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Doctor of Education in Organizational Leadership



Dr. Joey Cope, Dean of the College
of Graduate and Professional Studies

Date: 10/29/2020

Dissertation Committee:



Dr. Scott Bailey, Chair

Leah Wickersham-Fish

Dr. Leah Wickersham-Fish

Julie A. McElhany

Dr. Julie McElhany

Abilene Christian University
School of Educational Leadership

Engaging Students in the Virtual Classroom: A Mixed-Methods Study of Teacher Leaders
Creating Connections Through Virtual Learning Communities

A dissertation submitted in partial satisfaction
of the requirements for the degree of
Doctor of Education in Organizational Leadership

by

Michaine Suzanne Ashley

November 2020

Dedication

I would like to dedicate this dissertation to my husband and family who have supported me through the journey to attain my degree through many hours of writing, research, and late nights. Without them, I would not be who I am or where I am today.

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First, I must thank God for all of the blessings in my life and grace he has provided me through the ups and downs of this doctoral journey. He has blessed me with two children during this journey and granted me the patience and perseverance to keep going despite the struggles that go along with raising two infants while writing a dissertation.

I would also like to thank my family for their unending support. My husband, Ryan, for supporting me and stepping up to take care of both babies during my long hours of writing. I would not be where I am today if it were not for the great impact you've had on my life. To my dad, thank you for always believing in me and encouraging me to keep going. I hope that I always make you proud. To my mother in law, Sharri, thank you for everything you have done and continue to do. Without your help and constant "Nana visits" I would not have gotten this thing completed.

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Abstract

The core problem that drove this study was high attrition rates and low student academic growth in virtual students when compared to their brick and mortar peers. To investigate this issue, the study focused on one issue related to the core problem: student engagement. The purpose of the study was to determine what pedagogical practices and instructional strategies were utilized by teachers in their virtual learning communities (VCLs) in order to engage students in the virtual classroom. This explanatory-sequential, mixed methods, single case study was conducted through the collection of archival data and through a teacher questionnaire and follow up focus group interviews. The sample population included 25 virtual teachers from one virtual charter school in Texas. The findings indicated that teachers with higher engagement scores utilized a combination of communication methods (i.e., calls, texts, and emails) and provided students with supplemental resources outside of the curriculum. The findings for teachers with lower engagement scores indicated that utilizing a single method of communication and focusing on 1:1 tutoring over contacting students was less impactful on overall student engagement scores.

Keywords: virtual learning community (VLC), online learning, virtual school, engagement, virtual teacher leader, self-determination theory (SDT)

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Chapter 1: Introduction

Background

The growth of fully online K-12 virtual school programs has received considerable attention since its emergence in the educational environment (Aud et al., 2012; Gemin et al., 2015; iNACOL, 2012). K-12 distance education programs can serve entire populations of students that traditional brick and mortar classrooms cannot by increasing opportunity through choice, tutoring, and supplemental services to students with a variety of needs. For example, students living in remote areas, those who are hospitalized, homebound students with medical issues, professional athletes, students who are incarcerated, students who are employed and need flexible scheduling, and students who seek to enrich their education, move at their own pace, or experience learning that fits their learning style and needs can particularly benefit from online programs (Bogden, 2003; Chaney, 2001; Patrick, 2004).

With rapid growth in enrollment in online school programs, a significant number of students in online courses experience high attrition rates and lower academic growth as compared to their peers in brick and mortar school settings (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013, 2014). Prevailing research attributes the problems of high attrition rate and lower academic growth to the lack of engagement by students (Archambault et al., 2013; Borup & Stevens, 2017; Borup et al., 2014; Finn, 1993) and parents (Borup et al., 2012; Borup et al., 2015; Boulton, 2008). Interaction and communication in virtual school settings has been researched extensively, and scholars have determined that these two components play an essential role in the engagement of students in virtual school programs (Borup et al., 2012; Foster et al., 2018; Lui & Cavanaugh, 2012; Ribón et al., 2013; Roybler & Marshall, 2002; Ticknor et al., 2017; Wilkens et al., 2014).

Despite the importance of interaction and communication in the success of students enrolled in a virtual school program (Borup et al., 2012; Foster et al., 2018; Lui & Cavanaugh, 2012; Ribón et al., 2013; Roybler & Marshall, 2002; Ticknor et al., 2017; Wilkens et al., 2014), many virtual schools still struggle with how to achieve and maintain interaction and communication with their virtual students. Whereas research supports the link between course outcome and human interactions and communications (Borup et al., 2012; Foster et al., 2018; Lui & Cavanaugh, 2012; Ribón et al., 2013; Roybler & Marshall, 2002; Ticknor et al., 2017; Wilkens et al., 2014), there is little research on how the components of virtual courses play a role in these aspects (Morgan, 2007).

However, virtual learning communities (VLCs) have been touted in recent years as providing a means for students to feel supported and engaged (Ticknor et al., 2017) while also helping overcome the hurdles of distance and time that plague virtual schools (Linton, 2016). A VLC is defined as a community of practice in which members can share and federate their expertise amongst each other (Ribón et al., 2013). Chia and Pritchard (2014) emphasized that virtual learning communities aid in collaboration in the virtual school setting while having a positive impact on students' cognitive, intellectual, and interpersonal aspects.

Additionally, the impact of virtual teacher leaders on establishing VLCs has been noted (Chua & Chua, 2017; Kuscu & Arslan, 2016; Schrum & Levin, 2013). A virtual teacher leader is defined as a leader focused on monitoring, sharing, commenting, producing, organizing, and supervising both students and colleagues (Polat & Arabaci, 2014) and who possesses the following skills: the ability to select and use proper technology to provide collaboration, confidence, and effective communication on virtual media; the ability to create an environment of confidence amongst students and colleagues; and, the ability to manage cultural differences to

facilitate learning (Kirel, 2007). Teacher leaders' ability to foster communication in the virtual setting plays a significant role in the successful implementation of virtual learning communities with the purpose of decreasing attrition and improving academic achievement amongst virtual students (Chua & Chua, 2017; Foster et al., 2018; Kuscu & Arslan, 2016; Schrum & Levin, 2013; Wilkens et al., 2014).

This problem significantly impacts the students at Virtual School High (VSH), a 2000-3000 student virtual high school centralized in DFW but serving students across the state of Texas. VSH is defined as a cyber charter school (Watson et al., 2004) as it is made up of two subdistricts within one school but draws students from across the state of Texas. Although the school's corporate office is located in the Dallas-Fort Worth metroplex, teacher leaders participating in this study are located across the state of Texas as they work from their home offices.

Demographically, the students of VSH were of 49.10% white, 31.29% Hispanic, 13.44% black, and 6.17% other ethnicities. The student population was composed of 57.13% female and 42.87% male students, with a total of 2285 students enrolled full time at the time the data were pulled in the spring of 2020. VSH has experienced high attrition rates and lower academic achievement in its student population as it grows and is working to develop a virtual learning community with the support of teacher leaders to mitigate and ultimately resolve these issues. Department completion rates for VSH show that only 53% - 63% of students enrolled successfully completed their courses by the end of the 2018-2019 school year.

Statement of the Problem

The problem that was addressed in this study was the difficulty of teachers engaging students in the virtual classroom for grades 9-12. Fully online, K-12 virtual school programs

have experienced rapid growth since emerging in the educational community (Aud et al., 2012; Gemin et al., 2015; iNACOL, 2012), but students in online courses experience higher attrition rates and lower academic growth when compared to their peers in face-to-face school settings (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013).

Prevailing research attributes the problems of high attrition rate and lower academic growth in virtual schools to the lack of engagement by students (Archambault et al., 2013; Borup & Stevens, 2017; Borup et al., 2014; Finn, 1993) and parents (Borup et al., 2012; Borup et al., 2015; Boulton, 2008) noting the importance of engagement and interaction on student success in any school setting. Additionally, research emphasizes the importance of creating connections established through meaningful interactions on the cognitive outcomes of students in the virtual space. These results further link engagement, interaction, and student success (Borup, 2016; Borup et al., 2012; Garrett Dikkers et al., 2013; Graham et al., 2014; Hawkins et al., 2011; Hay et al., 2004; Manasia & Parvan, 2015; Tomai et al., 2010).

