2009; Wyatt, 2014) (p. 982). Although researchers (Ross, 1998; Woolfolk Hoy et al., 2009) have extended this research and emphasized the potential consequences of TSE; they have not covered the substantial body of evidence on the consequences of TSE that had been published over the previous decade (Zee & Komen, 2016).

Search Process

The search process for this literature review included forty peer-reviewed scholarly articles related to this study. Articles were collected from the Virginia Tech Online Library, Virginia Tech Libraries Research Education Database, EBSCO Research Database and Google Scholar. The following key terms were used when conducting the search for literature: collective efficacy, student achievement, self-efficacy, resilience, student-teacher relationships, teacher perceptions, student perceptions, professional learning community and motivation and behavior. Additionally, filters were utilized to limit the findings to peer reviewed articles and dissertations. Searches for this study began in September, 2020 and continued through May, 2022. All articles that were regarded as appropriate to the study were uploaded into Zotero and categorized alphabetically.

Initial searches yielded articles that included broad studies about what TSE is and why it is important in education. Other studies linked TSE or CTE to teacher perceptions, student perceptions, work efficiency, work effectiveness and school climate. However, some of the articles connected CTE directly to positive student outcomes and improved academic

achievement. Hattie (2015) is referenced frequently and is evident in many of the scholarly articles that were reviewed. In addition to the peer reviewed articles, the following books were included as resources for this review, Visible Learning and the Science of How We Learn (Hattie, 2009) and Visible Learning For Teachers: Maximizing Impact on Learning (Hattie, 2011). Additional scholarly articles will continue to be collected as this study progresses. Through this review of literature, the following topics were identified and will be discussed in this paper (1) history, (2) professional learning communities, (3) collective teacher efficacy, (4) behaviors, and (5) school climate.

History

The construct of teacher efficacy has continued to evolve over the past 30 years. The foundation for teacher efficacy was developed from Rotter's (1966) locus of control theory and Bandura's (1977, 1986, 1997) social cognitive theory. However, the meaning and measure of teacher efficacy has been heavily debated among scholars and researchers (Goddard et al., 2000). Goddard et al. (2000) also explained, using the work of Rotter (1966) as a theoretical base, researchers at the Rand Corporation who were studying the effectiveness of reading instruction first conceived teacher efficacy as the extent to which teachers believed they could control the reinforcement of their actions.

Collective Teacher Efficacy (CTE) is a newer concept in the field of education that emerged in the 1990's (Dockery 2011). CTE, which is rooted in the original social cognitive theory of self-efficacy, was first presented in 1993 by Albert Bandura. The social cognitive theory (SCT) which was developed to further understand human agency and the control that people have over their own lives, looks specifically at behavioral change through an individual's

motivation (Goddard et al., 2000). In 1993, Bandura wrote that "students are motivatable and teachable whatever their background" (Francara & Bliss, 2011). District leaders and principals must embrace this concept as they support schools with successfully improving through better-quality instructional practices that yield increased student achievement data metrics. More importantly, it is imperative that district leaders and principals create a vision and develop school cultures that motivate students to strive toward higher achievement (Francara & Bliss, 2011). Another critical aspect of effective instructional leadership that principals must achieve is influencing staff to hold high academic performance and behavioral expectations for all students while simultaneously believing that staff are the ones who possess the power to elicit positive change in schools.

Collective Teacher Efficacy can be defined as *"a group's shared belief in the conjoint capabilities to organize and execute the courses of action required to produce given levels of attainment."* (Goddard et al., 2000). Bandura's social cognitive theory extends the analysis of human agency to the exercise of collective agency that the shared beliefs of a group of people working together can produce an effect or outcome (Goddard et al., 2000).

Schools cannot be relegated to brick and mortar buildings where children simply come to learn and adults come to teach. Schools function as complex communities where adults and students alike learn and grow together, interact and socialize and support one another while simultaneously navigating cultural ethos (Dockery, 2011). Because schools are large learning communities where staff and students interact with each other under a set of shared beliefs and values, the culture of a school needs to be dissected as leaders determine the enablers and barriers to school improvement. In their study about collective teacher efficacy and the impact

it has on student achievement, Goddard et al. (2000) cited Bandura's work on SCT that supports an idea that personal agency operates within the broad network of sociostructural influences. Therefore, in order for a principal to effectively lead their school, it is important for them to have a deep understanding of a school's culture and how emergent cultures might be influencing the behaviors of teachers and students.

Professional Learning Communities

Munoz and Branham (2016) shared that researchers have consistently cited teacher isolation as a major barrier to substantive school improvement and for years schools have been encouraged to embrace a more collaborative culture emphasizing joint analysis of professional practice. Professional Learning Communities (PLC's) is an effective educational structure that has been supported by numerous studies over the past twenty years. Poekert (2012) referenced that although the concept of PLC's is not new, schools across the country continue to institute them into their structural models. The PLC helps to guide teachers in their own professional growth through partnering with other team members to collaboratively seek solutions to challenges they face in their classrooms and improving their instructional practice through site-based inquiry (DuFour, 2004; Fullan, 2001; Hord & Sommers, 2008).

DuFour et al. 4. (2006) defined PLC's as an ongoing collaborative process in which educators work to achieve better results for students through engaging in recurring cycles of collective inquiry and action research. PLC's are driven by "Three "Big Ideas":

1. Learning is the fundamental purpose
2. Creating collaborative cultures
3. A focus on results (Muñoz & Branham, 2016).

John Hattie's (2009) meta-analytic work concluded that schools improve student learning, when teams of teachers work together (a) to establish the essential learning all students must acquire, (b) to gather evidence of each student's learning through an ongoing assessment process, and (c) to use the evidence of student learning to discuss, evaluate, plan, and improve their instruction (Muñoz & Branham, 2016).

DuFour et al. (2016) have been instrumental in getting educational leaders to embrace the concept of PLC's by encouraging them to abandon traditional models where teachers work in isolation and move toward pushing teachers to work in collaborative teams (Muñoz & Branham, 2016). As a result, many district leaders have made instituting a PLC model a top priority for their schools. PLC prioritization includes funding for professional development and explicit training for all instructional staff. Additionally, principals must maintain a firm commitment to PLC structures by incorporating common planning time in the school's master schedule so that teachers can engage in meaningful collaborative team meetings during the instructional day (Dockery 2011). Both the Center on Organization and Restructuring of Schools (Newmann & Wehlage, 1995); and The Wallace Foundation (Louis et al., 2010) conducted research reviews and their findings support that a PLC structure has a positive effect on both student and adult learning (DuFour & Mattos, 2013).

In a study of teacher effectiveness through self-efficacy, collaboration and principal leadership, Seghal (2016) explored how self-efficacy beliefs are formed among teachers and whether principal leadership and peer relationships have a role in the perception of self-efficacy beliefs. The findings of the study support that the educational practice of collaboration among teachers and a principal's leadership have the potential to positively influence teacher

self-efficacy (Sehgal, 2016). Sehgal (2016) concurred with Tschannen-Moran (1998) and Ashton (1984) on their work which previously established the relationship between teacher self-efficacy and teacher effectiveness and confirmed that collaboration and principal leadership play a role in building teacher self-efficacy (Sehgal, 2016).

Over the past three decades, additional educational research has emerged that supports the Professional Learning Community model as an effective organizational structure that schools can implement as a best practice (Dockery, 2011). An effective PLC model moves teachers away from operating in isolation and toward working in teams where members function within a systematized and productive structure. Poekert (2016) studied Ready Schools Miami, which is a school reform initiative centered on developing ideal conditions for teacher learning. RSM was a partnership between multiple organizations including a large urban school district, a university, educational foundations and nonprofits with a focus on creating sustainable improvement in student learning and healthy child development. Poekert (2016) found that school reform efforts that included collaborative professional development can impact teaching practices that encourage students to engage in higher order thinking which supports their cognitive development.

PLC's are more than meetings where teachers come together and review student data. A high functioning collaborative PLC team uses evidence of student learning to guide team outcomes (Dockery, 2011). For a collaborative team to be productive, its members need to be confident yet vulnerable enough to openly share student assessment data, question team members and reflect upon their own instructional practices (DuFour & Reeves, 2016). In a study of secondary teachers who participated in multi-disciplinary collaboration, Beatty (2000) found

that changes occurred in teachers' perceptions of themselves and their work. Furthermore, Lieberman (2000) and (Sehgal, 2016) suggests that teacher collaboration and networking helped to improve student academic performance.

Reflective and responsive teaching should not be done in isolation, and it can be more powerful when student learning is used as the evidence for effective teaching, especially when it is done in collaboration with other practitioners (Hattie, 2009). Getting teachers to buy into a PLC model where they work closely with each other in collaborative teams can be a challenging task for principals and district leaders. However, when teachers are confident in their abilities and when values such as trust and honesty are adopted by the collaborative team members, teachers are more likely to engage in best practices such as information sharing, planning for assessment and developing common assessments (Hattie, 2015). Moreover, high functioning collaborative teams are willing to engage in ongoing monitoring of student performance data. The constant review of performance data keeps teachers informed on the progress of their students and helps them to be in a better position to implement Response To Intervention (RTI) practices. Additionally, routine data reviews allow teachers to identify student's academic strengths and weaknesses as they relate to the mastery of targeted curriculum standards.

Thornton et al. (2020) cited that research indicates teacher self-efficacy and collective teacher efficacy can influence lesson planning, instructional decisions, and interactions with students throughout the entire organization. Establishing a tightly structured PLC model where teachers are expected to engage in professional work within collaborative teams, might have a positive effect on teacher self-efficacy. In a study of Turkish middle schools conducted by Duyar et al. (2013) they found that some aspects of principal leadership and professional

collaboration among teachers predicted teacher self-efficacy (Sehgal, 2016). Poekert's (2012) study of large-scale school reform concurred with conclusions from previous research that high-quality collaborative professional development can improve the quality of classroom teaching. Adding to this conclusion, research literature on professional development suggests that high-quality professional development should be collaborative (Borko, 2004; Cordingley, Bell, Thomason, & Firth, 2005; Guskey, 2003). Finally, further research in this area might look at how engaging in a high functioning collaborative team affects a teacher's perception of agency over their work and whether or not there is a correlation between increased agency over one's work and higher ratings of self-efficacy.

Collective Teacher Efficacy

Collective teacher efficacy, CTE, is described as the collective belief of teachers in their ability to positively impact outcomes and student achievement (Hattie, 2015). Donohoo (2018) cited multiple research studies indicate that teacher self-efficacy and collective teacher efficacy indirectly influence student achievement through patterns of behavior (Ashton & Webb, 1986; Guskey & Passaro, 1994; Ross, 1992; Tschannen-Moran, Woolfolk-Hoy & Hoy, 1998; Sun & Leithwood, 2015). Additionally, studies found an association between teacher efficacy and highly effective teaching practices that promote student achievement (Donohoo, 2018). Eells (2011) made the first attempt to quantify the correlation between collective efficacy and student achievement by conducting a meta-analysis of available relevant studies during that time (Donohoo, 2018). "Collective efficacy was strongly and positively associated with student achievement across subject areas, when using varied instruments, and in multiple locations'' (Eells 2011, p. 110). Eells (2011) concluded that ''the beliefs that teachers hold about the ability

of the school to promote positive outcomes were predictive of positive learning outcomes for their students'' (p. 115). Donohoo (2018) cited that "as a result of Eells' (2011) research, Hattie (2016) positioned collective teacher efficacy at the top of the list of factors that influence student achievement based on his synthesis of over 1500 meta-analyses." (p. 326).

A research study, The Applicability of Visible Learning to Higher Education (Hattie, 2015) is based on a synthesis of 1200 meta-analyses relating to influences on achievement. In this study, eight major mind frames of successful teachers were identified. The most critical mind frame is knowing one's capacity to impact others. Understanding the power of one's capacity to influence learning leads to three sub-questions:

1. What do I mean by impact today and have I communicated this to my students?
2. What is the magnitude of the impact I am seeking?
3. How many students can I teach such that they attain this magnitude on the impact I have clearly communicated?

Hattie (2012) goes on to share that teachers who fully understand their capacity to impact their students, explicitly inform students what successful impact looks like from the outset; they see assessment as providing feedback about their impact; they work with other teachers to develop common conceptions of progress; they engage in dialogue not monologue; they strive for challenge and not 'doing your best'; they use the language of learning; and they see errors as opportunities for learning.

In a study of teacher effectiveness (Sehgal, 2016) looked at three specific measurements: delivery of instruction, role in student/teacher interaction, and regulating student learning. Using a shortened version of the "students' evaluation of the teaching rating scale", developed by Toland and De Ayala (2005), data were collected from 6,020 students who rated 575 teachers. The results suggested a positive association between two of the primary behaviors and teacher effectiveness ratings that included the teacher's role in facilitating teacher/student interactions and teacher's role in regulating student learning. These data also support a positive association between strong principal leadership and teacher self-efficacy which suggest that schools can enhance teacher effectiveness by increasing self-efficacy beliefs through creating environments where teacher collaboration is fostered by the principal. Finally, as school leaders continue to seek to improve the effectiveness of their teachers, they might consider the need to focus on enhancing self-efficacy of their teachers through the prioritization of enhanced teacher collaboration and principal leadership (Sehgal, 2016).

In a study of productive patterns of behavior, Donohoo (2018) concurred that efficacious schools have staff members who believe in each other's ability to impact student achievement, regardless of the students' background and socioeconomic status. Moreover, Donohoo (2018) supported these findings with the findings of a study of the relationship between CTE and student achievement at economically disadvantaged middle schools that was conducted by Sandoval et al. (2011). This study determined efficacious schools could impact student achievement through shared beliefs in their colleagues' ability to impact student achievement (Donohoo, 2018).

Individual teachers function as members of the larger school community and their shared beliefs influence the social climate of the school they work in (Hoy & Sweetland, 2002). Since previous educational research has already established that the effective implementation of a PLC structure in schools has a positive impact on adult and student learning (Hattie, 2015), it might be prudent for district leaders and principals to also consider if there is a negative impact on the functionality of a team and or adult and student learning when individuals with low self-efficacy are introduced into the collaborative PLC team. Principals might also look at whether an individual's self-efficacy increases over time when they consistently collaborate in high functioning PLC teams where the members have high teacher self-efficacy. Moreover, further consideration might need to be given to whether or not the progress and functionality of a collaborative PLC team and student achievement are negatively impacted if multiple members of the collaborative team possess low self-efficacy or if the group members combined, have overall low collective efficacy. Finally, it might be beneficial for future researchers to study whether or not teachers with low self-efficacy are able to set high academic standards and behavioral expectations for students, develop and maintain supportive and trusting relationships with their students and also provide their students with the motivation and support that is necessary to meet those expectations.

Behaviors

Teacher behaviors have a direct impact on the climate of the classroom. Goddard et al. (2000) cited that there is a strong connection between teacher self-efficacy and teacher behaviors, including level of effort and persistence with tasks. Moreover, their study demonstrated that collective teacher efficacy is more important in explaining student

achievement than socioeconomic status. In a previous study, Hoy et al. (2000) found when collective teacher efficacy is high, students are likely to respond positively to the respect they get from their parents, teachers, and peers for their academic success. Equally, teachers are also likely to respond positively to the respect they get from other teachers, administrators, and parents when their students succeed.

Donohoo (2018) concurred that multiple studies showed CTE was associated with several productive teacher behaviors including implementation of school improvement strategies, increased teacher leadership, communication of high expectations, and a strong focus on academic pursuits. Research supports that efficacious staff members engage in productive teaching behaviors. However, a review of the research identifying other consequences related to CTE and productive behaviors are either limited or do not exist (Donohoo, 2018). Looking at a heuristic framework to link TSE to outcomes at various levels of classroom ecology, Zee and Komen (2016) postulated that TSE could have consequences on a range of classroom processes at both student and teacher levels, including instructional activities, behavioral expectations, and emotional classroom dynamics. Furthermore, a process-oriented framework was developed by Woolfolk Hoy et al. (2009) that could support further studies that look at how TSE might be associated with outcomes at various levels of classroom ecology (Zee & Komen, 2016).

Miller et. al. (2008) conducted a longitudinal study in one urban school district on the impact of teacher absences on student achievement and found that an estimated 10 additional days of teacher absences reduces student achievement in fourth-grade mathematics by at least 3.2% of a standard deviation. It is important that teachers understand the level of disruption

that high absenteeism might have on the flow of the instructional process and the potential negative impact it has on the academic progress of students. Moreover, if self-efficacy influences teacher behaviors and if previous studies support that there is a correlation between higher teacher absences and a reduction in student achievement, then district leaders might need to consider how increasing teacher efficacy could improve overall staff attendance. Furthermore, as principals work to improve student data outcomes in their schools, they might look more closely at staff attendance patterns to determine whether or not there is a correlation between teachers who have high absence rates and the performance data of the students in those teacher's classrooms.

Maintaining high collective teacher efficacy is vital to the health of a school because CTE has been found to be positively correlated to student achievement (Hattie, 2018). Donohoo (2018) concurred with previous studies that teachers with higher CTE demonstrated a stronger willingness to take risks and were also more receptive to new ideas. Additionally, studies showed that students were excluded from the educational process less frequently in schools where CTE was evident (Donohoo, 2018). As district leaders and principals continue to prioritize the narrowing of learning gaps, improving classroom instruction, establishing a positive school climate and increasing student achievement metrics, it will be critically important for them to consider the relationship between teacher perceptions and their collective efficacy ratings.

A study of teacher leadership and collective efficacy was conducted by Angelle and Teague (2014) and included a sample of three school districts in a southeastern US state. They examined the relationship between teacher collective efficacy and the teacher's perceptions of the extent of teacher leadership. The researchers found a clear and strong relationship

between collective efficacy and teacher leadership in two of the three districts (Angelle & Teague, 2014). Additional arguments included that teachers perceived their leadership as more than just administrative roles assigned to them by the principal but also included informal forms of leadership that allow for them to have influence on organizational effectiveness (Angelle & Teague, 2014). Lee et al. (2011) included 480 teachers from Hong Kong in a study of the relationship among a PLC culture, faculty trust, teacher's collective efficacy and their commitment to students. Using an exploratory factor analysis, Lee et al. (2011) found that variances of teacher's commitment to students could be positively accounted for (Donohoo, 2018).

The data for the study conducted by Angelle and Teague (2014) were collected through the Teacher Leadership Inventory (TLI) (Angelle and DeHart, 2010) and the Teacher Efficacy Belief Scale – Collective Form (TEBS-C) (Olivier, 2001). The TLI is a questionnaire of 17 statements that includes a four-point Likert scale (never, seldom, sometimes, and routinely) designed to measure teacher perceptions of the extent of teacher leadership in schools. A major component of teacher leadership is the willingness of the teacher to assist fellow colleagues by engaging in sharing evidenced-based best practices for teaching and learning through a variety of school level collaborative meetings and professional development (Angelle & Teague, 2014).

An examination of the data collected through the TLI revealed that higher ratings of teacher collective efficacy were directly tied to a greater sense of teacher leadership (Angelle & Teague, 2014). Although their study found that school staff who possessed higher collective efficacy held a stronger belief in their ability to meet school goals and achieve the mission, no

causality could be claimed. However, it is important to note that an analysis of the data revealed that teachers who saw themselves as school leaders also perceived greater collective efficacy in their peers. More importantly, teachers who strongly believe in their colleagues' ability to meet student learning goals also perceive that greater numbers of teachers in their school are willing to lead beyond the classroom. This study affirms that the development of school cultures that deeply embed shared leadership, PLC's and shared decision making can positively impact the collective beliefs of the faculty. (Angelle & Teague, 2014)

Thornton et al. (2020) found that TSE and CTE can affect the behaviors of teachers including but not limited to their efforts and innovation planning, persistence and willingness to work with difficult students. Teacher behaviors need to be considered when assessing the functionality of the professional learning community. For PLC team members to effectively implement the best practices of aligning lessons to curriculum standards and conducting ongoing student performance data monitoring, they need to function as a cohesive unit and support the work of each other. Thornton et al. (2020) studied ways to support improving teacher self-efficacy to promote instructional change and noted previous findings of (Bandura, 1997; Tschannen-Moran, Woolfolk-Hoy & Hoy, 1998; Ross & Gray, 2006) which found an association between higher efficacy and commitment to the job. The authors concluded that teacher efficacy can positively influence key variables associated with achievement and school improvement (Thornton et al., 2020).

School Climate

Climate can have an impact on the performance of students and teachers within a school. Although a correlation has been made between Professional Learning Communities and

academic achievement, research also supports that students are able to thrive when they are placed into classroom environments that are supportive, foster trust and accountability and hold students to high expectations (Love & Kruger, 2005). What teachers believe about their student's ability to achieve is important to students' perceptions of their teachers and academic engagement. Chong et al. (2010) concurred with Sweetland & Hoy (2000) that "academic climate represents the extent to which the school is driven to achieve academic excellence, as reflected in its ability to maintain high teacher, student and parent standards and expectations, and academic press." (p. 184). Furthermore, Sweetland and Hoy (2000) postulated that when teachers feel empowered through a positive academic climate, they may be more likely to believe in their collective capacity as a faculty to foster changes that promote school performance (Chong et al. 2010).

At the lowest levels of education students possess the ability to actively evaluate their teachers (Hattie 2014). Studies conducted on young adolescents show students do not rate teachers on their personalities but instead on how teachers treat them. Students want to be treated with fairness, dignity and individual respect (Hattie 2014). Love and Kruger (2005) conducted a study about teacher beliefs and student achievement in urban school settings. As a result, they concurred their findings to a previous study of Willis (1998) that found that classrooms that served primarily African American students, where teachers were able to effectively establish a learning community and formulate strong relationships with their students and parents, also had teachers who tended to believe that they could connect with their black students (Love & Kruger, 2005).

Love and Kruger (2005) drew a correlation between the relationships of students and their teachers and its impact on achievement. They conducted qualitative and observational studies and revealed that African American students might learn best in classrooms and school environments with adults whose style is relational and personal, like an extended family (Boykin, 1983, 1994; Willis, 1992, 1998). Love and Kruger (2005) also looked at previous studies related to school climate and African American students that were conducted by (Delpit, 1995; Hale-Benson, 1986; Hilliard, 1997, 1999; Ladson-Billings, 1994, 2001; Murrell, 1993; Willis, 1995 and concurred that African American students respond more positively when teachers hold them to higher standards of expectation while also holding them accountable to themselves and others.

Lev et al. (2017) conducted a study of teacher self-efficacy and student ratings and found a strong correlation between teacher self-efficacy and how high or low students rated their teachers in the homeroom setting. Their study expanded upon the previous work of (Warren & Hale, 2016) that concluded low TSE can lead to negative emotions which impede a teacher's ability to manage student behaviors and nurture their success through the establishment of positive relationships among students (Lev et al., 2017). The study showed that when educational settings were set up in a manner to promote closer and more intimate relations between the teacher and their students, students are more attuned to teacher expectations (Lev et al., 2017). These findings also support the study by (Chang et al., 2004; Gillies & Khan, 2008) who shared students' awareness and sensitivity to their teacher is crucial for student functioning, as much of their learning and behaviors are mediated by the teacher (Lev et al., 2017). Hattie (2012) ranked the effect sizes of 195 program influences on student

learning. In statistics, an effect size is a number measuring the strength of the relationship between two variables. According to Hattie's research an effect size in education of 0.6 or greater has a high influence on student achievement, given a full range of 0 - 1.62. The following influences were rated to have a high impact on student achievement; teacher-student relationships = 0.72, teacher clarity = 0.75, teacher credibility in the eyes of students = 0.90 and student expectations = 1.44.

Chong et al. (2010) referenced the work of Hoy, Tarter, & Woolfolk-Hoy (2006), and concurred that empirical evidence suggests student achievement and the teachers' perceptions of their school's academic climate are positively related. Another research study that measured the influence of affective teacher-student relationships on student's level of engagement in the school process and their achievement, Roorda and Koomen et al. (2011) found that there were substantial associations among TSR's and student engagement and achievement. More importantly, it is believed that the impact of the teacher-student relationship is even greater with children who experience learning difficulties or who are considered to be academically at risk and economically disadvantaged. Finally, a study found that middle school teachers who felt efficacious about their collective capabilities to promote learning and instruction, were more likely to perceive high standards and expectations from the school's leadership, and parents and students for academic success (Chong et al. 2010).

Contribution to the Literature

The following topics were identified and discussed in this literature review: (1) history, (2) professional learning communities, (3) collective teacher efficacy, (4) behaviors, and (5) school climate. This study aims to examine associations among teacher self-efficacy, teacher

behaviors and student achievement. Considering CTE and the components of effective PLC structures, Hattie (2016) rates CTE at the top of the list of factors that influence student achievement. Additional research substantiates teacher self-efficacy can influence teacher behaviors related to lesson planning, instructional decision making and interactions with students (Thornton et al. 2020). Examining teacher behaviors, Zee and Komen (2016) postulated that TSE could have consequences on a range of classroom processes at both student and teacher levels, including instructional activities, behavioral expectations, and emotional classroom dynamics. Although Donohoo (2018) cited CTE has been associated with productive teacher behaviors including execution of school improvement strategies and communication of high expectations, further research in identifying related consequences between CTE and productive teacher behaviors is needed. Investigating school climate, Lev et al. (2017) concluded school climate could be impacted by low CTE due to the negative emotions associated with lower levels of TSE which can impede a teacher's ability to manage student behaviors and nurture their success through the establishment of positive relationships.

Conclusion and Significance of the Literature Review

Substantiating further evidence that establishes associations among CTE and teacher behaviors and student achievement could make positive contributions to the field of education. This literature review looked at previous research studies that were conducted on the topic of collective teacher efficacy teacher behaviors and student achievement. The literature review determined that CTE and TSE are not only important to the overall climate of the school and the classroom, but TSE can also be associated with the perceptions that students have about their teachers (Angelle & Teague, 2014). This review also looked at the importance of teacher–

student relationships and whether or not relationships can be associated with student performance.

Researchers commonly agree that several data metrics can be associated with gains in school performance and student achievement. Various metrics should be considered when justifying a school division's goals and initiatives and the allocation of financial resources for instructional programming. Principals must establish themselves as the chief leaders of learning in their school buildings. Tightly focused transformational leadership practices such as a clearly defined school mission, ongoing student data monitoring, managing curriculum and instruction, addressing school climate issues and protecting instructional time can have an indirect and positive impact on student achievement (Fancera & Bliss, 2011). However, although Leithwood, Patten, and Jantzi (2010) cited that transformational leadership practices can be linked to improving CTE among staff and CTE can positively influence student learning outcomes, there has not been an examination of the influence that transformational leadership practices have on CTE as a means to mediate school achievement (Fancera & Bliss, 2011).