A core problem within virtual schools is teachers struggle to keep students engaged throughout their coursework (Kim et al., 2015; Pazzaglia et al., 2016). Zweig et al. (2015) noted engagement and course completion as two leading problems for virtual teachers. Students' learning is significantly hindered when they rely solely on their own efforts and disregard the importance of engaging with others (Bandura, 1986; Borup, 2016; Vygotsky, 1978). Núñez and León (2015) expounded on the impact of community on student learning in the virtual setting by noting that the classroom environment generated by the teacher is an essential element in student motivation and emotional engagement in the classroom, especially in a virtual classroom where

students are not face to face with their teacher on a daily basis; an idea supported by Ticknor et al.'s (2017) study.

Research has supported that teacher leader's instructional leadership style has a statistically significant (Raza & Sikander, 2018) positive effect on student achievement (Alam & Ahmed, 2017; Carter, 2017; Heaven & Bourne, 2016; Robinson et al., 2007; Seashore et al., 2010) in both virtual and brick and mortar educational settings. Teacher leadership is not only vital in the creation of the communal aspect in virtual schools (Nunez & Leon, 2015; Ticknor et al., 2017) but also on the development of successful pedagogical practices in virtual schools (Adelstein & Barbour, 2017; Davis et al., 2007). Teachers have already taken a significant role in school leadership, though teacher leaders have the best opportunity to lead in tech-rich schools (Kuscu & Arslan, 2016; Schrum & Levin, 2013; Warren, 2016). Research also linked teacher leadership to the importance of communication in virtual schools (Kuscu & Arslan, 2016) and the need to create a positive virtual culture (Chua & Chua, 2017; Foster et al., 2018). Teacher leaders' use of communication links the need for interaction, importance of communication, and the leadership aspect of this research (Borup et al., 2012; Chua & Chua, 2017; Foster et al., 2018; Kuscu & Arslan, 2016; Ticknor et al., 2017).

Purpose of the Study

The purpose of this explanatory-sequential, mixed methods, single case study was to determine: a) to what extent, if any, does student engagement in teachers' VLCs correlate with student scores on unit tests; b) what pedagogical practices and instructional strategies are being utilized by teacher leaders with higher student engagement scores in their VLCs in ninth-12th grade virtual classrooms; and c) what pedagogical practices and instructional strategies are being utilized by teachers with lower student engagement scores in their VLCs in ninth-12th grade virtual classrooms? Utilizing an instrumental case

study design, multiple data sources within a single school district will provide insight into the impact of virtual learning communities on engagement at a district level (Baxter & Jack, 2008; Creswell, 2007; Merriam, 2009).

For the quantitative data portion of the study, the researcher utilized archival student data from the 2019-2020 school year at VSH. The population of the qualitative data portion of study was comprised of teachers who were current employees of VSH during the 2019-2020 school year who began employment at the beginning of the school year in August 2019; teachers who started after August 30th were not eligible for the study. Analyzing the quantitative student engagement data, *time spent in the LMS-course*, determined which teachers were identified as teacher leaders in this study. Teachers with the highest quantitative student engagement scores, above 76,000 hours, were labeled as teacher leaders within the district for the purpose of this study and placed in Focus Group 1. Teachers with engagement scores below 59,000 were considered lower engagement teachers and placed in Focus Group 2. There were no teachers who fell within the 59,000 to 76,000 hour range.

Teacher leaders must possess skills such as a focus on monitoring, sharing information, providing constructive feedback, producing and organizing effective content deliverables, and supervising students and fellow teachers (Polat & Arabaci, 2014). Kirel (2007) further outlined the requirements for teacher leaders in a virtual setting, noting the importance of teachers' ability to select and use proper technology; their ability to collaborate virtually; their confidence of use in technology; and, their ability to effectively communicate via virtual platforms.

To analyze student academic achievement, quantitative student gradebook data were retroactively gathered from the 2019-2020 school year at the end of the spring 2020 semester and analyzed to determine how student engagement in teacher's VLCs correlated with student scores

on unit tests. The qualitative portion of the study was two-fold: 1) teacher questionnaire and 2) two live virtual focus groups. A Google form questionnaire was administered to gather information on the pedagogical practices being employed by teachers in their VLCs to engage students in their courses. The questionnaire included questions to determine the impact of interaction, communication, and the VLC as a whole based on the teachers' perspective. Utilizing the information gathered from the questionnaire, I then held focus groups with two groups of teachers, Group 1 consisted of teachers with high engagement scores while Group 2 consisted of teachers with low engagement scores, to further expound upon the qualitative data gathered in the questionnaire.

Research Questions

The following research questions will guide the study:

Q1: To what extent, if any, does student engagement in teachers' virtual learning communities correlate with student scores on unit tests?

Q2: What pedagogical practices and instructional strategies are being utilized by teacher leaders with higher student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms?

Q3: What pedagogical practices and instructional strategies are being utilized by teachers with lower student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms?

Definition of Key Terms

This section provides operational definitions of the important terms that have been recurrently used in the present chapter. For this purpose, the following terms are defined accordingly:

Communication. Communication in the virtual school setting is most commonly seen in the form of emails but may also be exhibited through synchronous sessions, chats/hangout messages, or other forms of online messaging where students, parents, and teachers may talk/type and respond to one another. Communication is a key variable in student success in virtual schools as research has noted that students need to attend and engage in school activities in order to internalize a feeling of comfort and belonging in the school (Borup, 2012; Christenson et al., 2001; Ekmekci, 2013; Finn, 1993; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Ticknor et al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011). Additionally, Anderson and Dron (2011) noted that learning is located in contexts and relationships rather than merely in the minds of individuals, further emphasizing the importance of communication in the virtual setting.

Engagement. Engagement is defined as active, effortful, goal-oriented interaction with the learning environment (Skinner et al., 2008). In this study, engagement in the virtual environment was defined as regular submission of assignments in the learning management system (LMS; minimum of two submissions weekly) and keeping on pace with the assignment submission calendar in the LMS (no more than five assignments behind at any given time). Engagement was measured by the amount of time students spent in the LMS per course and was determined by pulling data reports directly from the LMS.

Explanatory sequential design. The explanatory sequential design is a mixed methods design in which the researcher begins by conducting a quantitative phase and subsequently follows up on specific results with a qualitative phase to help explain the quantitative results further (Creswell & Plano Clark, 2018). This study utilized an explanatory sequential design by first analyzing quantitative data on engagement vs student test scores then follow up with a

qualitative analysis comparing pedagogy utilized by teachers with high engagement scores, defined by the data as teacher leaders, and pedagogy utilized by teachers with low engagement scores.

Interaction. Interaction between students and teachers at virtual school high occurred via email, phone calls, chat/hangouts messaging, 1-hour live synchronous sessions, optional 1:1 tutoring sessions, and other communication methods where students and teachers were directly engaging with one another. Interaction plays a key role in the success of virtual schools because it allows students to achieve the goals of attaining an engaging online environment and building a sense of community if they are actively attending the online school and interacting with teachers on a regular basis (Borup, 2012; Christenson et al., 2001; Ekmekci, 2013; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Ticknor et al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011).

Pedagogical practices. Pedagogical practices are specific strategies and instructional processes that virtual teachers can directly tailor in order to meet the needs of their specific group of students (Borup & Stevens, 2017). Some examples of tailored instruction in virtual schools are teachers providing personalized support via asynchronous sessions (Borup et al., 2014; Borup & Stevens, 2017), nurturing student relationships using a specific type of communication method (Berry, 2019; Borup et al., 2014; Borup & Stevens, 2017; Garrison et al., 2010), and any specific type of motivational strategy used to bolster engagement (Berry, 2019; Borup et al., 2014; Borup & Stevens, 2017; Garrison et al., 2010).

Student test scores-unit #. The student test scores-unit # is defined as the score a student receives on one specific unit test for a specific course. The majority of courses at VSH are 10-unit courses and thus have 10 unit tests (5 per semester). Certain elective courses contain less

(i.e., 8 units, 4 tests per semester) while others contained more (12 units, 6 tests per semester). Each unit test will be analyzed as a separate entity under the main variable category student test scores-unit #.

Time spent in LMS. The amount of time spent in the LMS is the number of minutes a student is logged into the Learning Management System (LMS). If students are inactive for more than 10 minutes, the LMS utilized in this study removed them from the system (i.e., logs them off) so students must be actively working in the system to remain logged in.

Unit test. This study defined a unit test as a cumulative review of each unit within the curriculum provided to students within the LMS. The curriculum itself is provided by an external company then input into the LMS for student access, thus all unit tests are the same per course even if multiple teachers teach the same course. Unit tests occurred once per unit after students have had access to the lessons containing the content information. Students were not required to complete or pass lessons before taking the unit test. However, students were required to pass the unit tests in sequential order before moving into the next unit. For CORE curriculum courses (English, Science, Math, Social Studies), there were 10 unit tests per course (5 per semester). For elective courses, the number of unit tests varied from 8 per course to 12 per course depending on the course content.