Klem & Connell (2004) supported the correlation between higher levels of student academic engagement and improved performance. They found that the level of academic engagement is a strong predictor of behavior which impacts student achievement, regardless of socioeconomic status. Students who engage more deeply in the learning process will more often earn higher grades, perform better on tests and experience lower rates of dropping out of school prior to meeting graduation requirements.

Hattie (2015) offers a key question; How might we build the capacity of teachers and university administrators to collectively construct and evaluate successful teaching programs

and learning experiences? This question offers a topic area that might be considered for further research. Secondly, Zee and Koomen (2016) found a need for greater integration among diverse literatures because most studies in the area of CTE did not inform or effectively build upon one another which could prevent researchers from drawing links between TSE and the quality of classroom processes. Further research that links the findings of studies in this field is needed.

Schools are becoming progressively more complex and leading them effectively is challenging work. Successfully meeting the needs of increasingly diverse student populations who bring multifaceted challenges to the classroom makes leading schools more difficult than ever before. The success of a school is contingent upon data metrics that measure the growth and achievement of all student groups in the aggregate as well as the individual performances of each student that enters through the school's doors. Schools function as organizations and organizations can only be as good as the people who lead and serve within them. This literature review looked at the relationship between teachers' efficacious beliefs that they possess the power to influence the outcomes of the students they teach and teacher behaviors in the classroom. The literature review also looked at whether or not there is an association between specific instructional behaviors that teachers engage in and student academic achievement.

The review of literature found that additional research is needed in order to better understand the impact that student and teacher relationships have on the school's climate. More specifically, the perceptions that students have of their teachers and perceptions that teachers have of their students. Finally, having a better understanding of the association between TSE and teacher perceptions and how teacher perceptions are associated to teacher

behaviors could help to provide guidance to school division leaders and principals who are in the process of determining goals and initiatives, professional development topics and allocation of resources as they continue to seek ways to build instructional leadership capacity in their teachers and advance student learning (Dockery, 2011).

Chapter Three

Methodology

In this chapter, the research design will be presented including the purpose of the study, methodology and research justification. The purpose of the study and research questions were restated. The site and sample selection, sample collection and instrument design were included, and an overview of data collection, treatment, and data analysis were provided.

Purpose of the Study

The purpose of this study was to identify the relationship between teacher self-efficacy (TSE) and teacher behaviors and student academic achievement. Research on implications that TSE has on teacher behaviors adds to a relatively limited literature base that holds possibilities for leaders to elicit positive school change through improved instruction and higher student achievement (Lekwa et al., 2019). Wolfolk Hoy (2000) concurred with (Armor et al., 1976) that TSE, the teachers' confidence in their ability to promote students' learning, was identified in a 1970's study conducted by the RAND corporation as one of the few teacher characteristics related to student achievement. Although self-efficacy has been studied for nearly 50 years, more research is needed to show the connection between school reform efforts and their specific impact on teacher practice and student learning (Poekert, 2012). There are also limited studies focusing on factors that predict the development of TSE in teachers. Pfitzner (2016) concurred with (Henson, 2002; Klassen et al., 2011) that there is a lack of research on the topic of how TSE beliefs are formed. This is a key problem for educators since studies of TSE support a positive association between TSE beliefs and confidence in one's abilities in the classroom.

Furthermore, additional research on TSE might offer guidance and support to school district leaders who are interested in fostering TSE beliefs of teachers (Pfitzner, 2016).

Research Design – Methodology & Justification

Zee and Komen (2016) cited "Most reviews and critiques of the TSE literature have predominantly focused on key conceptual and methodological issues surrounding research on teachers' capability beliefs, or have proposed alternative paradigms and frameworks to broaden and clarify this construct" (e.g., Henson, 2002; Klassen et al., 2011; Labone, 2004; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998; Wheatley, 2005; Woolfolk Hoy, Hoy, & Davis, 2009; Wyatt, 2014) (p. 982). Although researchers (Ross, 1998; Woolfolk Hoy et al., 2009) have extended this research and emphasized the potential consequences of TSE; they have not covered the substantial body of evidence on the consequences of TSE that had been published over the previous decade (Zee & Komen, 2016).

To address potential influences TSE scores might have on teacher behavior and TSE scores and teacher behavior scores might have on student academic achievement, this study used a quantitative analysis method that included a simple linear regression model through the Statistical Package for Social Sciences (SPSS). In model 1 the simple linear regression model isolated teacher behavior as the dependent variable and TSE as the independent variable. In model 2 the simple linear regression model isolated student academic achievement as the dependent variable and TSE as the independent variable and in model 3 academic achievement was isolated as the dependent variable and teacher behavior as the independent variable. The researcher put controls on the study by limiting the participants to teachers of core subjects in grades 6-12 that have an end of course Virginia Standards of Learning assessment (SOL).

Further controls included restricting the selection of participants to a middle school and high school within the same feeder pattern, geographical region or zone because different schools may have different levels of resources, working conditions and socioeconomic status that could impact teacher perceptions and behaviors.

Further data analysis was conducted through a simple linear regression model to determine the significance of the relationship between TSE and teacher behavior, TSE and student achievement and teacher behavior and student achievement. The study compared one variable at a time to the other single variable. A continuation of this study included a regression analysis to determine which variable, TSE or teacher behavior, has the greatest positive or negative relationship with student achievement. Since the purpose of the study was to examine the relationship between TSE and teacher behavior and student achievement while controlling for level of resources, working conditions and socioeconomic status, utilizing a simple regression model through SPSS could be appropriate for this study.

To determine if there was a relationship between TSE, teacher behavior and student achievement the study used three separate models to compare one variable to another single variable at a time in the following manner:

1. TSE (TSES) score and Teacher Behavior (CSAS) score
2. TSE (TSES) score and Student Achievement (SOL) score
3. Teacher Behavior (CSAS) score and Student Achievement (SOL) score

Once it was determined that there was a relationship between two of the variables the researcher reviewed the coefficient table to determine the level of significance of the

relationship. The following significance levels were determined for the following sets of variables:

Table 1

Significance of Relationship between Variables

Model 1 **TSE and Observable Teacher** **Classroom Behavior**	**Model 2** **TSE and Student Achievement**	**Model 3** **Observable Teacher Classroom Behavior and Student Achievement**
No relationship	No relationship	No relationship
Positive relationship	Positive relationship	Positive relationship
Negative relationship	Negative relationship	Negative relationship
Slightly positive relationship	Slightly positive relationship	Slightly positive relationship
Slightly negative relationship	Slightly negative relationship	Slightly negative relationship

As reflected in table 1, the researcher included three models in the study to determine the level of significance of the relationship between each of the two variables. The researcher reported on relationships that were statistically significant.

Research Questions

This study sought to address the following question: What is the relationship between teacher self-efficacy and teacher behavior and student academic achievement? In response to the purpose of the study, the following research questions will be addressed related to the relationship between teacher self-efficacy and teacher behavior and student academic achievement.

1. What is the relationship between teacher self-efficacy and teacher behavior?
2. What is the relationship between teacher self-efficacy score and student academic performance (SOL pass rate)?
3. What is the relationship between teacher behavior score and student academic performance (SOL pass rate)?

Needed Data

To address the following question: Does teacher self-efficacy and teacher behavior impact student academic achievement, the researcher determined the teacher's self-efficacy score and classroom behavior score. Participants completed a 24-question teacher self-efficacy survey (TSES) that will be scored by the researcher. A final score indicating the efficacy level of each participant was determined by the researcher. The researcher will utilize the Classroom Strategies Assessment System (CSAS) to conduct observations of participants implementing an instructional activity. The researcher will assign a behavioral score to participants using the CSAS. The researcher gathered student achievement data for all students in the study participants' classrooms. These student data are the Virginia Standards Of Learning Assessment (SOL) scaled scores, which are administered at the end of the course.

Site and Sample Selection

The targeted site of the study was a medium sized suburban/urban school division in the Commonwealth of Virginia. Medium-sized school divisions were defined as divisions that served between 2,000 students and 75,000 students (Earthman, 2019). The study site consists of 2 school facilities that include 1 middle school and 1 high school. The school division has additional educational programs within the district that were not selected for the study. For the

academic year 2022-2023, the school division served between 2,000 and 3,000 students and 400 professional instructional staff. The school division was selected because it is mid-sized and ethnically, culturally and linguistically diverse. The school division also has a high graduation rate of above 90%. Student demographic data indicate the student body is approximately 60% white, 12% Hispanic, 5% black and 10% Asian. Students identifying from multiple racial backgrounds account for approximately 12% of the enrollment population.

The range of the sample size will include 10 to 20 middle and high school teachers in grades 6 -12. Participants of the study were limited to teachers of core subjects that require an end of course test (SOL).

Instrument Design

The study utilized several instruments and methods that include a multi-step data collection; (1) Teacher Self-efficacy Scale (TSES); (2) classroom activity; (3) Classroom Strategy Assessment System instrument (CSAS); (4) Virginia Standards Of Learning Assessment (SOL). Teachers will complete the Teacher Self-efficacy Scale (TSES) developed by Tschannen-Moran and Hoy (2001). The researcher selected the TSES instrument because it is a 24-question standardized survey tool that has been used by many researchers who have previously studied self-efficacy. The TSES is considered to be one of the best tools to gauge teacher self-efficacy (Shahzan, 2017).

Table 2

Summary of Teacher Self Efficacy Scale Questionnaire

Question	1-10
1. How much can you do to get through to the most difficult students?	1-10
2. How much can you do to help your students think critically?	1-10
3. How much can you do to control disruptive behavior in the classroom?	1-10
4. How much can you do to motivate students who show low interest in school work?	1-10
5. To what extent can you make your expectations clear about student	
6. behavior?	1-10
7. How much can you do to get students to believe they can do well in school work?	1-10
8. How well can you respond to difficult questions from your students?	1-10
9. How well can you establish routines to keep activities running smoothly?	1-10
10. How much can you do to help your students value learning?	1-10
11. How much can you gauge student comprehension of what you have taught?	1-10
12. To what extent can you craft good questions for your students?	1-10
13. How much can you do to foster student creativity?	1-10
14. How much can you do to get children to follow classroom rules?	1-10

15. How much can you do to improve the understanding of a student who is failing?	1-10
16. How much can you do to calm a student who is disruptive or noisy?	1-10
17. How well can you establish a classroom management system with each group of students?	1-10
18. How much can you do to adjust your lessons to the proper level for individual students?	1-10
19. How much can you use a variety of assessment strategies?	1-10
20. How well can you keep a few problem students from ruining an entire lesson?	1-10
21. To what extent can you provide an alternative explanation or example when students are confused?	1-10
22. How well can you respond to defiant students?	1-10
23. How much can you assist families in helping their children do well in school?	1-10
24. How well can you implement alternative strategies in your classroom?	1-10
25. How well can you provide appropriate challenges for very capable students?	1-10

Table 2 reflects the questions that were included in the TSES survey that were used to determine each participant's self-efficacy score. Participants were informed that the TSES questionnaire was designed to help the researcher gain a better understanding of the kinds of

things that create challenges for teachers and all answers are confidential. Participants were instructed to indicate their opinion about each of the questions below by marking any one of the nine responses in the columns on the right side of the survey form, ranging from (1) “None at all” to (10) “A Great Deal” as each represents a degree on the continuum. Although the scale ranges from 1-10 the following indicators coincide with the odd numbers along the continuum: (1) None at all, (3) Very Little, (5) Some Degree, (7) Quite A Bit, (9) A Great Deal. The researcher added up the 24 individual scores (1 score for each question response) and provided each participant a final average score.

Classroom observations are a commonly used method by school administrators and instructional coaches to monitor and assess teachers’ pedagogical practices. Classroom observations provide a process to formatively measure how teachers deliver instruction, engage with students, and proactively manage the classroom to meet the continuum of student’s needs (Dudek et al., 2018). Teachers and students engaged in an academic activity that was be developed by the teacher and observed by the researcher. The activity included a 45-60-minute observation of a learning topic that has not been previously introduced to the students. The researcher used the Classroom Strategy Assessment System (CSAS), which is an evidence-based multi-rater classroom observation instrument designed to assess the teachers’ use of instructional and behavioral management strategies (Lekwa et al., 2020). The tool is commonly used by observers for measuring, developing, and supporting evidence-based instructional and behavioral management practices in classrooms. The CSAS measures how often teachers utilize effective instruction and behavioral management practices (Poulou et al.,, 2019). The CSAS has been approved by the State of New Jersey as a teacher practice evaluation

instrument for teacher evaluation and has demonstrated evidence of reliability, concurrent validity, and sensitivity to change following intervention, as well as convergent and predictive validity with measures of student achievement (Dudek et al., 2018). The researcher added up the individual scores that were observed in each of the 12 categories and provided each participant a final average score.