Virtual learning community (VLC). A virtual learning community is a community of practice in which students and teachers can share and federate their expertise amongst one another (Ribón et al., 2013) and aid in collaboration while having a positive impact on students' cognitive, intellectual, and interpersonal aspect (Chia & Pritchard, 2014). In this study, a virtual learning community consisted of any online forum of communication through which teachers and students communicate to foster cognitive, intellectual, and interpersonal growth.

Virtual school. In this study, a virtual school referred to a cyber charter school defined as an online school chartered within a single district that can draw students from across the state and provides 100% of instruction in the online environment (Watson et al., 2004).

Virtual student attrition. In this study, virtual student attrition will be defined as the number of students who are enrolled in the virtual school in a given year but who withdraw from the program without completing their courses before the end of the school year (Martin et al., 2016).

Virtual teacher leader. A virtual teacher leader is defined as a leader focused on monitoring, sharing, commenting, producing, organizing, and supervising both students and colleagues (Polat & Arabaci, 2014) and who possess the following skills: ability to select and use proper technology to provide collaboration, confidence, and effective communication on virtual media, ability to create an environment of confidence amongst students and colleagues, and the ability to manage cultural differences to facilitate learning (Kirel, 2007). Virtual teacher leaders in this study were identified by analyzing the quantitative data for student engagement in their virtual learning community.

Summary

The growth of fully online K-12 virtual school programs has received considerable attention since emerging in the educational setting (Aud et al., 2012; Gemin et al., 2015; iNACOL, 2012), and two significant issues have arisen due to that growth: (1) higher attrition rates and (2) lower academic growth for online students when compared to their peers in face-to-face school settings (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013). Although existing research attributes these issues to lack of engagement by students (Archambault et al., 2013; Borup & Stevens, 2017;

Borup et al., 2014; Finn, 1993) and parents (Borup et al., 2012; Borup et al., 2015; Boulton, 2008), there has not been extensive research into how to address these issues in the virtual K-12 environment. In Chapter 2 I reviewed the existing research base on engagement, virtual K-12 education, VLCs, and teacher leadership to provide a foundation for the research conducted in this study.

Chapter 2: Literature Review

While experiencing a rise in enrollments since emerging on the educational scene, K-12 virtual schools in the U.S. may also experience problems with higher attrition rates and lower academic growth as compared to traditional brick and mortar K-12 schools (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013). According to recent studies, noncompletion rates in virtual schools range as high as 75% to 90% in virtual schools (Breslow et al., 2013; Jordan, 2015; Jun, 2005; Rochester & Pradel, 2008). Existing research attributes these issues to lack of engagement by both students (Archambault et al., 2013; Borup & Stevens, 2017; Borup et al., 2014; Finn, 1993) and parents (Borup et al., 2012; Borup et al., 2015; Boulton, 2008) in virtual K-12 schools. In this explanatory-sequential, mixed methods study, the researcher sought to analyze the issue of engaging students in the virtual classroom for Grades 9-12 by determining: a) to what extent, if any, does student engagement in teachers' VLCs correlate with student scores on unit tests; b) what pedagogical practices and instructional strategies are being utilized by teacher leaders with higher student engagement scores in their VLCs in ninth-12th grade virtual classrooms; and c) what pedagogical practices and instructional strategies are being utilized by teachers with lower student engagement scores in their VLCs in ninth-12th grade virtual classrooms.

In order to locate and analyze foundational research supporting for the topic of this study, an extensive literature review was completed over the span of 3 years. The primary collection tool was the online database of Brown Library at Abilene Christian University (ACU OneSearch). The use of ACU OneSearch helped ensure the most relevant and up to date literature on each topic was located and incorporated into the study. I utilized a funneled (broad to specific) search pattern by beginning with basic or broad terms to search the literature then

becoming more narrowed and specific as more research was collected and the problem of practice more defined.

Specific keywords and phrases used to find and identify relevant literature included *engagement, virtual schools, teacher leadership, and virtual learning communities (VLCs)*. These keywords and phrases were utilized to locate and incorporate research that would expound upon the broad topic of student engagement while also providing insight and support for the more specific details of virtual education and the use of VLCs. This literature review is focused on reviewing and analyzing the foundational literature on the self-determination theory, current culture of K-12 virtual school education, impact of engagement in VLCs on virtual students, and engagement theories and the link to teacher leadership.

Conceptual Framework

Jang et al. (2016) analyzed the idea that a productive or counterproductive trajectory for student engagement throughout the course of a school year depends on how students perceive the classroom teacher as being supportive or conflictual; an idea originally posited by Haerens et al. (2015). This idea of student engagement being directly impacted by teacher support is foundationally based in self-determination theory (SDT), where students' psychological needs, specifically autonomy, competence, and relatedness, are inherent motivational assets that impact their education as a whole (Jang et al., 2016; Ryan & Deci, 2000a; Ryan & Deci, 2017). Ryan and Deci (2017) described SDT as being centrally concerned with the social conditions that facilitate or hinder human flourishing, an idea that has significant relevance to the success of students in the virtual K-12 school environment.

The SDT's underlying principle idea of self-organization in psychological development and functioning is a concept deeply founded in historical research such as cognitive-

developmental perspectives (e.g., Piaget, 1971; Werner, 1948), humanistic psychology (e.g., Goldstein, 1939; Rogers, 1963), and psychodynamic approaches (e.g., Freud, 1923; Loevinger, 1976; White, 1963; Winnicott, 1965). The SDT itself examines how biological, social, and cultural conditions may either enhance or undermine the inherent student capacity for psychological growth, engagement, and wellness in both general and specific endeavors (Ryan & Deci, 2017). The SDT is utilized in this study due to its ability to put into focus the psychological growth and development of students in order to allow the researcher to investigate some of the basic features and mechanisms underlying social behavior and social development that may impact the engagement of virtual 9-12 students (Ryan & Deci, 2017).

The needs-centric focus of the SDT allows teachers to put student's basic psychological needs of autonomy, competence, and relatedness into context in the educational setting. Autonomy is experienced in the classroom when the instructor provides students with the ability to make choices within the classroom structure established by the instructor (Hsu et al., 2019). Teachers can allow for student autonomy in the virtual classroom by creating opportunities for students to work and submit assignments in their own way while avoiding controlling language like *must* and *should* (Hsu et al., 2019), which puts undue pressure on students, especially in the virtual setting where tone and facial expressions are not present. The second core psychological need, confidence, refers to students' beliefs that they are able to master the content or are able to perform well academically (Hsu et al., 2019); an idea similar to Bandura's (1986) historic notion of self-efficacy. Virtual teachers can fulfill students' need for competence by providing informational feedback focused on evidence of improvement and mastery as well as by offering hints when students seem stuck (Hsu et al., 2019). The use of VLCs provides teachers a way to meet students' need for competence in the virtual environment (Berge & Clark, 2005; DiPietro,

2010; Russell, 2004; Savery, 2005). The final core psychological need, relatedness, describes students' feelings of being connected and experiencing a sense of belonging (Hsu et al., 2019). This feeling of connectedness can be attained by interacting with classmates, teachers, or with the learning materials. Students' need for relatedness can also be met through students engaging in the teacher's VLC. The connection between the core psychological needs discussed in the SDT and teachers' use of VLCs will be discussed in more detail later in this literature review.

Rayburn et al. (2018) noted contexts that support students' three core psychological needs (i.e., autonomy, competence, and relatedness) fosters greater internalization of goals and values than contexts that hinder these needs satisfaction. SDT focuses on what circumstances impact the deeply ingrained developmental processes of internalization and integration provides a foundation upon which to view student engagement as a multifaceted, meta-construct that necessitates being examined from multiple perspectives. For this reason, I chose to utilize an explanatory-sequential, mixed method design for this case study.