The observation activity included the following steps:

(1) Pre-observation conference

(2) Classroom observation that includes recording the total number of response opportunities

(3) Completion of instructional and behavioral management rating scales

Table 3 Definitions of CSAS-O Strategy Counts

Strategy counts	Definitions
Concept Summaries	A teacher summarizes or highlights key concepts or facts taught during the lesson. Summarization statements are typically brief and clear. This teaching strategy helps students organize and recall material taught.
Academic Response Opportunities	A teacher creates opportunities for students to share their understanding of the lesson content with the teacher or class. These opportunities can be verbal or nonverbal responses (e.g., explain answers, repeat key points, brainstorm ideas, and show answers on the board).
Academic Praise	A teacher gives a verbal or nonverbal statement or gesture to provide feedback for appropriate academic performance.
Academic Corrective Feedback	A teacher gives a verbal or nonverbal statement or gesture to provide feedback for incorrect academic performance.
Clear Directives	A teacher gives a verbal instruction that specifically directs a behavior to occur immediately. These directives are clear and they provide specific instructions to students to perform a behavior. They are declarative statements (not questions), describe the desired behavior, and include no more than two steps.
Vague Directives	A teacher gives a verbal instruction that is unclear when directing a behavior to occur immediately. These directives are vague, may be issued as questions, and often include unnecessary verbalizations or more than two steps.
Behavior Praise	A teacher gives a verbal or nonverbal statement or gesture to provide feedback for appropriate behavior.

Behavior Corrective Feedback	A teacher gives a verbal or nonverbal statement or gesture to provide feedback for inappropriate behavior.
Total Strategy Count	The sum of the frequency of the eight teacher practices.

1. Note. Adapted from "Development and construct validity of the Classroom Strategies Scale-Observer Form," by Reddy, L.A., Fabiano, G., Dudek, C.M., and Hsu, L., 2013, School Psychology Quarterly, 28, 4, 317−341.

Table 4 Definitions of CSAS-O Strategy Rating Scales

Instructional Strategies Rating Scales	
Total Scale	The Total Instructional Strategies scale reflects the overall use of Instructional Methods and Academic Monitoring/Feedback.
Instructional Methods Composite	How classroom instruction occurs. Measures teachers' use of teacher directed student directed methods, or differentiated instruction. This includes how a teacher incorporates active learning techniques such as hands-on learning and collaborative learning in the presentation of lessons as well as how a teacher delivers academic content to students.
Adaptive Instruction Subscale	Strategies teachers use to respond to their students' learning needs while teaching. These practices reflect teacher flexibility and responsiveness to students' needs, as well as methods of differentiated instruction.
Student Directed Instruction Subscale	Strategies teachers use to actively engage students in the learning process. These practices encompass constructivist and hands-on instructional techniques, linking lesson content to prior learning, personal experiences, and cooperative learning.

Direct Instruction Subscale	Strategies teachers use to deliver academic content or convey information to students. These practices include direct instruction techniques, modeling, identifying, and summarizing.
Academic Monitoring Feedback Composite	How teachers monitor students' understanding of the material and provide feedback on their understanding. These strategies assess students' thinking and encourage students to examine their own thought processes. Teachers guide students' understanding by encouraging students, affirming appropriate application of the material, and correcting misperceptions.
Promotes Students' Thinking Subscale	Strategies teachers use to activate students' thinking about the lesson material. These practices assess teachers' efforts to get their students to think about their thinking process (i.e., open-ended, what, how, and why).
Academic Performance Feedback Subscale	Strategies teachers use to provide specific feedback to their students' on their understanding of the material. These practices assess teachers' efforts to explain what is correct or incorrect with student academic performance.
Behavioral Management Strategies Scales	
Total Scale	The Total Behavioral Management Strategies scale reflects the overall use of Proactive Methods and Behavior Feedback.
Preventative Methods Composite	Strategies teachers use to promote positive behaviors in the classroom and reduce the likelihood of negative behaviors. These strategies include prompts, routines, reviewing rules, and presenting instructions or requests in a clear manner.
Proactive Methods Subscale	Verbal and nonverbal strategies teachers use to prevent student disengagement, and problem behaviors from occurring in the classroom. These practices assess how teachers create a positive classroom environment.

Directives Subscale	Strategies teachers use for issuing directions or instructions to students and behavioral expectations in the classroom.
Behavior Feedback Composite	How teachers respond to students' appropriate and inappropriate behaviors. This includes the usage of praise to encourage positive behaviors and corrective feedback to redirect negative behaviors.
Behavior Praise Subscale	Verbal and nonverbal strategies teachers use to positively reinforce specific appropriate behaviors in the classroom. These practices assess how teachers respond to positive behavior in the classroom.
Behavior Corrective Feedback Subscale	Verbal and nonverbal strategies teachers use to correct students' inappropriate behavior. These practices assess how teachers respond to negative behavior in the classroom.

1. Note. Adapted from "Development and construct validity of the Classroom Strategies Scale-Observer Form," by Reddy, L.A., Fabiano, G., Dudek, C.M., and Hsu, L., 2013, School Psychology Quarterly, 28, 4, 317-341.

Tables 3 and 4 reflect the observable categories, behavioral descriptions, and definitions of the CSAS components. During the classroom observations the researcher monitored the CSAS behaviors and calculated the total number of observed behaviors to determine an overall teacher instructional behavior (CSAS) score.

Instrument Validity and Reliability

The argument posed by Bandura (1997) that self-efficacy was not uniform across different types of tasks spawned a debate about whether the measurement of teacher efficacy should be unidimensional (general teacher efficacy) or multidimensional (task-specific efficacy) (Nie et al., 2012). Tschannen-Moran and Hoy (2001) responded to these limitations by

developing a Teacher Sense of Efficacy Scale (TSES), that corresponded to the tasks that teachers faced in school. Nie et. al (2012) conducted a study on the (TSES) and examined its factorial, predictive, convergent and discriminant validity, as well as its internal consistency reliability. Results of the study support the stability of three-factor structure of TSES. Therefore, it is recommended that the measures of teacher efficacy should be task specific. The researchers also confirmed that the three factors can be further collapsed into one general factor. Discriminant validity of task-specific efficacy rated low while the general teacher efficacy showed better predictive power. The findings of the study suggest that the general self-efficacy score, once separated from task-specific teacher efficacy beliefs, should be used for prediction purposes (Nie et al., 2012).

The Classroom Strategy Assessment System (CSAS) was developed to formatively assess teacher's progress of strategy use during instructional delivery and measure the frequency and the quality to which they use a variety of behavior management and instructional strategies (Lekwa et al., 2020). The reliability and validity of CSAS scores have been examined through multiple studies that tested single time points (i.e., Stage 1 in development of a progress monitor) (Lekwa et al., 2020). Reddy et al., (2013) "Acknowledged acceptable internal consistency and reliability, as well as empirical support, for the hypothesized factor structure of the Instructional Strategies and Behavior Management Strategy Rating scales." "This program of research also includes evidence of concurrent and predictive validity between CSAS scores and student achievement (Dudek, Reddy, & Lekwa, 2018; Lekwa, Reddy, Dudek, & Hua, 2019; Reddy et al., 2013b) as well as student academic behavioral engagement in the classroom." (Lekwa, Reddy, & Shernoff, 2019) (p. 138).

Data Collection Procedures

The researcher, who has completed CITI training (Appendix A), received IRB approval from Virginia Tech University. Upon IRB approval, the researcher submitted an application to conduct research, to the identified school district's Office of Planning and Evaluation. After approval was granted, the researcher worked with the point of contact to identify potential study participants. Communication was conducted through email and an introductory meeting between the researcher and participants was set up by the researcher, where the Study Information Sheet was be provided (Appendix B).

The researcher used electronic communication with the potential participants to include an initial email introducing the researcher and explaining the study (Appendix C). The researcher invited interested participants to notify the point of contact of the school division of their willingness to participate in the study and to attend an informational meeting. Once the list of potential participants is developed the researcher provided the participants with further details including timelines for instructional activities, interviews and observations. The researcher also scheduled an informational meeting with potential participants so that questions specific to the study could be answered. Further details about student participation, student information, confidentiality and opt out forms etc. were shared at that time. The researcher informed the Office of Planning and Evaluation that although students will be present during the observation, they will not be considered participants and will not be studied or rated by the observer.

Teachers completed the Teacher Self- Efficacy Scale (TSES). The estimated time for completion was 5-7 minutes. The researcher observed the instructional activity that was

prepared by the teacher. The estimated observation time was 45-60 minutes but for consistency purposes, the researcher conducted a 1-hour observation in each class. The researcher did not include deception in the study. All questionnaires and classroom activities that the participants will engage in were authentic, clearly explained and straight-forward. Teachers developed a core content instructional activity for a concept that was introduced to the students for the first time. The estimated lesson planning time was 30-45 minutes. The researcher used the classroom strategy assessment system (CSAS) which is an evidence-based multi-rater classroom observation instrument that is designed to assess the teachers' use of instructional and behavioral management strategies. The CSAS measures how often teachers utilize effective instruction and behavioral management practices (Poulou, Reddy, & Dudek, 2019).

The researcher sought permission from the school district's Office of Planning and Evaluation to obtain end of course SOL scores for each participant's students. Collected student data did not contain identifying information such as, student name, student ID number, student issued email, demographic information, special program participation status or level of educational service e.g., special education, 504 accommodations and ESOL services.

Data Treatment/Management

The researcher gathered teacher self-efficacy data through the administration of the Teacher Self-efficacy Scale (TSES) developed by Tschannen-Moran and Hoy (2001). The TSES instrument will be administered electronically through Virginia Tech's QuestionPro administration tool. All collected data were stored digitally on a password protected server. All transcriptions were stored on the VT google drive which is also password protected. All other

data and information collected by the researcher during the pre-conference interviews and all recorded information during the observation phase (instructional activity) was saved in the same password protected drive. The data were only available to the primary and co-investigator.

Additional privacy steps were taken to protect all participants. The researcher did not include teacher and student names and employee and student ID numbers in any of the collected data. The school district and individual school names were also be omitted from the data. During the observation phase the researcher collected the data in the following manner, e.g., Teacher 1 and Classroom A (T1, CA), Teacher 2 and Classroom B (T2, CB) etc. All data will be disposed of upon the completion and successful final defense of the study.

Summary

The purpose of this study was to examine the relationship between teacher self-efficacy and teacher behaviors and their impact on student academic achievement through addressing one primary question and two sub-questions. The researcher explored the relationship between teacher self-efficacy and teacher behaviors and their impact on student academic achievement. The researcher further explored the relationship between teacher self-efficacy score and student academic achievement (SOL) score and teacher behavior score and student academic achievement (SOL) score.

To gain insight into these relationships the researcher used a quantitative analysis method that utilizes a simple linear regression model through the Statistical Package for Social Sciences (SPSS). The researcher highlighted the statistical significance of each regression model

including the relationship between teacher self-efficacy score and student academic achievement (SOL) score and teacher behavior score and student academic achievement (SOL) score. Details for the results and findings were included in Chapter Four.

Chapter Four

Data Analysis Methodology

The purpose of this study was to identify the relationship between teacher self-efficacy (TSES) score and observable teacher instructional behaviors (CSAS) score and student academic achievement (SOL) scores. This study addressed the following question: What is the relationship between teacher self-efficacy and teacher behavior and student academic achievement? In response to the purpose of the study, the following research questions were addressed related to the relationship between teacher self-efficacy and teacher behavior and student academic achievement.

1. What is the relationship between teacher self-efficacy score and teacher behavior score?
2. What is the relationship between teacher self-efficacy score and student academic performance (SOL pass rate)?
3. What is the relationship between teacher behavior score and student academic performance (SOL pass rate)?

Results of the data analysis collected in the Teacher Self Efficacy Survey (TSES), Classroom Strategies Assessment System (CSAS), and student achievement (SOL score) as described in Chapter 3 are presented in this chapter. The researcher of the study sought to determine whether there was a relationship between TSES score and teacher behavior score, TSES score and SOL score and teacher behavior score and SOL score. The data were analyzed to determine the extent to which a construct of TSES (i.e., how individuals judge and perceive

their ability to perform a specific task) contributed to variance in CSAS (i.e., observable teacher behaviors during the implementation of instructional activities) over and above that which could be explained by the constant variable of TSES in model 1 and model 2 and teacher behavior (CSAS) in model 3.

Data Collection

The sample population included data from 2 public schools representing 1 middle school and 1 high school from a medium sized school district in Virginia. Participants who completed the TSES survey and classroom observation were teachers at the secondary level (grades 6-12) who taught at least one core curriculum course with an end of course Standards of Learning assessment during the 2022-2023 school year. Requests to participate were sent from the Superintendent's office to employees with three follow up reminders. Participants were instructed to identify their school's name and course title. Individual responses were aggregated at the division level and participants could not be individually identified.

Survey Administration

The researcher administered the Teacher Self Efficacy Survey (TSES) and the Classroom Strategy Assessment System (CSAS) during a two-week period between May 1 and May 15 of 2023 to obtain overall teacher self-efficacy perception scores and each participant's observable teaching behavior count during a one (1) hour observed instructional lesson. The researcher also obtained SOL scaled scores from the school district's Office of Assessment and Accountability between May 22 and May 26. The sample data do not include SOL retake scores. The survey was distributed electronically to all participants of the included 2 school sites through the Virginia Tech QuestionPro collection system. Participants received an email

describing the purpose of the study and a request for their participation. Additionally, the email provided a survey link, a summary of the data requested, a disclosure of confidentiality, and a description of the informed consent process and included informed consent documentation. Three reminder emails were sent to the participants to complete the survey. Once all of the survey responses were collected the data were downloaded and stored electronically on a secure laptop and backed up on the researcher's Virginia Tech Google drive, both requiring two-factor authentication. The survey yielded 100% participation and completion rate and all participants who agreed to be observed willingly completed the process.

The survey instrument was sent to the participant's work email and included the participant's first initial of their first name and their full last name, but survey participants were not required to provide any further identifying information. To set up the classroom observation schedule participants were required to provide the researcher with the school's name, classroom number, course subject name and total number of students in the class but this information was coded by the researcher to maintain anonymity. The survey instrument incorporated 24 questions from the TSES survey that is designed to rate the types of things that pose challenges for classroom teachers. Each TSES question allowed respondents to select between 1 and 10 with 1 rated as the lowest score and 10 as the highest score. The CSAS observation tool is designed to assess the teachers' use of instructional and behavioral management strategies. The CSAS includes six (6) observable instructional strategies and six (6) observable behavioral strategies that teachers use to support student engagement, keep students on task and promote learning.

Presentation of Data

The researcher tested for ANOVA assumptions prior to running the data in SPSS. The following assumptions were met:

1. Sample size of a minimum of 10
2. Data must have a normal distribution
3. Data should not have any outliers
4. Variables cannot be multicollinear

The researcher used 1 variable for each of the three categories; 1) Teacher Self-Efficacy, 2) Teacher Behavior, 3) SOL score. The independent variable in model 1 and model 2 was teacher self-efficacy (TSES) score and the independent variable in model 3 was observable teacher behavior (CSAS) score. An average score was calculated and rounded to the nearest hundredth for each participant in each of the three categories. The process of calculating an average score for the data was necessary due to the variance in numbers in each category e.g., one participant had as few as four students participate in the SOL assessment whereas another participant had as many as 24 students participate in the assessment. Additionally, some participants had fewer than 30 observable teacher behaviors on the CSAS tool whereas other participants had more than 60 observable behaviors. Table 5 provides the average scores for the categories, by participant.

Table 5

Final Average Score for Categories

Study Participant	TSES Score	CSAS Score	SOL Score
Teacher 1A	8.08	2.25	2.48
Teacher 2B	7.5	4.5	1.25
Teacher 3C	8.29	5.17	1.95
Teacher 4D	7.67	1.83	2.0
Teacher 5E	9.54	4.25	2.78
Teacher 6F	8.67	3.17	2.4
Teacher 7G	8.5	5.67	1.56
Teacher 8H	8.46	3.08	2.27
Teacher 9I	9.21	5.67	2.1
Teacher 10J	8.21	2.83	1.94

As reflected in table 5, each participant was provided a final average score for TSES, CSAS, and SOS.

The researcher collected data from the 24 question TSES survey. Each TSES question allowed respondents to select between 1 and 10 with 1 rated as the lowest score and 10 as the highest score. Table 6 provides the teacher's perception of their own self-efficacy with a scoring rating for each question. The table also includes the total TSES score and the final average calculation score for each teacher.

Table 6

TSES Individual Scores, Final Scores and Final Average Calculation

	T1A	T2B	T3C	T4D	T5E	T6F	T7G	T8H	T91	T10J
Q1	9	7	8	8	10	8	10	9	9	10
Q2	9	7	8	7	9	9	10	9	10	10
Q3	8	7	9	8	10	8	10	9	9	9
Q4	8	7	9	8	10	8	8	9	9	9
Q5	10	9	9	9	10	9	9	10	10	10
Q6	8	8	8	7	10	9	8	9	8	10
Q7	8	8	10	10	10	9	9	8	10	8
Q8	7	9	9	8	10	9	7	10	10	9
Q9	6	6	8	8	10	9	8	9	8	8
Q10	8	8	8	8	9	9	10	8	10	8
Q11	10	8	8	9	10	9	8	8	10	8
Q12	6	6	8	6	8	9	10	9	8	7
Q13	8	7	7	8	10	8	8	9	9	9
Q14	10	8	8	7	9	9	8	8	8	8
Q15	8	7	8	8	9	8	8	8	9	7
Q16	9	8	8	6	10	9	8	9	10	8
Q17	7	9	8	8	8	8	8	7	10	8

Q18	9	7	8	6	10	9	8	8	10	8
Q19	6	6	8	9	10	9	8	9	9	8
Q20	8	9	10	9	10	9	9	8	10	9
Q21	7	8	8	5	9	8	8	8	8	7
Q22	9	8	6	6	9	8	8	8	8	5
Q23	7	7	8	7	10	9	8	7	10	7
Q24	9	6	10	9	9	9	8	7	9	7
Total	194	180	199	184	230	208	205	203	221	197
Average	**8.08**	**7.5**	**8.29**	**7.67**	**9.54**	**8.67**	**8.5**	**8.46**	**9.21**	**8.21**

As reflected in table 6, each participant received an individual score for TSES, a final score for TSES and a final average calculation score for TSES. The researcher used average TSES score to when studying the relationship between TSES score and CSAS score and TSES score and SOL score.

The researcher collected data from the CSAS tool that were gathered during the classroom observation. The two observation categories included instructional strategies and behavioral management strategies. Each category included 6 observable behaviors. Instructional Strategies included; (1) Concept summaries (CS); (2) Student directed instruction (SDI); (3) Direct instruction (DI); (4) Academic praise (AP); (5) Academic corrective feedback (ACF); (6) Academic performance feedback (APF). Behavioral Management Strategies included; (1) Behavioral praise (BP); (2) Behavioral corrective feedback (BCF); (3) Proactive methods

(PME); (4) Prevention management (PMA); (5) Directives transitions (DT); (6) Clear directives (CD). Table 7 provides the tally total for each observed category, the total number of observed instructional and behavioral management strategies and the final average calculation CSAS score.

Table 7

CSAS Individual scores, Total Scores and Final Average Calculation

	T1A	**T2B**	**T3C**	**T4D**	**T5E**	**T6F**	**T7G**	**T8H**	**T91**	**T10J**
CS	2	1	2	2	1	2	1	2	2	2
SDI	3	2	2	3	5	6	3	5	3	2
DI	4	8	8	2	7	6	5	3	6	3
AP	1	7	8	3	10	7	8	5	7	6
ACF	3	3	5	1	8	0	6	3	7	3
APF	3	7	11	4	5	4	13	6	9	5
BP	1	3	0	1	3	3	4	3	4	1
BCF	1	3	2	1	0	0	6	0	6	1
PME	2	4	3	2	2	3	4	1	6	2
PMA	1	3	6	1	2	3	3	3	5	3
DT	2	6	7	1	8	2	7	3	5	4
CD	4	7	8	2	3	3	8	3	8	2
Total	27	54	62	22	51	38	68	37	68	34
Average	**2.25**	**4.5**	**5.17**	**1.83**	**4.25**	**3.17**	**5.67**	**3.08**	**5.67**	**2.83**

As reflected in table 7, each participant received an individual score for CSAS, a final score for CSAS and a final average calculation score for CSAS. The researcher used average CSAS

score to when studying the relationship between CSAS score and TSES score and CSAS score and SOL score.

The researcher collected end of course SOL assessment scaled scores for each student in each of the participants' classes. The Virginia Standards of Learning (SOL) are established minimum expectations for what students should know and be able to do at the end of each grade or course in English, mathematics, science, history/social science and other subjects. SOL test results are given a scaled score with a range from 0 to 600. A scaled score below 350 is a fail below basic whereas a score of 350-399 is a fail basic. A score of 400-499 is a pass proficient and a score between 500-600 is pass advance (Virginia Department of Education, 2022). The researcher translated all final SOL score results into a numerical rating scale ranging from 0-3 and calculated a final average SOL score rounded to the hundredth for each teacher. Tables 8-17 provides the student scaled score, SOL result, the coded score and the teacher's average calculation score.

Table 8

Summary of Standard of Learning Scores for Teacher 1, Classroom A (T1,CA)

Student	**Scaled Score**	**SOL Result**	**Study Score**
	0-350	Fail Below Basic	0
	350-399	Fail Basic	1
	400-499	Pass Proficient	2
	500-600	Pass Advance	3
S1	491	PP	2
S2	448	PP	2
S3	579	PA	3
S4	531	PA	3
S5	406	PP	2
S6	455	PP	2
S7	531	PA	3
S8	442	PP	2
S9	461	PP	2
S10	442	PP	2
S11	524	PA	3
S12	469	PP	2
S13	448	PP	2
S14	364	FB	1
S15	500	PA	3
S16	512	PA	3
S17	560	PA	3
S18	571	PA	3
S19	502	PA	3
S20	483	PP	2
S21	500	PA	3
S22	502	PA	3
Average Score	**487.32**		**2.48**

Note: This table provides a summary of Teacher 1 and Classroom A. All observed participants were assigned a teacher number and classroom letter. A table will be provided for each participant.

Table 9

Summary of Standard of Learning Scores for Teacher 2, Classroom B (T2,CB)

Student	**Scaled Score**	**SOL Result**	**Study Score**
	0-350	Fail Below Basic	0
	350-399	Fail Basic	1
	400-499	Pass Proficient	2
	500-600	Pass Advance	3
S1	337	FBB	0
S2	451	PP	2
S3	479	PP	2
S4	361	FB	1
Average Score	**407.0**		**1.25**

Table 10

Summary of Standard of Learning Scores for Teacher 3, Classroom C (T3,CC)

Student	**Scaled Score**	**SOL Result**	**Study Score**
	0-350	Fail Below Basic	0
	350-399	Fail Basic	1
	400-499	Pass Proficient	2
	500-600	Pass Advance	3
S1	479	PP	2
S2	424	PP	2
S3	479	PP	2
S4	454	PP	2
S5	477	PP	2
S6	491	PP	2
S7	485	PP	2
S8	375	FB	1
S9	392	FB	1
S10	459	PP	2
S11	433	PP	2
S12	500	PA	3
S13	477	PP	2
S14	388	FB	1
S15	523	PA	3
S16	454	PP	2
S17	412	PP	2
S18	491	PP	2
S19	472	PP	2
Average Score	**456.05**		**1.95**

Table 11

Summary of Standard of Learning Scores for Teacher 4, Classroom D (T4,CD)

Student	**Scaled Score**	**SOL Result**	**Study Score**
	0-350	Fail Below Basic	0
	350-399	Fail Basic	1
	400-499	Pass Proficient	2
	500-600	Pass Advance	3
S1	418	PP	2
S2	435	PP	2
S3	410	PP	2
S4	410	PP	2
Average Score	**418.25**		**2.0**

Table 12

Summary of Standard of Learning Scores for Teacher 5, Classroom E (T5,CE)

Student	**Scaled Score**	**SOL Result**	**Study Score**
	0-350	Fail Below Basic	0
	350-399	Fail Basic	1
	400-499	Pass Proficient	2
	500-600	Pass Advance	3
S1	422	PP	2
S2	444	PP	2
S3	478	PP	2
S4	495	PP	2
S5	478	PP	2
S6	478	PP	2
S7	478	PP	2
S8	478	PP	2
S9	478	PP	2
Average Score	**469.89**		**2.0**

Table 13

Summary of Standard of Learning Scores for Teacher 6, Classroom F (T6,CF)

Student	**Scaled Score**	**SOL Result**	**Study Score**
	0-350	Fail Below Basic	0
	350-399	Fail Basic	1
	400-499	Pass Proficient	2
	500-600	Pass Advance	3
S1	423	PP	2
S2	558	PA	3
S3	479	PP	2
S4	524	PA	3
S5	479	PP	2
Average Score	**492.6**		**2.4**

Table 14

Summary of Standard of Learning Scores for Teacher 7, Classroom G (T7,CG)

Student	**Scaled Score**	**SOL Result**	**Study Score**
	0-350	Fail Below Basic	0
	350-399	Fail Basic	1
	400-499	Pass Proficient	2
	500-600	Pass Advance	3
S1	425	PP	2
S2	307	FBB	0
S3	365	FB	1
S4	472	PP	2
S5	421	PP	2
S6	456	PP	2
S7	341	FBB	0
S8	370	FB	1
S9	451	PP	2
S10	412	PP	2
S11	443	PP	2
S12	392	FB	1
S13	397	FB	1
S14	408	PP	2
S15	383	FB	1
S16	477	PP	2
S17	450	PP	2
S18	588	PA	3
Average Score	**419.89**		**1.56**

Table 15

Summary of Standard of Learning Scores for Teacher 8, Classroom H (T8,CH)

Student	**Scaled Score**	**SOL Result**	**Study Score**
	0-350	Fail Below Basic	0
	350-399	Fail Basic	1
	400-499	Pass Proficient	2
	500-600	Pass Advance	3
S1	444	PP	2
S2	505	PA	3
S3	451	PP	2
S4	508	PA	3
S5	416	PP	2
S6	524	PA	3
S7	472	PP	2
S8	493	PP	2
S9	525	PA	3
S10	502	PA	3
S11	456	PP	2
S12	419	PP	2
S13	430	PP	2
S14	472	PP	2
S15	407	PP	2
S16	424	PP	2
S17	495	PP	2
S18	522	PA	3
S19	402	PP	2
S20	472	PP	2
S21	499	PP	2
S22	439	PP	2
Average Score	**467.14**		**2.27**

Table 16

Summary of Standard of Learning Scores for Teacher 9, Classroom I (T9,CI)

Student	**Scaled Score**	**SOL Result**	**Study Score**
	0-350	Fail Below Basic	0
	350-399	Fail Basic	1
	400-499	Pass Proficient	2
	500-600	Pass Advance	3
S1	417	PP	2
S2	506	PA	3
S3	500	PA	3
S4	505	PA	3
S5	412	PP	2
S6	371	FB	1
S7	462	PP	2
S8	515	PA	3
S9	342	FBB	0
S10	410	PP	2
S11	426	PP	2
S12	388	PP	1
S13	579	PA	3
S14	460	PP	2
S15	485	PP	2
S16	485	PP	2
S17	385	FB	1
S18	577	PA	3
S19	413	PP	2
S20	526	PA	3
S21	545	PA	3
S22	509	PA	3
S23	477	PP	2
S24	457	PP	2
Average Score	**464.67**		**2.17**

Table 17

Summary of Standard of Learning Scores for Teacher 10, Classroom J (T10, CJ)

Student	**Scaled Score**	**SOL Result**	**Study Score**
	0-350	Fail Below Basic	0
	350-399	Fail Basic	1
	400-499	Pass Proficient	2
	500-600	Pass Advance	3
S1	449	PP	2
S2	414	PP	2
S3	501	PA	3
S4	303	FBB	0
S5	449	PP	2
S6	491	PP	2
S7	501	PA	3
S8	477	PP	2
S9	528	PA	3
S10	474	PP	2
S11	477	PP	2
S12	548	PA	3
S13	410	PP	2
S14	410	PP	2
S15	435	PP	2
S16	332	FBB	0
S17	443	PP	2
S18	366	FB	1
Average Score	**444.89**		**1.94**

Tables 8-17 reflect the individual student SOL scores in each class, an average SOL score for all students in each class and an average study score for the teacher. The researcher used the average study score when comparing TSES score to SOL score and CSAS score to SOL score.