Mixed Methods Case Study Design

Johnson et al. (2007) formed a composite definition of mixed methods research as “the type of research in which a researcher or team or researchers combines elements of qualitative and quantitative research approaches for the purposes of breadth and depth of understanding and corroboration” (p. 123). This composite definition of mixed methods research was compiled using numerous historical research studies on mixed methodology (Creswell, 1994, 2003; Greene et al., 1989; Tashakkori & Teddlie, 1998, 2003). Johnson et al.'s (2007) definition for mixed methods research has since been utilized by multiple researchers (Creswell & Plano-Clark, 2018; Venkatesh et al., 2016) and, as such, was utilized as the definition of mixed methods research for this study. Creswell and Plano-Clark (2018) noted that mixed methods

research is used to develop an in-depth understanding of one or more different types of cases followed by a comparison of the cases in terms of certain criteria. Furthermore, Creswell and Plano-Clark (2018) emphasized that mixed methods research provides a way to harness the strengths and offset the weaknesses of either quantitative or qualitative research alone which can result in meta-inferences into the collected data; an idea supported by significant foundational research (Creswell, 2009; Tashakkori & Teddlie, 2003; Venkatesh et al., 2013; Venkatesh et al., 2016).

Within the mixed methods framework, the researcher implemented a pragmatic worldview utilized by a number of mixed methods researchers (Creswell & Plano-Clark, 2018) and noted by Tashakkori and Teddlie (2003a) to be embraced by 13 different authors as the optimal worldview for mixed methods research. According to foundational research on pragmatism, the epistemology of the pragmatic worldview focuses on practicality, wherein researchers are focused on the consequences of the research and, as such, collect data focused on the primary importance of the research question rather than the research methods in use (Creswell & Plano-Clark, 2018; Johnson & Onwuegbuzie, 2004; Morgan, 2007; Tashakkori & Teddlie, 2003; Venkatesh et al., 2013). The primary focus when determining the methodology for this study was to answer the research questions and the study's resulting impact on foundational research into the field. Consequently, this study employed a specific subset of mixed method research called explanatory-sequential design. Explanatory-sequential design is a type of mixed method design that requires the researcher to begin by collecting a quantitative data phase followed up by a further research into specific results with a subsequent qualitative phase to help explain the quantitative results (Creswell, 1994, 2007; Creswell & Plano-Clark, 2018; Tashakkori & Teddlie, 1998; Teddlie & Tashakkori, 2009).

Utilizing the explanatory-sequential mixed methods approach, this study will conduct a single case study at one virtual high school in Texas. Yin (2018) defined a case study as an empirical method that a) investigates a contemporary phenomenon in depth and within its real world context and, b) relies on multiple sources of evidence to cope with a technically distinctive situation in which there will be many more variables of interest than data points. Creswell and Plano-Clark (2018) noted that a mixed methods case study design is more detailed and contextualized than a case that contains quantitative or qualitative data alone. A case study is utilized to understand a real-world case with the assumption that the study will likely involve important contextual conditions pertinent to the case (Yin, 2018; Yin & Davis, 2007). Case studies are dissimilar to experimental design studies because they do not attempt to control the environment in which the study occurs (Yin, 2018), researchers design the study with an understanding that the context in which the study occurs has implications on any results obtained throughout its course.

Narrowing the definition of case study, Yin (2018) described an embedded-single case study as one that involved multiple units of analysis at more than one level within the same organization. As the researcher in this study analyzed multiple units of analysis, both quantitative and qualitative data sets, within a single virtual school district, an embedded single-case study design was utilized. Additionally, Yin (2018) emphasized that utilizing an embedded case study design can serve as an important device for maintaining a case study's focus throughout the course of the study. Due to the length of this study, maintaining the study's focus throughout its course was important due to the quantitative data being collected retroactively from the 2019-2020 school year and the qualitative data portion being collected in the spring of the 2019-2020 school year. Further defining the single-case study design, a critical case test of existing theory is

eminently justifiable according to Yin (2018). A critical case test is defined as a study used to determine whether the propositions set forth by an established theory are correct or whether some alternative explanations could be more relevant (Yin, 2018). This study utilized the critical case, single-case study design by investigating the established propositions of the SDT and its link to student engagement in order to extend the current literature foundation on the theory's application in the virtual school setting (Yin, 2018).

SDT and Engagement

The theoretical framework of the SDT describes three key components of student success in the classroom: a) teacher motivational style (e.g., autonomy support vs teacher control); b) student motivational style (e.g., need satisfaction vs need frustration), and c) student functioning (e.g., engagement vs disengagement; Reeve et al., 2004; Ryan & Deci, 2000a, 2000b; Skinner et al., 2009). Researchers maintain that when students' basic psychological needs (i.e., autonomy, competence, and relatedness) are supported in the classroom, students are more likely to learn and be engaged in their studies (Niemic & Ryan, 2009; Ryan & Deci, 2000a; Ryan & Deci, 2017). Reeve (2009) described the source of students' need support being the teacher's motivational style; noting that when need supportive, the teacher acts as a social-contextual facilitator of students' need satisfaction and optimal functioning in the school environment; an idea later emphasized in Jang et al.'s (2016) study. The use of autonomy supportive teacher motivational style enhances students' positive classroom functioning (e.g., engagement), because it nurtures and supports the three core psychological needs of autonomy, competence, and relatedness needs satisfaction during instruction (Cheon et al., 2012; Jang et al., 2012). To test the impact of need supportive teaching in the virtual setting, Hsu et al. (2019) conducted a case study to determine the impact of teachers utilizing certain pedagogical practices in order to meet

three psychological needs of students in the virtual school setting. The results of their study indicated that effective online pedagogy that fulfills student's need for autonomy, relatedness, and competence helped online learners succeed by enhancing their level of motivation to engage in their schoolwork (Hsu et al., 2019).

Additionally, a significant body of research, ranging from the early nineties until 2019, has indicated that teachers providing an autonomy-supporting learning environment foster the satisfaction of students' core psychological needs, which in turn enhances their ability to achieve the intended learning outcomes (Deci et al., 1991; Hsu et al., 2019; Jang et al., 2012; Levesque-Bristol et al., 2006; Levesque-Bristol et al., 2010; Reeve, 2012; Williams & Deci, 1996). In both experimental manipulations (Cheon et al., 2012) and longitudinal surveys (Jang et al., 2012), students who experience engagement-energizing psychological need satisfaction showed robust classroom engagement due to the teacher adopting an autonomy-supportive style toward instruction and interaction (Jang et al., 2016; Reeve & Jang, 2006). Researchers also noted that students' engagement will be greater if the teacher supports both autonomy and structure in the classroom (Jang et al., 2010; Sierens et al., 2009). Chen and Jang (2010) conducted a study utilizing a model based on the self-determination theory and determined that when contextual support associated with the core psychological needs (i.e., autonomy, competence, relatedness) was provided for online learners, results indicated better learning outcomes amongst students. Furthermore, researchers linked the satisfaction of students' core psychological needs with an enhancement in self-determined motivation, which led to higher perceived knowledge transfer and improved learning outcomes in virtual students (Hsu et al., 2019; Levesque-Bristol et al., 2006; Ryan & Deci, 2000).

According to Stefanou et al. (2004), the characteristic elements of autonomy support outlined in the SDT can be classified into three categories: a) organizational autonomy support (e.g., students can choose group members, evaluation procedures, and due dates), b) procedural autonomy support (e.g., students can choose what materials to use in their school work, how to display their work, etc.), and c) cognitive autonomy support (e.g., students can find multiple solutions to problems, debate ideas freely, have time to make decisions, etc.). The use of organizational autonomy support allows students to feel more comfortable in the way the classroom works, while procedural autonomy support fosters initial learning engagement, and cognitive autonomy support encourages stronger investment in learning activities (Núñez & León, 2015).

After noting engagement as a key element to student success in school, Fredricks et al. (2004) further described engagement as tri-faceted, composed of behavioral, cognitive, and emotional engagement. Behavioral engagement refers to involvement in learning tasks and environments, such as a VLC; cognitive engagement refers to psychological investment in the process of learning, such as the use of learning strategies; and emotional engagement refers to affective reactions to learning tasks and environments, such as emotions (Fredricks et al., 2004). Skinner et al. (2008) reinforced the idea of behavioral, cognitive, and emotional engagement in their research by noting that engagement represents active, effortful, goal-orientated interaction with the learning environment.

The use of a multi-component approach to considering engagement as a meta-construct can be useful in research and can broaden the understanding of engagement as a whole (Finn & Zimmer, 2012; Fredricks et al., 2004; Kim et al., 2015; Lawson & Lawson, 2013). Not only has engagement been linked to a host of adaptive outcomes such as increased grades, learning and

achievement (King & Gaerlan, 2014; Skinner et al., 2008), but it has also been linked to improved attendance and retention (Sinclair et al., 2003), all significant issues amongst K-12 virtual high schools (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013).

Current Culture in K-12 Virtual School Education

Among the issues existing in both virtual and brick and mortar institutions, one of the key criticisms of the U.S. education system in the 21st century is the comparison of public schools to factories, in which students are assigned groups based on age and then progress through a series of lockstep style courses (Groff et al., 2010). Archambault et al. (2013) described this compartmentalization of learning as a one-size-fits all approach to instruction that is stifling student creativity, individuality, and innovation. In recent years, online learning has sought to break the mold of compartmentalized education by providing an alternative educational opportunity for students, gaining popularity worldwide and leading to a reduction in the temporal and spatial problems associated with the traditional form of education (Hsu et al., 2019; Panigrahi et al., 2018). Online learning not only improves access to education and training but also reduces the cost and improves cost effectiveness of education on a wide scale (Bates, 1997).

In his foundational study, Moore (1993) considered distance learning systems and identified three critical elements that impact transactional engagement of online learners: 1) the structure of the environment, 2) the degree of meaningful communication (i.e., dialogue) that the structure permits, and 3) the degree to which the learner is able to mediate choices and decisions regarding personal learning goals and trajectories. These three key factors provide a foundation for research into online education today as well as tying into student's three core psychological needs described by the self-determination theory (i.e., autonomy, competence, and relatedness;

Jang et al., 2016; Ryan & Deci, 2000a; Ryan & Deci, 2017). Following the ideas founded in Moore's theory of transactional distance, researchers Bernard et al. (2004) and Roblyer et al. (2007) proposed one factor that impacts student success in online learning environments is the format in which content and interaction are delivered to students. Online learning environments can take the form of either synchronous or asynchronous sessions. A synchronous session involves the instructor and students communicating in real time despite being physically separated by distance (Bernard et al., 2004; Roblyer et al., 2007). This can be achieved via video conference, Zoom meeting, or other form of direct messaging system where the student and teacher can be visible via webcam in real time. An asynchronous session occurs when the instructor and students are separated by both distance and time (Bernard et al., 2004; Roblyer et al., 2007). These types of sessions could occur via email, Google document, previously recorded instructional documents, the LMS, or any other type of material where the instructor and students are not working simultaneously. Synchronous interactions provide students an avenue to interact with their teacher and peers to build community and increase their feelings of belonging within their school environment (Garrison et al., 2010). Asynchronous sessions allow students to learn at their own pace with the availability of online learning materials provided through the learning management systems (LMS) allowing students to work at a pace and time that fits their needs and schedule (Fulton & Kober, 2002; Panigrahi et al., 2018; Setzer & Lewis, 2005; Showalter et al., 2017). This individualized approach to learning starkly contrasts the lockstep, compartmentalized learning environments described by Groff et al. (2010) and Archambault et al. (2013).

However, despite the many advantages that online learning provides, retaining students in virtual learning platforms remains a key challenge as virtual schools maintain high attrition rates

(Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Perna et al., 2014; Rice, 2006; Watson et al., 2013; Zweig et al., 2015) when compared to traditional brick and mortar schools. As more students are moving into the virtual school environment, educators and research are working to determine the best practices for online learning and teaching (Hsu et al., 2019). Sharoff (2019) noted that virtual schools must focus on facilitating engaging online courses that enhance student participation and build a sense of community. However, in order to achieve the goals of attaining an engaging online environment and building a sense of community, students must actively attend the online school on a regular basis (Borup et al., 2012; Christenson et al., 2001; Ekmekci, 2013; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Ticknor et al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011). The significant research base supporting the importance of student attendance in the success of virtual schools has garnered the attention of school administrators and policy makers to the idea of truancy in virtual schools. The current idea of truancy in education is based on the physical presence of a student in the classroom within the traditional school model (Archambault et al., 2013), but this idea does not easily translate into the cyber classroom; whereas research has established that regular school attendance is a key factor in school settings (Gottfried, 2010; Musser, 2011; Roby, 2004), even linking attendance to higher scores on standardized tests (Gottfried, 2011), holding students accountable for attendance is still an area of contention amongst virtual schools and policy makers. Issues with attendance may be caused by a variety of persistent problems in education today such as student underachievement as well as learning, behavioral, and emotional difficulties that ultimately lead to school dropouts (Battin-Pearson et al., 2000). In his historic study, Finn (1989) theorized that school dropouts are caused by a gradual process of disengagement and alienation, marked by a chronic cycle of tardiness,

absenteeism, failing classes, suspensions, and transitions between schools. Recent research into attrition rates in virtual schools attributes the problem to the lack of engagement by students (Archambault et al., 2013; Borup & Stevens, 2017; Borup et al., 2014; Finn, 1993) and parents (Borup et al., 2012; Borup et al., 2015; Boulton, 2008) in the virtual school setting. Based on the existing research, educators have established that monitoring attendance is an important factor in student success in all school environments and, as such, there is a standing call for additional research in this area.

However, the concept of attendance in cyber schools remains difficult to define. Patrick and Sturgis (2013) noted that cyber schools in 36 states had moved to completion-based or competency-based programs as a method for measuring student progress in an attempt to address the issue of attendance. Despite these attempts, administrators and faculty of cyber schools still struggle to ensure that their students are in fact attending and receiving instruction, as well as progressing in their courses and working towards completing their education (Archambault et al., 2013). Panigrahi et al. (2018) noted that keeping student enrolled and engaged in the virtual education environment is a challenging job as meaningful connections between instructors and students are often lacking. However, despite issues with attendance and that virtual schools continue to underperform in areas of student academic achievement (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Miron et al., 2018; Rice, 2006; Watson et al., 2013) enrollments continue to rise in virtual schools across the country (Aud et al., 2012; Gemin et al., 2015; iNACOL, 2012).

Parents and students who choose to attend online schools generally do so with the idea that online learning will provide them flexibility in time, space, or pacing over what they have received at a traditional brick and mortar school, though most enter into virtual schooling

without a full understanding of what may be required as an online learner (Kim et al., 2012).

Virtual schools are particularly appealing to students who may be at-risk of not graduating due to flexibility in scheduling, tutoring and remediation support, and the opportunity to work during holidays and summer breaks to regain credits that they may have fallen behind in at their previous schools (Fulton & Kober, 2002; Setzer & Lewis, 2005; Showalter et al., 2017).

Whereas distance education programs serve many populations that traditional classrooms do not, by providing increased opportunity through choice, tutoring, and supplemental services (Bogden, 2003; Chaney, 2001; Patrick, 2004), research has found that many students who struggled academically in brick and mortar schools may continue to struggle in the online setting without additional support provided by teachers (Waters & Leong, 2014). Allen and Seaman (2007) noted that more self-discipline is required by students in the online educational setting than what is generally needed in the traditional brick and mortar classroom. Thus, it is likely that students who struggled with self-discipline in a brick and mortar setting would struggle equally, if not more, in a virtual classroom setting.

Despite these concerns, virtual school enrollments continue to rise across the country (Aud et al., 2012; Gemin et al., 2015; iNACOL, 2012). Based on the results of a study using data from blended schools in the U.S., Gulsino and Miron (2017) stated that one of the biggest challenges of virtual schools is determining how to manage the continued influx of online learning opportunities to ensure students get the full benefit without ending up lost in cyber space. In his foundational study on school attendance, Finn (1993) established a connection between attendance and school engagement, outlining that student attendance and participation in activities is directly related to student performance. Later researchers noted that the results of Finn's (1993) foundational study could be the answer to ensuring that students were receiving

the full benefits that virtual schools are capable of providing (Spitler et al., 2013). Additionally, Finn (1993) emphasized that students need to attend and engage in school activities in order to internalize a feeling of comfort and belonging in the school, an idea expounded upon by a wealth of additional research (Borup et al., 2012; Christenson et al., 2001; Ekmekci, 2013; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Ticknor et al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011).

Although significant research has established the importance of attendance and engagement in both virtual and brick and mortar school environments, Anderson and Dron (2011) emphatically noted that learning is located in contexts and relationships rather than merely in the minds of individuals. This idea was supported by research from Moje and Lewis (2007) who posited that learning is always situated within discourse communities not only in face-to-face environments but also ideational groupings across time and space. Thus, although student attendance in virtual schools plays a key role in their success (Borup et al., 2012; Christenson et al., 2001; Ekmekci, 2013; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Ticknor et al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011), it is important that virtual schools develop their programs with the understanding that learning engagement is an important antecedent for positive learning outcomes (Hu & Hui, 2012) and thus virtual programs must find a way to effectively engage students in their setting before expecting an increase in student learning outcomes.