This study used a quantitative analysis method that included a simple linear regression model through the Statistical Package for Social Sciences (SPSS). In a simple linear regression R is the correlation between the predictor variable, x, and the response variable, y and R-square

is the proportion of the variance in the response variable that can be explained by the predictor variable in the regression model. The p-value indicates if there is a significant relationship described by the model.

Teacher Self Efficacy (TSES) and Teacher Instructional Behaviors (CSAS)

The regression model assessed the overall relationship between teacher self-efficacy score and teacher instructional behavior score. The model indicated that TSE explained 17.8% of variations in observable teacher behaviors during the instructional process. The model yielded a *p*-value of .225 > 0.05; thus, the model was not statistically significant which means there existed a probability that the variation in the observable teacher behaviors during the instructional process attributed to teacher self-efficacy was due to chance. Table 18 included an SPSS output summary explaining the correlation between teacher self-efficacy score and teacher instructional behavior score.

Table 18

Model Summary TSES and CSAS

Model	R	R Square	P-value
1	.422	.178	.225

Further, the regression relationship between TSE and observable teacher behavior reflected a positive correlation since the standardized coefficient was 0.943 > 0. That is as TSE increases then the observable teacher behavior also increases. The model reflected a *p*-value .422 >.05; thus the model was not statistically significant. Table 19 included an SPSS output summary explaining the relationship between TSE and observable teacher classroom behavior.

Table 19

Coefficients TSES and CSAS

Coefficients	Unstandardized Coefficients	Standardized Coefficients	t	p-value	Correlation
Constant	-4.094		-.677	.518	
TSES	.943	.422	1.315	.225	.422

As reflected in tables 18 and 19, TSE explained 17.8% of the variation in observable teacher behavior during the instructional process. The model was not statistically significant indicating that the variation could be attributed to chance. Further, the model reflected a positive relationship between TSE and observable teacher behavior. That is as the TSES score increased the teacher's desired observable instructional behavior (CSAS) score also increased.

Teacher Self Efficacy Score (TSES) and Student SOL Score

The regression model assessed the overall relationship between teacher self-efficacy and student SOL scores. The model indicated that TSE explained 42.1% of variations in student SOL scores. The model yielded a *p*-value of .043 < 0.05; thus, the model was statistically significant. That is TSE highly explained the variation within student SOL scores. Table 20 included an SPSS output summary explaining the correlation between TSE and student SOL scores.

Table 20

Model Summary TSES and SOL Score

Model	R	R Square	P-value
1	.648	.421	.043

Further, the regression relationship between TSE and student SOL scores reflected a positive correlation since the standardized coefficient was 0.463 > 0. That is as the teacher's TSES score increases then the student SOL scores improve. The model reflected a p-value .043 < 05; thus, the model was statistically significant. Table 21 included an SPSS output summary explaining the relationship between TSE and student SOL scores.

Table 21

Coefficients TSES and Student SOL Score

Coefficients	Unstandardized Coefficients	Standardized Coefficients	t	p-value	Correlation
Constant	-1.812		-1.119	.296	
TSES	.463	.648	2.409	.043	.648

As reflected in tables 20 and 21, TSE explained 42.1% of the variation in student SOL scores. The model was statistically significant indicating that TSE highly explained the variation in student SOL scores. Further, the model reflected a positive relationship between TSE and student SOL score. That is as the teacher's TSES score increased the student SOL scores improved.

Teacher Instructional Behaviors (CSAS) and Student SOL Score

The regression model assessed the overall relationship between observable teacher behaviors during the instructional process and student SOL scores. As reflected in table 22 the model indicated that observable teacher instructional behaviors explained 11.5% of variations in student SOL scores. The model yielded a *p*-value of .338 > 0.05; thus, the model was not statistically significant. That is the variation within student SOL scores attributed to observable teacher instructional behaviors was due to chance.

Table 22

Model Summary Teacher Behavior (CSAS) and SOL Score

Model	R	R Square	P-value
1	.339	.115	.338

Further, the regression relationship between observable teacher behaviors and student SOL scores reflected a negative correlation since the standardized coefficient was -0.108 < 0. That is as observable teacher behavior increases then student SOL scores decrease. The model reflected a *p*-value -.339 < .05; thus the model was not statistically significant. Table 23 included an SPSS output summary explaining the correlation between observable teacher behaviors and student SOL scores.

Table 23

Coefficients Teacher Behavior (CSAS) and Student SOL Score

Coefficients	Unstandardized Coefficients	Standardized Coefficients	t	p-value	Correlation
Constant	2.496		5.787	<.001	
CSAS	-.108	-.339	-1.020	-.338	-.339

As reflected in tables 22 and 23, observable teacher instructional behavior (CSAS) score explained 11.5% of the variation in student SOL scores. Although there was a relationship between the two variables the model was not statistically significant indicating that the variation within student SOL scores attributed to observable teacher behavior was due to chance. Further, the model reflected a negative relationship between observable teacher classroom behavior and student SOL score. That is as observable teacher instructional behavior increased the student SOL scores decreased.

Additional Findings

In designing the study, the researcher determined that if constructs were shown to contribute differently to variance in CSAS or SOL score, there would be further examination of the constructs at the item level. Because the constructs for teacher behavior were shown to contribute to student achievement and the constructs accounted for different amounts of variance in student achievement, four additional regressions were run for the dependent measure of SOL score using individual elements from the CSAS observation tool and SOL scaled score results. The four additional regressions included 1) high school teacher CSAS score and

high school student SOL scaled score, 2) middle school teacher CSAS score and middle school student SOL scaled score, 3) high school teacher CSAS score and high school student SOL average scaled score, 4) middle school teacher CSAS score and middle school student SOL average scaled Score.

High School Teacher Instructional Behaviors (CSAS) and Student SOL Score

The regression model assessed the overall relationship between high school teacher observable instructional behavior (CSAS score) and high school student SOL score. As reflected in table 24, the significance level for the regression model is .976 > 0.05 which indicates that the model is not statistically significant. Thus, the variation within high school student SOL scores can be attributed to chance rather than observable teacher instructional behavior. High school teacher instructional behavior did not explain any variation in high school student SOL scores. That is, if lower levels of high school teacher instructional behaviors are observed during instruction and a lower number of high school students participate in the SOL's it could be a logical explanation that teacher behaviors are not as impactful on student SOL scores.

Table 24

Model Summary High School Teacher Behavior (CSAS) and SOL Score

Model	R	R Square	p-value
1	.019	.000	.976

Table 25 indicated that the regression model resulted in a slightly positive correlation between student SOL scores and observed high school teacher classroom behaviors. However,

the relationship yielded a p-value 0.976 > .05 indicating the overall model was not statistically significant.

Table 25

Coefficients High School Teacher Behavior (CSAS) and Student SOL Score

Coefficients	Unstandardized Coefficients	Standardized Coefficients	t	p-value	Correlation
Constant	2.306		4.478	.021	
CSAS	-.005	-0.19	.033	.976	-0.19

Middle School Teacher Instructional Behaviors (CSAS) and Student SOL Score

The regression model assessed the overall relationship between middle school teacher observable instructional behavior (CSAS score) and middle school student SOL score. R square is 0.096. Table 26 reflected that middle school teacher classroom behaviors explained 9.6% of the variation in middle school student SOL scores. Table 26 displays the significance level for the regression model is .613 > 0.05 which indicates that the model is not statistically significant. Thus, the variation within middle school student SOL scores can be attributed to chance rather than observable middle school teacher classroom behaviors.

Table 26

Model Summary Middle School Teacher Behavior (CSAS) and SOL Score

Model	R	R Square	P-value
1	.309	.096	.613

As indicated in table 27, the regression model resulted in a slightly negative correlation (-.097) between middle school student SOL scores and observed middle school teacher classroom behaviors. That is, as the middle school teacher classroom behavior increased the middle school student SOL scores decreased. However, the relationship yielded a p-value 0.613 > .05 indicating the overall model was not statistically significant.

Table 27

Coefficients Middle School Teacher Behavior (CSAS) and Student SOL Score

Coefficients	Unstandardized Coefficients	Standardized Coefficients	t	p-value	Correlation
Constant	2.260		2.906	.062	
CSAS	-0.097	-.309	-0.563	.613	-.309

High School Teacher Instructional Behaviors (CSAS) and SOL Average Scaled Score

The regression model assessed the overall relationship between high school teacher observable instructional behavior (CSAS score) and high school student SOL average scaled score. R squared is 0.032. Table 28 reflected that the regression model indicated that high

school teacher classroom behaviors explained 3.2% of the variation in high school student scaled average SOL scores. The significance level for the regression model is .773 > 0.05 which indicates that the model is not statistically significant. Thus, the variation within high school student scaled average SOL scores can be attributed to chance rather than observable teacher classroom behaviors.

Table 28

Model Summary High School Teacher Behavior (CSAS) and Scaled Average SOL Score

Model	R	R Square	p-value
1	.180	.032	.773

Table 29 reflected that the regression model resulted in a direct positive correlation (3.862) between high school student scaled average SOL scores and observed high school teacher classroom behaviors. That is, as the high school teacher classroom behavior increased the high school student scaled average SOL scores improved. However, the relationship yielded a p value 0.773 > .05 indicating the overall model was not statistically significant.

Table 29

Coefficients High School Teacher Behavior (CSAS) and Student Scaled Average SOL Score

Coefficients	Unstandardized Coefficients	Standardized Coefficients	t	p-value	Correlation
Constant	451.946		10.403	.002	
CSAS	3.862	.180	.316	.773	.180

Middle School Teacher Instructional Behaviors (CSAS) and SOL Average Scaled Score

The regression model assessed the overall relationship between middle school teacher observable instructional behavior (CSAS score) and middle school student SOL average scaled score. R squared is 0.077. Table 30 reflected that middle school teacher classroom behaviors explained 7.77% of the variation in middle school student scaled average SOL scores. The significance level for the regression model is .651 > 0.05 which indicates that the model is not statistically significant. Thus, the variation within middle school student scaled average SOL scores can be attributed to chance rather than observable teacher classroom behaviors.

Table 30

Model Summary Middle School Teacher Behavior (CSAS) and Scaled Average SOL Score

Model	R	R Square	p-value
1	.278	.077	.651

Table 31 reflected that the regression model resulted in a direct negative correlation (-5.450) between middle school student scaled average SOL scores and observed middle school teacher classroom behaviors. That is, as the middle school teacher classroom behavior increased the middle school student scaled average SOL scores decreased. However, the relationship yielded a p value 0.651 > .05 indicating the overall model was not statistically significant.

Table 31

Coefficients Middle School Teacher Behavior (CSAS) and Student Scaled Average SOL Score

Coefficients	Unstandardized Coefficients	Standardized Coefficients	t	p-value	Correlation
Constant	464.382		9.450	.003	
CSAS	-5.450	-.278	-.501	.651	-.278

Summary of Findings

The purpose of this study was to identify the relationship between teacher self-efficacy (TSES) score and observable teacher instructional behaviors (CSAS) score and student academic achievement (SOL) scores. This study addressed the following question: What is the relationship between teacher self-efficacy and teacher behavior and student academic achievement? In response to the purpose of the study, the following research questions were addressed.

1. What is the relationship between teacher self-efficacy score and teacher behavior score?
2. What is the relationship between teacher self-efficacy score and student academic performance (SOL pass rate)?

3. What is the relationship between teacher behavior score and student academic performance (SOL pass rate)?

After analyzing the data, the researcher determined the following about the three models that were tested. In model 1 TSE score explained 17.8% of the variation in observable teacher behavior. That is there is not a statistically significant relationship between TSE score and CSAS score indicating that the variation in observable teacher behavior could be attributed to chance. The model reflected a positive relationship between TSE score and CSAS score. That is, as the teacher's TSES score increased the teacher's CSAS score also increased.

After analyzing the data for model 2 the researcher determined that there was a statistically significant relationship between TSES score and student academic achievement (SOL) score. TSES score explained 42.1% of the variation in student SOL scores. The model was statistically significant indicating that TSE highly explained the variation in student SOL scores. Further, the model reflected a positive relationship between TSES score and student SOL score. That is as the teacher's TSES score increased the student SOL scores also improved.

After analyzing the data for model 3 the researcher determined that teacher CSAS score explained 11.5% of the variation in student SOL scores. The model was not statistically significant indicating that the variation within student SOL scores attributed to observable teacher instructional behavior was due to chance. Further, the model reflected a negative relationship between observable teacher instructional behavior and student SOL score. That is as the teacher's CSAS score increased, student SOL scores decreased.

Conclusion

This study examined the relationship between teacher self-efficacy (TSES) score and observable teacher instructional behaviors (CSAS) score and student academic achievement (SOL) scores. The data analysis determined that the relationship between TSES score and SOL score was statistically significant. The data analysis also determined a positive relationship between TSES score and SOL score indicating that as teacher's TSES score increased student SOL scores improved. Chapter Five provides a summary of the data, discussion of findings, presentation of implications of the findings, highlighted conclusions, and recommendations and suggestions for future studies.

Chapter Five

Findings, Summary and Conclusions

The purpose of this study was to identify the relationship between teacher self-efficacy (TSES) score and observable teacher instructional behaviors (CSAS) score and student academic achievement (SOL) scores. This study addressed the following question: What is the relationship between teacher self-efficacy and teacher behavior and student academic achievement? In response to the purpose of the study, the following research questions were addressed.

1 What is the relationship between teacher self-efficacy score and teacher behavior score?

2 What is the relationship between teacher self-efficacy score and student academic performance (SOL pass rate)?

3 What is the relationship between teacher behavior score and student academic performance (SOL pass rate)?

This study examined the relationship between teacher self-efficacy (TSES) score and observable teacher instructional behavior (CSAS) score and student academic achievement (SOL) scores. The data analysis determined that the relationship between TSES score and SOL score was statistically significant. The data analysis also determined a positive relationship between TSES score and SOL score indicating that as teacher's TSES score increased student SOL scores improved.

Summary of Findings

After using a quantitative analysis method that applied a simple linear regression model through SPSS, the researcher analyzed the data to determine the extent to which a construct of TSES (i.e. how individuals judge and perceive their ability to perform a specific task) contributed to variance in CSAS (i.e., observable teacher behaviors during the implementation of instructional activities) and student achievement (SOL scaled score) over and above that which could be explained by the constant variable of TSES in model 1 and model 2 and teacher behavior (CSAS) in model 3 and highlighted the findings. The researcher identified the regression relationship, its statistical significance, and interpreted the statistical results to reach a conclusion supporting each research question. These findings, supported by study data and analysis as well as related and supporting research, follow. The additional findings noted in chapter 4 included separating middle school participant scores from high school participant scores. The ideal value of a study group is a minimum of 10. Therefore, the insignificant results obtained in the additional findings section could be attributed to a small sample size 5.

Finding 1

The relationship between teacher self-efficacy and observable teacher instructional behaviors for the participants in this study was not statistically significant but they were positively correlated. The model indicated that the TSE explained 17.8% of variations in observable teacher behaviors during the instructional process and yielded a *p*-value of .225 > 0.05; thus, the relationship between the two variables is not statistically significant. The regression relationship between TSE and observable teacher behavior yielded a standardized

coefficient was 0.943 > 0 which reflects a positive correlation between the two variables. Therefore, as the teacher's self-efficacy increases then the teacher's observable classroom instructional behavior also increases.

Research supports that efficacious staff members engage in productive teaching behaviors. Donohoo (2018) concurred that multiple studies showed teacher efficacy was associated with several productive teacher behaviors including implementation of school improvement strategies, increased teacher leadership, communication of high expectations, and a strong focus on academic pursuits. Eden, (2016) cited Bandura (1997) has provided evidence supporting his theory that self-efficacy beliefs have strong predictive power and also have an influence on behaviors such as setting goals, effort toward goals and persistence when faced with challenges. Shahzad (2017) concurred with Ashton and Webb (1986) that teachers with higher levels of self-efficacy are more skillful instructional practitioners, better organized, and are more successful in engaging students in the learning process through high quality questioning practices.

Finding 2

The relationship between teacher self-efficacy and student achievement was significant and positively correlated. The model indicated that TSE explained 42.1% of variations in student SOL scores. The model yielded a p-value of .043 < 0.05; thus, the model was statistically significant. The regression relationship between TSE and student SOL scores revealed a positive correlation since the standardized coefficient was 0.463 > 0. That is as the teacher's TSES score increased then the student SOL scores improved.

Multiple studies support a positive relationship between high teacher self-efficacy and student academic achievement. Poulou et al. (2019) cited a study conducted by Woolfolk and Hoy (1990) which found a relationship between teacher self-efficacy (i.e., confidence in positively managing the classroom) and student achievement. Generally, teachers with higher self-efficacy are more likely to manage the classroom effectively (Tschannen-Moran, Woolfolk, & Hoy, 2007), show higher instructional quality (Holzberger, Philipp, & Kunter, 2013), use more differentiated instruction and constructivism (Suprayogi, Valcke, & Godwin, 2017), develop challenging lessons (Deemer, 2004), use classroom management and instructional methods to encourage student autonomy, and keep students on task (Chao et al., 2017; Miller et al., 2017). A study of 80 teachers and 150 high school students conducted by Mojavezi (2012) included administering a TSE scale to gauge the teacher's sense of self-efficacy and a questionnaire to score students' motivational level. The researchers' findings supported Bandura's observations (1994) that teachers who have a high sense of self-efficacy about their classroom competence can motivate their students and improve their cognitive development (Shahzad, 2017).

Finding 3

The relationship between observable teacher instructional behaviors and student achievement was not statistically significant and they were negatively correlated. The model indicated that observable teacher instructional behaviors explained 11.5% of variations in student SOL scores. The model yielded a p-value of .338 > 0.05; thus, the model was not statistically significant.

Thornton et al. (2020) found that TSE can affect the behaviors of teachers including but not limited to their efforts and innovation planning, persistence and willingness to work with

difficult students. Thornton et al. (2020) studied ways to support improving teacher self-efficacy to promote instructional change and noted previous findings of (Bandura, 1997; Tschannen-Moran, Woolfolk-Hoy & Hoy, 1998; Ross & Gray, 2006) which found an association between higher self-efficacy and commitment to the job. The authors concluded that higher levels of teacher self-efficacy can positively influence key variables associated with student academic achievement and school improvement (Thornton et al., 2020).

Implications for Practice

Based on the study, analysis of data and associated findings, several implications for school and district leaders were acknowledged. These implications identified recommendations and actions that school and district leaders might consider, provided an explanation, and were related to corresponding findings. These implications are included below.

Implication 1

District leaders and principals might want to consider professional development and training opportunities for teachers to: 1) identify high leverage instructional behaviors, 2) learn how to develop high leverage instructional behaviors, 3) implement high leverage instructional behaviors during the instructional process with greater frequency. Although the relationship between TSE and desired teacher instructional behaviors is not significant, TSE explained 17.8% of variation in desired instructional behavior.

Implication 2

District leaders and principals might look for professional development and training opportunities for teachers that support increased self-efficacy and promote stronger student engagement in the learning process. The relationship between teacher self-efficacy

and student academic achievement is significant. TSE explained 42.1% of variations in student SOL scores. The model also explained a positive correlation between TSE and SOL score revealing that as the teacher's TSES score increased then the student SOL scores improve. District leaders need to determine key areas to appropriately allocate resources that will improve instructional practices among teachers, support positive student outcomes and allow principals to improve schools (Thornton et al., 2020). Increasing self-efficacy across greater numbers of teachers in a school could have positive implications on student achievement.

Implication 3

Leaders might seek to identify if there are specific non-instructional behaviors that teachers engage in during the instructional process that negatively impact student achievement. The model for teacher classroom behavior and student achievement was not statistically significant but did reflect a negative relationship between observable teacher classroom behavior and student SOL score. That is, as observable teacher instructional behavior increased the student SOL scores decreased. It might prove to be beneficial for educational leaders and practitioners to gain a deeper understanding about specific classroom management and other behaviors that teachers engage in that impact student achievement.

Suggestions for Future Studies

The purpose of this study was to identify the relationship between teacher self-efficacy (TSES) score and observable teacher instructional behaviors (CSAS) score and student academic achievement (SOL) scores. The study was limited to one school division in Virginia and included 10 secondary (grades 6-12) teachers who taught a core curriculum subject with an end of

course SOL test. The researcher gathered teacher self-efficacy data through the administration of the Teacher Self-efficacy Scale (TSES) developed by Tschannen-Moran and Hoy (2001) and teacher instructional behavioral data through the Classroom Strategy Assessment System (CSAS) which is an evidence-based multi-rater classroom observation instrument designed to assess the teachers' use of instructional and behavioral management strategies. Student achievement data (SOL scaled score) was collected through the school district's Office of Assessment and Accountability. Zee and Koomen (2016) found a need for greater integration among diverse literatures because most studies in the area of TSE did not inform or effectively build upon one another which could prevent researchers from drawing links between TSE and the quality of classroom processes.

Due to the small sample size and the variance in data, future researchers should consider expanding the study group by increasing the number of teacher participants and the number of student achievement scores. This would allow greater variance in TSES and CSAS scores and student achievement scores. The researcher recommends increasing the sample group from one middle school and one high school to all middle schools and all high schools in Virginia's Region IV area. Expanding the sample size will allow the researcher to focus on a specific level, either middle school or high school and thus it will not be necessary to conflate the middle school data with the high school data. It also will allow greater control on study limitations. The researcher observed differences in teaching styles and frequency of instructional behaviors between middle school teachers and high school teachers.

Observation data showed that middle school teachers of students in lower grades (6-8) had higher ratings of observable instructional behaviors. Whereas high school teachers

permitted students to work more independently on their computer laptops or in small groups. Some high school teachers permitted students to work uninterrupted, outside of the classroom, for extended periods of time which resulted in a lower frequency of observable instructional behaviors. The researcher noted middle school teachers engaged in higher levels of behavioral management strategies during the instructional process (e.g. corrective feedback, prevention management and clear directives) than high school teachers. Although it wasn't noted in the study, differences in the ages and the maturity levels of the students (e.g. 11 year old student in sixth grade compared to a 17 year old student in eleventh grade) might have had implications on teacher perception and behavior causing middle school teachers to engage in higher frequencies of classroom management behaviors.

For further refinement of the study of teacher behaviors and student achievement, the researcher could expand the variables of student achievement beyond SOL scaled scores. Expanding the definition of student achievement beyond the single variable of SOL score could yield a higher significance level within the model. Further refinement could be beneficial because some students in the study may demonstrate growth in ways that cannot be measured by SOL tests. Future researchers should consider expanding the definition of academic achievement to include: (1) growth on teacher created standards aligned unit tests (2) growth on performance-based assessments and (3) growth, progress and improvement on portfolio work, written essays, and research projects over the course of the academic year.

Chapter Summary

Chapter Five provided a summary and discussion of findings, presented implications of the findings, highlighted conclusions, and presented recommendations and suggestions for future studies. The study described the relationship between teacher self-efficacy and instructional behavior for the participants in this study indicating TSE explained some of the variance in teacher instructional behavior. The relationship between the variables was not statistically significant but they were positively correlated. That is, as the teacher's self-efficacy increased then the teacher's observable classroom instructional behavior also increased.

The researcher determined that there was a statistically significant relationship between teacher self-efficacy and student academic achievement (SOL) score. The statistical significance indicated that TSE highly explained the variation in student SOL scores. Further, the model reflected a positive relationship between TSES score and student SOL score. That is, as teacher's self-efficacy increased then the students SOL score also increased.

The researcher determined that the relationship between teacher instructional behavior and student achievement (SOL scores) for the participants in this study was not statistically significant. Additionally, the researcher determined a negative correlation between the two variables. That is, as the observable instructional teacher behavior increased the student SOL scores decreased.

Personal Reflections

This study presented the researcher with the opportunity to determine if a relationship existed between teacher self-efficacy, teacher behaviors and student achievement. If determined, the researcher was able to examine the significance of the relationship and how one variable impacted the other. Overall, this research study produced a positive experience. To properly conduct this study the researcher had to learn how to identify, select and secure an appropriate sample population and identify the appropriate methodology. The researcher had to accurately collect data, code the data, run the data, analyze the data and present the data to an audience.