Impact of Engagement in VLCs on Virtual School Students

Kim et al. (2015) stated there is no straightforward way of defining the construct of engagement. Due to its multi-faceted composition, engagement has been defined by numerous researchers throughout historical literature and no one definition has been identified as accepted

by the majority of researchers. Different researchers may focus on a specific subset of associated indices when defining engagement and, as such, the definition of engagement may vary based on the specific area of the researcher's focus (Kim et al., 2015). For this study, the established definition of engagement utilized stated that student engagement is an active, effortful, goal-oriented interaction with the learning environment (Skinner et al., 2008). This definition of engagement was chosen because it focused on students actively participating and interacting with their learning environment, an established factor of importance in the virtual educational setting (Borup et al., 2012; Christenson et al., 2001; Ekmekci, 2013; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Ticknor et al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011). This study further refined its' definition of engagement by acknowledging Fredricks et al.'s (2004) description of engagement as a tri-faceted meta-construct, composed of behavioral, cognitive, and emotional factors. As noted in the conceptual framework, behavioral engagement refers to involvement in learning tasks and environments; cognitive engagement refers to psychological investment in the process of learning; and emotional engagement refers to affective reactions to learning tasks and environments (Fredricks et al., 2004). This tri-faceted definition both supports and provides greater insight into the foundational definition provided by Skinner et al.'s (2008) study.

Teachers engaging students in the virtual learning environment can be accomplished in a variety of ways. Synchronous interactions allow teachers to interact with their students in real-time and aid in community building as well as promoting student feelings of belonging within the online environment (Garrison et al., 2010). Asynchronous sessions allow teachers to engage students when not in real-time sessions through the use of teacher-created videos, resources, email, and other digital tools that can allow students to work at a pace and access the materials

and information at a time that fits their specific environmental learning needs (Fulton & Kober, 2002; Panigrahi et al., 2018; Setzer & Lewis, 2005; Showalter et al., 2017). In virtual school environments, the ability for teachers to provide engaging online learning opportunities while still meeting the students' needs for autonomy support outlined in the self-determination theory (SDT) is aided by the use of technology and flexible scheduling (Berge & Clark, 2005; Boling & Beatty, 2010; Curtis & Werth, 2015; DiPietro, 2010; Rosa & Lerman, 2011; Russell, 2004; Savery, 2005), though additional factors such as technological isolation caused by geographical distance and stakeholder digital fluency may hinder the ability for student to receive the full spectrum of support (Ribon et al., 2013). With the mindset that high engagement is a significant factor in the continued motivation and commitment of virtual students (Borup et al., 2012; Christenson et al., 2001; Ekmekci, 2013; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Shernoff & Hougstra, 2001; Ticknor et al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011), researchers continue to investigate the correlation between engagement in virtual schools and students' need for community; a need that could be met by the establishment of a VLC in the virtual school environment. In analyzing VLCs, Xie et al. (2018) stated it is essential to focus on the influence of the network structure and interactive relationships developed within a virtual learning community in order to understand its' impact on learners' behavior. As such, an understanding of community and interactions in the virtual school environment must be established.

Community is defined as feelings of membership and closeness within a social group and has been identified by researchers as a protective factor against online attrition rates in virtual schools (Angelino et al., 2007; Berry, 2019; Tirrell & Quick, 2012). Further refining the definition of community, a VLC is defined as an online community to which members are

committed and involved professionally or educationally over an extended period of time, with opportunities for synchronous and asynchronous communications (Duncan-Howell, 2010; Linton, 2016; Ribon et al., 2013). VLCs have also been described as a virtual society where interactive and collaborative learning are core practices utilized to form a learning oriented social network (Xia et al., 2018). According to researchers, developing a sense of community within the school setting can benefit students both academically and socially (Berry, 2019; Lai, 2015; Lovitts, 2001; Rovai, 2003). Additionally, certain indicators of social connectedness can show the extent to which families, schools, and education systems foster students' wellbeing in the virtual setting (Manasia & Parvan, 2015; OECD, 2013). In their study, Manasia and Parvan (2015) conducted multiple quantitative statistical analyses including ANOVA and multivariate analysis and concluded that a VLC can contribute to the creation of authentic and relevant learning experiences for students in the virtual school environment. These benefits can be achieved in the online setting by students engaging in a virtual learning community with their teachers and peers.

Research has identified participation in VLCs as an opportunity for student interaction and community building, both of which are research-based practices for effective online teaching and learning (Cavanaugh et al., 2009; Hawkins et al., 2013; Linton, 2016). Oh and Lee (2016) posited that a VLC is most contributive to student learning and development when members of the community freely and openly exchange information as an ongoing process. Without establishing trust and relationships with students, the potential impact of the VLC is diminished (Booth, 2012; Crisp & Jarvenpaa, 2013; Schiller et al., 2014). As such, it is imperative that virtual teachers work to build trust and relationships with students (Shen, 2015) by meeting their basic psychological needs (i.e., relatedness, competence, and autonomy) in order to maximize on

the learning and developmental potential created by the virtual learning community. However, the process of realizing socialization of meaningful education in the virtual space is one that takes time and must be purposefully nurtured (Xia et al., 2018). As teachers begin to establish a VLC, stakeholders are unfamiliar with one another often prefer to engage in discussions only with individuals they are familiar with; leading to smaller, less in-depth communications as individuals gain familiarity with each other (Xia et al., 2018; Zhang, 2008). In the second stage of VLC development, stakeholders have attained a level of familiarity and comfort amongst each other and the types of interactions grow in depth and quality (Xia et al., 2018; Zhang, 2008). Once teachers have built relationships and trust amongst their students within the VLC, the in-depth and thought-provoking communication allowed through a community aspect can take place (Booth, 2012; Crisp & Jarvenpaa, 2013; Schiller et al., 2014).

Linton (2016) expanded on the importance of using VLCs by stating that student success increases in courses that are interactive and flexible, providing multiple opportunities for interaction, an idea previously established in iNACOL's (2011) research stating that effective online instructors build community amongst course participants within student-centered learning environments. Academic benefits for students engaging in communities include increased classroom participation and deep learning (Berry, 2019; Garrison et al., 2010) while social benefits include increased ability to manage stress and increase in overall emotional well-being (Berry, 2019; Pyhalto et al., 2009; Stubb et al., 2011). Overall, students who feel a sense of community in their school environment, either online or face-to-face, are less likely to drop out of an academic program (Berry, 2019; Ke & Hoadley, 2009); a significant finding that links back to the central issue of this study, high attrition rates in virtual schools (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013).

Existing research has established connections between virtual learning environments and the creation of authentic and relevant learning experiences for students in virtual schools (Manasia & Parvan, 2015). Cheng and Zeng (2016) noted that certain factors such as learning motivation, learning attitude, prior knowledge, learning styles, and learning environment all play a pivotal role in the engagement and success of students. These factors must be taken into account when virtual teachers begin establishing their VLCs to ensure that the learning experiences are both authentic and relevant for the specific group of students within that learning environment. Mayes et al. (2011) further explained that purposeful interactions amongst instructors and students is more important in an online setting due to a separation of time and space than what is needed in traditional brick and mortar schools. Despite the advantages that the virtual educational setting provides, researchers note that cultivating a sense of community can be difficult for online students (Ke & Hoadley, 2009) and the limited interactions they have with their peers in person may increase feelings of distance and potentially undermine a students' sense of connection with others their age (Koslow & Pina, 2015). Mayes et al.'s (2011) study went on to emphasize that effective online teachers proactively address the sense of isolation that often occurs in online environments by intentional promotion of social presence. Additional research (Oh & Lee, 2016; Phirangee et al., 2016; Rovai, 2007) found students felt more connected when teachers took an active role in facilitating discussions and created conditions where students could express themselves freely and openly, further creating a sense of safe community in the virtual setting.

Virtual teachers can meet the needs of their students by establishing an engaging and safe community in the virtual setting through the use of virtual learning communities. Consequently, teachers' instructional style, whether autonomy supportive or teacher controlled (Reeve et al.,

2004; Ryan & Deci, 2000a, 2000b; Skinner et al., 2009), can have a significant role in the success of virtual students and of the virtual school as a whole (AbuSneineh & Zairi, 2010; Al-Busaidi, 2012; Jang et al., 2016; Selim, 2007; Taha, 2014). The use of autonomy supportive teaching enhances virtual students' positive classroom functioning (e.g., engagement) by nurturing and supporting student autonomy, competence and relatedness need satisfaction during synchronous and asynchronous instruction (Cheon et al., 2012; Jang et al., 2012; Jang et al., 2016). The use of VLCs allow teachers to provide autonomy supporting teaching while promoting social presence and engagement, which then creates opportunities for knowledge-sharing and collaborative efforts that can build strong, socially sustainable communities locally and around the world (James et al., 2013; Rautenbach & Black-Huges, 2012; Shorkey & Uebel, 2014).