Although the researcher was satisfied with the study findings, the researcher noted several suggestions for future research. These suggestions included increasing the size of the study sample to include all middle schools and high schools in Region IV in Virginia, and focusing the study analysis on specific levels by separating middle school data from high school data. Further, given the opportunity for future studies, the researcher purposes to examine the relationship of variables in each model when isolating the variables to middle school or high school and not conflating the two. Having a better understanding of the relationship between TSE and teacher behaviors and student achievement could help to provide guidance to school division leaders and principals who are in the process of determining goals and initiatives, professional development topics and allocation of resources as they continue to seek to build instructional leadership capacity in their teachers and advance student learning.

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Appendix A- IRB Approval Letter

VIRGINIA TECH

Division of Scholarly Integrity and Research Compliance
Institutional Review Board
North End Center, Suite 4120 (MC 0497)
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-3732
irb@vt.edu
http://www.research.vt.edu/sirc/hrpp

MEMORANDUM

DATE: February 13, 2023

TO: Carol S Cash, William Leroy Bates Jr

FROM: Virginia Tech Institutional Review Board (FWA00000572)

PROTOCOL TITLE: Teacher Efficacy

IRB NUMBER: **23-067**

Effective February 13, 2023, the Virginia Tech Human Research Protection Program (HRPP) determined that this protocol meets the criteria for exemption from IRB review under 45 CFR 46.104 (d) category(ies) 2(ii),4(ii).

Ongoing IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities impact the exempt determination, please submit an amendment to the HRPP for a determination.

This exempt determination does not apply to any collaborating institution(s). The Virginia Tech HRPP and IRB cannot provide an exemption that overrides the jurisdiction of a local IRB or other institutional mechanism for determining exemptions.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

https://secure.research.vt.edu/external/irb/responsibilities.htm

(Please review responsibilities before beginning your research.)

PROTOCOL INFORMATION:

Determined As: **Exempt, under 45 CFR 46.104(d) category(ies) 2(ii),4(ii)**
Protocol Determination Date: **February 13, 2023**

ASSOCIATED FUNDING:

The table on the following page indicates whether grant proposals are related to this protocol, and which of the listed proposals, if any, have been compared to this protocol, if required.

Appendix B

Letter Seeking Study Approval

Office of Planning and Evaluation
Arlington County Public Schools
2110 Washington Blvd
Arlington, VA 22204

Subject: Letter of Request to Conduct Research at Arlington County Public Schools

Dear Office of Planning and Evaluation:

I am writing this letter to seek approval to administer a survey to classroom teachers, observe instructional lessons, and collect end of course SOL data of students who are taught by the observed teachers. I am conducting a research project in partial fulfillment of my doctoral program at Virginia Tech University and currently in the process of writing my dissertation. My project is entitled *Relationship Between Teacher Self-Efficacy and Teacher Behaviors and Academic Achievement*.

I hope that you will grant me permission to conduct my survey, observations and data collection in your school division. The purpose of my study is to examine the relationship between teacher self-efficacy and teacher behaviors and their impact on student academic achievement. This study seeks to address the following question: How do teacher self-efficacy and teacher behavior impact student academic achievement?

The following research questions will be addressed related to the impact that teacher self-efficacy has on teacher behaviors and student academic achievement.

1. What is the relationship between teacher self-efficacy score and student academic performance (SOL pass rate)?
2. What is the relationship between teacher behavior score and student academic performance (SOL pass rate)?

With your approval, selected teachers will complete an online survey using the Teacher Self-Efficacy Rating Scale (TSES) which is a questionnaire designed to help the researcher gain a better understanding of the kinds of things that create challenges for teachers during the instructional delivery process. All answers will be confidential. This survey will be administered online and will be available for two weeks. Teachers can complete it at their own convenience. The TSES consists of 27 multiple choice questions and should take approximately 10 minutes to complete. Survey results will be extrapolated for the study and individual results will remain confidential. During the observation the researcher will rate the teacher using the Classroom Strategy Assessment System instrument (CSAS), which is an evidence-based multi-rater

classroom observation instrument designed to assess the teachers' use of instructional and behavioral management strategies (Lekwa et al., 2020). The study requires the researcher to collect student achievement data which includes the final SOL score for each student in the observed classroom.

There are no costs incurred by the school division.

Your approval is greatly appreciated. I am happy to answer any questions or concerns that you may have regarding my request and project. Please feel free to contact me via email at wbates@fccps.org or by phone at 571-422-8426

If approved, please provide a brief written statement of approval on your school division's letterhead. I appreciate your time and consideration.

Sincerely,

William L. Bates Jr.
Doctoral Candidate, Virginia Polytechnic Institute and State University

Appendix C

Email to Participants

Subject Line: Relationship Between Teacher Self-Efficacy and Teacher Behaviors and Academic Achievement

Study participant,

I am conducting a research study as part of the requirements for a doctorate in Educational Leadership and Policy Studies with Virginia Polytechnic Institute and State University. Recently, the Arlington County Public Schools Office of Planning and Evaluation granted me permission to conduct the research for my study entitled Relationship Between Teacher Self-Efficacy and Teacher Behaviors and Academic Achievement. As part of the study, I am surveying teachers to gather data that provides a rating of their self-efficacy.
Teachers will be asked to complete an online survey using the Teacher Self-Efficacy Rating Scale (TSES) which is a questionnaire designed to help the researcher gain a better understanding of the kinds of things that create challenges for teachers during the instructional delivery process. All answers will be confidential. This survey will be available for two weeks and teachers can complete it at their own convenience. The TSES consists of 27 multiple choice questions and should take approximately 10 minutes to complete.

The researcher will also conduct one classroom observation and rate the teacher using the Classroom Strategy Assessment System instrument (CSAS), which is an evidence-based multi-rater classroom observation instrument designed to assess the teachers' use of instructional and behavioral management strategies (Lekwa et al., 2020). Finally, the study requires the researcher to collect student achievement data which includes the final SOL score for each student in the observed classroom.

Consent for participation in the study will be requested at the beginning of the electronic survey. The study will maintain the confidentiality of each school and survey results will not be shared with the school district.

If you are interested in learning more about this research study, please click on the following link {{Insert Link Here}}.

If you have any questions or concerns about the research, please feel free to contact me at wbates@fccps.org or Dr. Carol Cash, Committee Chair and Professor at Virginia Tech at ccash48@vt.edu. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant, contact the Virginia Tech HRPP Office at 540-231-3732 (irb@vt.edu). The study's IRB reference number is IRB# 23-067.

Thank you in advance for your time and consideration.

Sincerely,

William L. Bates Jr.
Doctoral Candidate
Virginia Polytechnic Institute and State University

Appendix D

School District Approval Confirmation Letter

March 14, 2023

Dear Mr. Bates:

Our research committee has completed its review of your application to conduct the research study entitled "*Relationship Between Teacher Self-Efficacy and Teacher Behaviors and Academic Achievement"* in Arlington Public Schools (APS). The committee has approved your research contingent on the following requirements:

1. The participation of any APS staff member, student, or family who might be involved is completely voluntary at all times. Each participant (or parent of participating students) must be informed in writing of the scope and potential impact of their participation. You should be prepared to provide proof of their informed consent, if requested.
2. You must maintain the total anonymity of all students, staff, and schools associated with APS in any discussions or reports. Any disclosure that may reveal the participation of an APS student, staff member, school, or the school system must be approved in advance by the APS Department of Planning and Evaluation.
3. Any change to the proposed research must be submitted to and approved by the APS Department of Planning and Evaluation in advance of implementation.

We wish you success as you carry out this study.

Sincerely,

Robyn Ristau
Assistant Director for Evaluation

Appendix E

School District Approval Confirmation Letter

Department of Accountability and Research

Alexandria City Public Schools 1340 Braddock Place,
3rd Floor Alexandria, Virginia 22314
Phone: 703-619-8032
accountability@acps.k12.va.us
www.acps.k12.va.us/accountability

May 1, 2023

William Bates Jr.
150 S. Washington St., Ste. 400
Falls Church, VA 22046

Dear William Bates Jr.:

Thank you for submitting research application materials for external review by Alexandria City Public Schools for your interest to perform research in Falls Church City Public Schools. After a review of your application, supporting materials, and your responses to questions, the Alexandria City Public Schools review supports your ability to conduct your research project, *Relationship Between Teacher Self-Efficacy and Teacher Behaviors and Academic Achievement*, within Falls Church City Public Schools.

Please do note that any changes in your design or instruments must be approved prior to beginning your research. You are expected to implement your research in accordance with the methods, instrumentation, and the starting and ending dates indicated in the Application submitted. Significant departure within any of these areas without prior review and approval from ACPS would result in the removal of support for your research project.

Sincerely,

Dr. Clinton Page

Chief of the Department of Accountability and Researh

Appendix F

CITI Program Certificate

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)
COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** William Bates (ID: 9503710)
- **Institution Affiliation:** Virginia Polytechnic Institute & State University (Virginia Tech) (ID: 1684)
- **Institution Email:** williamb20@vt.edu
- **Institution Unit:** Education
- **Phone:** 5713635567

- **Curriculum Group:** Social & Behavioral Research
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Investigators and staff involved primarily in Social/Behavioral Research with human subjects.

- **Record ID:** 38594346
- **Completion Date:** 03-Feb-2023
- **Expiration Date:** 03-Feb-2026
- **Minimum Passing:** 80
- **Reported Score*:** 91

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Avoiding Group Harms - U.S. Research Perspectives (ID: 14080)	03-Feb-2023	3/3 (100%)
Populations in Research Requiring Additional Considerations and/or Protections (ID: 16680)	03-Feb-2023	5/5 (100%)
Consent and Cultural Competence (ID: 17263)	03-Feb-2023	5/5 (100%)
Defining Research with Human Subjects - SBE (ID: 491)	03-Feb-2023	5/5 (100%)
The Federal Regulations - SBE (ID: 502)	03-Feb-2023	4/5 (80%)
Assessing Risk - SBE (ID: 503)	03-Feb-2023	4/5 (80%)
Basic Institutional Review Board (IRB) Regulations and Review Process (ID: 2)	03-Feb-2023	5/5 (100%)
Informed Consent (ID: 3)	03-Feb-2023	5/5 (100%)
History and Ethics of Human Subjects Research (ID: 498)	03-Feb-2023	4/5 (80%)
Records-Based Research (ID: 5)	03-Feb-2023	4/4 (100%)
Research in Public Elementary and Secondary Schools - SBE (ID: 508)	03-Feb-2023	5/5 (100%)
Research and HIPAA Privacy Protections (ID: 14)	03-Feb-2023	3/5 (60%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?ke5aeb3fd-a93c-4aea-ab9f-a93ff4207d9c-38594346

Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

Appendix G

Information Sheet

PLEASE DELETE THE INSTRUCTIONS IN BOLD, BRACKETS, AND EXAMPLE LANGUAGE PRIOR TO SUBMISSION.
*The examples in this template are suggestions and should be modified depending on your research.

Information Sheet for Participation in a Research Study

Principal Investigator: Dr. Carol Cash
IRB# 23-067
Title of Study: Relationship Between Teacher Self Efficacy and Teacher Behaviors and Academic Achievement

You are invited to participate in a research study. This form includes information about the study and contact information if you have any questions.

I am a student in the graduate program for Educational Leadership at Virginia Tech, and I am conducting this research as part of my course work.

➢ WHAT SHOULD I KNOW?

If you decide to participate in this study, you will complete a survey via the VTECH QuestPro system. The survey, Teacher Self- Efficacy Scale (TSES) will take approximately 5 minutes to complete and is designed to help the researcher gain a better understanding of the kinds of things that create challenges for teachers during instructional delivery. All answers are confidential. To complete the survey you will indicate your opinion about each of the questions by marking any one of the nine responses in the columns on the right side of the survey form, ranging from (1) “None at all” to (9) “A Great Deal” as each represents a degree on the continuum.

As part of the study, you will be observed delivering a standard 60-80 instructional lesson in your core content curriculum. The researcher will use the classroom strategy assessment system (CSAS) which is an evidence-based multi-rater classroom observation instrument that is designed to assess the teachers' use of instructional and behavioral management strategies. Teacher's names will not be used and all observation ratings will be coded to maintain confidentiality. Finally, the researcher will collect SOL scaled score data for students in the participant's observed class. All collected data will be stored digitally on a password protected server. Prior to the researcher receiving scaled SOL scores it will be de-identified from students by APS by assigning each score an individual code (number). These data will be stored on the VT google drive which is also password protected. All other data and information collected by the researcher during the observation phase (classroom instructional activity) will be saved on the same password protected drive. The data will only be available to the investigator.

The Teacher Self Efficacy Survey should take approximately 5 minutes of your time. The classroom observation procedures should not impact the participants time.

We do not anticipate any risks from completing this study. Participants who are being observed during the instructional activity will remain anonymous. Furthermore, surveys and classroom observations will be conducted by the researcher who is a non-evaluator and non-employee of APS.

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

- **CONFIDENTIALITY**

We will do our best to protect the confidentiality of the information we gather from you, but we cannot guarantee 100% confidentiality. Your responses are anonymous, so no one can associate your answers back to you. Please do not include your name or other identifying information in your responses that can identify you. Any data collected during this research study will be kept confidential by the researchers.

- **WHO CAN I TALK TO?**

If you have any questions or concerns about the research, please feel free to contact me at williamb20@vt.edu You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant, contact the Virginia Tech HRPP Office at 540-231-3732 (irb@vt.edu).

Please print out a copy of this information sheet for your records.

If you would like to participate in this survey, click yes to begin or no to exit].