Engagement Theories and the Link to Teacher Leadership

Foundational research on student engagement, outlined in the Community of Inquiry (CoI) framework (Garrison et al., 2010), posited that community in the educational context is fostered by three interdependent elements: a) social presence, b) teaching presence, and c) cognitive presence. Social presence is the ability of students to establish themselves as real in the virtual environment (Garrison et al., 2010) and is cultivated when students are supported as individuals within the virtual classroom (Berry, 2019). This can occur when students engage in virtual learning communities with their peers and teachers and share elements of their personal and professional lives (Garrison, 2011). The second element of the CoI framework, teacher presence, is categorized by teacher's ability to facilitate connections in the online setting (Garrison et al., 2010) and can be attained by teachers providing authentic and supportive interactions with students that enables them to connect with peers and with the teacher

themselves (Garrison, 2011). The final element of the CoI framework, cognitive presence, refers to teachers' ability to facilitate moments of learning that provoke dialogue amongst students as well as the ability of students to experience a learning environment where they can question, critique, and reflect with their peers (Garrison et al., 2010). When instructors cultivate high levels of the three key elements of the CoI framework (i.e., teaching presence, social presence, and cognitive presence) in online classrooms they are helping students develop a sense of trust, belongingness, and self-disclosure (Garrison et al., 2010), which over time contributes to students' sense of community in virtual classrooms (Garrison et al., 2010).

Despite the strengths of the CoI framework, researchers have established that all frameworks have boundaries of generalizability (Whetten, 1989) that may prevent them from being fully applicable to settings outside of which they were originally developed. One of the original authors of the CoI framework, Archer (2010), acknowledged that extending the boundaries of generalizability in the CoI framework could provide a new outlook on the framework itself. After recognizing the limitations, Borup et al. (2014) sought to expand upon the solid foundation built in the CoI framework while additionally incorporating research specific to the K-12 online learning environment. Building off of Garrison et al.'s (2010) CoI framework, Borup et al. (2014) developed the Adolescent Community of Engagement (ACE) framework that identified ways that virtual community members (i.e., teachers, parents, and student peers) can positively impact online student engagement. The ACE framework posited that student engagement should be viewed as tri-faceted; a) impacted by teacher engagement, b) impacted by parent engagement, and c) impacted by peer engagement (Borup et al., 2014); when any of the three facets of student engagement are increased, overall student engagement increases directly.

The ACE framework also outlined three primary elements to teacher engagement that could significantly impact overall student engagement: 1) designing and organizing learning activities, 2) instructing, and 3) facilitating (Borup et al., 2014; Borup & Stevens, 2017). While many virtual schools limit what content teachers design themselves in favor of utilizing premade content from external vendors and inputting it into the LMS (Suwawi et al., 2018), the preponderance of virtual school teachers have majority control when it comes to instructing and facilitating students. This indicates that virtual teachers can directly tailor their instructional and facilitative practices to meet the needs of their specific group of students (Borup & Stevens, 2017). Examples of tailored instruction in virtual schools could be teachers providing personalized support via asynchronous sessions at a level that would be unattainable in a traditional brick-and-mortar classroom where the focus is primarily on whole group instruction (Borup et al., 2014; Borup & Stevens, 2017). According to the ACE framework, effective virtual teachers must also focus on nurturing student relationships, monitoring student engagement and motivating students to engage more fully, and encouraging communication with and between students; all factors noted by research to play a significant role on overall student engagement (Berry, 2019; Borup et al., 2014; Borup & Stevens, 2017; Garrison et al., 2010). The ideals outlined in the ACE framework are not only directly founded upon the three interdependent elements of the CoI framework (i.e., social presence, teaching presence, and cognitive presence) but they can be directly linked to best pedagogical practices for meeting student's three core psychological needs (i.e., autonomy, competence, and relatedness) that are outlined in the Self-Determination theory (Jang et al., 2016; Ryan & Deci, 2000a; Ryan & Deci, 2017).

The SDT links student behavior and feelings directly to social factors such as teacher's attitude and motivation style (Deci & Ryan, 1985, 2000; Jang et al., 2016; Reeve, 2006, 2009).

Núñez & León (2015) further explained that the classroom environment generated by the teacher is an essential element in student motivation and emotional engagement in the classroom, especially in a virtual classroom where students are not face to face with their teacher on a daily basis (Ticknor et al., 2017). Thus, the impact of teacher-led engagement in online learning environments plays a significant role in the cognitive outcomes of online learners; an idea supported by the Garrison et al. (2010) CoI framework's three interdependent elements (i.e., social presence, teaching presence, and cognitive presence) as well as the Borup et al. (2014) ACE framework's theory that student engagement is directly impacted by members of their online community (i.e., teachers, parents, and peers). Furthermore, the CoI framework emphasized the importance of teachers fostering a community amongst virtual students and noted the positive impact on student growth both academically and social (Berry, 2019; Garrison et al., 2010).

Additional research, both prior to and following Garrison et al.'s (2010) CoI framework and Borup et al.'s (2014) ACE framework, noted that social presence and personal connections established via engagement in meaningful interactions can be a prerequisite to cognitive outcomes (Borup et al., 2014; Shea & Bidjerano, 2009). Moore's (1993) theory of transactional distance focused on the universe of teacher-learner relationships that exist when learners and instructors are separated by space and time as seen in virtual schools. Moore's (1993) theory emphasized the interrelationship between three core variable that impact the intensity and quality of transactional distance in the virtual space: 1) dialogue, 2) structure, and 3) autonomy. The factors outlined in Moore's (1993) theory align with the ideals of the SDT, CoI framework, and the ACE framework and serve as further indication of the importance of teacher-learner relationships in the virtual space. Furthermore, researchers emphasized that meaningful

collaboration and communication are unlikely to occur in an online learning environment without teacher direction (Borup et al., 2014; Garrison et al., 2000). In the virtual setting, teachers are the primary point of contact for online students and thus play a central role in how online students develop a sense of community (Berry, 2019; Bolliger & Halupa, 2012; Garrison, 2011) and engage in the online learning environment. Research has noted that virtual schools need teachers and teacher leaders focused on student success more critically than their brick and mortar counterparts (Bowman, 2014; Brooks et al., 2004; Katzenmeyer & Moller, 2001). Mayes et al. (2011) not only argued that interaction among instructors and students is more important in an online setting due to geographical and time differences, but also posited that effective online teachers are proactive in addressing the sense of isolation that students may experience in the virtual setting by actively and intentionally promoting social presence.

In addition to effective teaching practices, teacher leaders are needed as experienced and respected role models in their school, who are innovative, organized, trustworthy, and confident facilitators of learning in the virtual space (Lumpkin et al., 2014). Teacher leaders are defined as experienced teachers who model integrity, have strong interpersonal and communication skills, display the highest levels of professionalism, have a commitment to student success and expertise, and demonstrate passion for student learning while taking the initiative as influential change agents in their organization (Bowman, 2004; Danielson, 2006; Katzenmeyer & Moller, 2001; Muijs & Harris, 2003; York-Barr & Duke, 2004). The key traits that teacher leaders exhibit coincide with the three key elements of fostering community in virtual schools outlined in the CoI framework (i.e., social presence, teaching presence, and cognitive presence), as well as the three primary elements of teacher engagement outlined in the ACE framework (i.e., designing and organizing, instructing, and facilitating). Research has supported that teacher

leader's instructional leadership style has a statistically significant (Raza & Sikander, 2018) positive effect on student achievement (Alam & Ahmed, 2017; Carter, 2017; Heaven & Bourne, 2016; Robinson et al., 2007; Seashore et al., 2010) in both virtual and brick and mortar educational settings.

In order to foster community in the virtual environment, Ribon et al. (2013) noted that teacher-led VLCs create a friendly environment that motivates students' development and accomplishment of curriculum. Researchers noted that effective online educators must utilize specific pedagogical practices best suited for K-12 online environments in order to meet the needs of their virtual students (Adelstein & Barbour, 2017; Davis et al., 2007). The pedagogy utilized in a VLC, including communicating with and engaging students, presenting content, and organizing the learning environment, provides students with quality online learning opportunities (Russell, 2004; Savery, 2005). Additionally, the pedagogical practices present in teacher-led virtual learning communities correlate with the interdependent elements of the Garrison et al. (2010) CoI framework (i.e., social presence, teaching presence, and cognitive presence) and support the primary elements of teacher engagement outlined in the Borup et al. (2014) ACE framework (i.e., designing and organizing, instructing, and facilitating). However, it is imperative to note the effectiveness of the virtual learning community is often reliant on the teachers creating them as the development of effective pedagogical strategies within a VLC may vary by teacher (Cavanaugh & Roe, 2019), further emphasizing the importance of established teacher leaders within the school (Lumpkin et al., 2014) who can exemplify effective pedagogical practices to other teachers within the school.

After establishing exemplary pedagogical practices, teachers are able to utilize the communal aspect provided by VLCs to provide autonomy supportive instruction to meet the

student's psychological needs for autonomy, competence, and relatedness as outlined in the self-determination theory (Cheon et al., 2012; Jang et al., 2012; Jang et al., 2016; Reeve et al., 2004; Ryan & Deci, 2000a, 2000b; Skinner et al., 2009). However, Katzenmeyer and Moller (2001) emphasized that the success of VLCs require administrators to share power, authority, and decision making with teachers. Research noted that administrators and school leaders are being called upon to invest in their teachers as transformers (Cavanaugh & Roe, 2019; European Civil Society for Education, 2017) and change makers (Cavanaugh & Roe, 2019; Tait & Faulkner, 2016) as the educational paradigm shifts. Administrators would benefit from sharing their power and authority with teachers because when empowered teacher leaders can better facilitate the implementation of the VLC, thus enabling the school to be transformed and student learning increased (Lumpkin et al., 2014).

Summary

The reviewed literature foundation in this chapter focused on the concepts of virtual student engagement, VLCs, and the impact of teacher leaders through the lens of the self-determination theory (Jang et al., 2016; Ryan & Deci, 2000a; Ryan & Deci, 2017), the Community of Inquiry framework (Garrison et al., 2010), the ACE framework (Borup et al., 2014), and Moore's theory of transactional distance (1993). Whereas K-12 virtual schools are growing rapidly in the US, the significant number of students experiencing high attrition rates and lower academic growth than their peers in traditional brick and mortar schools indicated a need for further research into this area (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013). Current literature attributed these issues to the lack of engagement by students and parents in the virtual school programs in

which they are enrolled (Archambault et al., 2013; Borup & Stevens, 2017; Borup et al., 2012; Borup et al., 2014; Borup et al., 2015; Boulton, 2008; Finn, 1993).

Moore's (1993) theory of transactional distance is built upon the need for dialogue, structure, and learner autonomy in school environments where teachers and students are separated by time and space; outlining the importance of teacher-learner interactions on the success of online students (Ustati & Hassan, 2013). The CoI framework outlined three interdependent elements (i.e., social presence, teaching presence, and cognitive presence) that play a pivotal role in fostering community within the educational context (Garrison et al., 2010). Expounding upon the CoI framework, the ACE framework (Borup et al., 2014) explained that effective virtual teachers must additionally focus on nurturing student relationships, monitoring student engagement and motivating students to engage more fully, as well as encouraging communication with and between students; all factors noted to have a significant impact on overall student engagement (Berry, 2019; Borup et al., 2014; Borup & Stevens, 2017; Garrison et al., 2010). Additionally, a significant body of research into virtual schools has noted that social presence and personal connections established via engagement in meaningful interactions with teachers can be a prerequisite to cognitive outcomes in the virtual school environment (Borup et al., 2014; Garrison et al., 2000; Shea & Bidjerano, 2009). The ability for teachers to provide engaging online learning opportunities in the virtual school environment, while still meeting the students' needs for autonomy support outlined in the SDT, is aided by the use of technology and flexible scheduling (Berge & Clark, 2005; Boling & Beatty, 2010; Curtis & Werth, 2015; DiPietro, 2010; Rosa & Lerman, 2011; Russell, 2004; Savery, 2005). Students have the ability to participate in VLCs, synchronously or asynchronously, which then provides opportunities for interaction and community building despite geographical barriers or time discrepancies

(Cavanaugh et al., 2009; Hawkins et al., 2013). Teacher's use of the communal aspect of virtual learning communities to provide autonomy supportive instruction to meet the student's psychological needs for autonomy, competence, and relatedness as outlined in the self-determination theory is another key aspect to the success of virtual schools (Cheon et al., 2012; Jang et al., 2012; Jang et al., 2016; Reeve et al., 2004; Ryan & Deci, 2000a, 2000b; Skinner et al., 2009).

Teacher leaders serve as a key factor in the creation and success of VLCs due to their focus on student success (Bowman, 2014; Brooks et al., 2004; Katzenmeyer & Moller, 2001) and their ability to act as influential change agents in their organization (Bowman, 2004; Danielson, 2006; Katzenmeyer & Moller, 2001; Muijs & Harris, 2003; York-Barr & Duke, 2004). By creating virtual learning communities that meet students' psychological needs (Ryan & Deci, 2017) as well as the need for a feeling of belonging in a community (Borup et al., 2014; Garrison et al., 2010), teacher leaders may be able to reduce the student attrition rates at their school; an idea supported by Ke and Hoadley's (2009) research that indicated that students who feel a sense of community within their school context are less likely to drop out of that academic program. In this study, the researcher sought to further investigate the link between student engagement in a VLC and the two core problems impacting virtual schools across the United States (i.e., high attrition rates and low student academic achievement; Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013) by comparing a) to what extent, if any, does student engagement in teachers' virtual learning communities correlate with student scores on unit tests; b) what pedagogical practices and instructional strategies are being utilized by teacher leaders with higher student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms; and c) what

pedagogical practices and instructional strategies are being utilized by teachers with lower student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms?

To address the research questions, Chapter 3 outlines the methodology and data collection techniques that was utilized in this study. By collecting archival quantitative student engagement data, I was able to determine whether student engagement had an impact on their unit test scores within the LMS. Additionally, a separate report on quantitative student engagement data allowed me to determine which teachers had the highest engagement scores in their classes. Subsequently, the collection of qualitative data allowed me to compare the pedagogical practices and techniques of teachers achieving high student engagement and compare them to the practices of teachers with low student engagement scores. The analysis of the combined qualitative and quantitative data in this explanatory-sequential, mixed methods, critical case study design led me to an increased level of understanding on the problem and established literature on the topic of student engagement in virtual schools.

Chapter 3: Research Method

The purpose of this explanatory-sequential, mixed methods, critical case study was to a) gain a deeper understanding of the association between student engagement in virtual learning communities (VLCs) and student scores on unit tests, and b) the association between teacher leaders' use of specific pedagogical teaching practices and engagement in ninth-12th grade virtual school students. This purpose was designed to address the driving problem of the study, which was high attrition rates and lower academic achievement of students in ninth-12th grade virtual schools as compared to their peers in traditional brick-and-mortar high schools (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013). I conducted this study to provide the educational community with greater insight into how student engagement in virtual schools impacts their academic success, as well as how teacher leaders' pedagogical practices impact student engagement, which will allow virtual school teachers, administrators, and policy makers to possess a more robust understanding of how to facilitate student engagement and overall academic success for virtual ninth-12th grade students. The research in this study was designed to answer three questions on the issue of student engagement and teacher pedagogy in the virtual school setting:

Q1: To what extent, if any, does student engagement in teachers' virtual learning communities correlate with student scores on unit tests?

Q2: What pedagogical practices and instructional strategies are being utilized by teacher leaders with higher student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms?

Q3: What pedagogical practices and instructional strategies are being utilized by teachers with lower student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms?

The purpose of this chapter is to outline the research design and methodology for the study. This chapter includes background on this explanatory-sequential, mixed methods design, including the populations studied in this research. In this chapter, I will discuss the research design and various data collection methods, study population and setting, the materials and instrumentation used to gather information and pertinent data to answer the two research questions that were identified in this study. Furthermore, in this chapter I will discuss data collection and analysis procedures, establish the validity, credibility, and ethical standards needed to ensure that the study remains valid for future research, and address limitations and delimitations.

Research Design

This study examined student engagement in virtual schools through the use of both quantitative and qualitative data sets. The quantitative portion of the study was focused on determining the presence of a correlation of student engagement to higher unit test scores while the qualitative portion focused on determining whether certain pedagogical practices implemented by teacher leaders would result in increased levels of student engagement in the virtual school environment. According to the literature review, a significant body of research into virtual schools has noted that social presence and personal connections established via engagement in meaningful interactions with teachers can be a prerequisite to cognitive outcomes in the virtual school environment (Borup et al., 2014; Garrison et al., 2000; Shea & Bidjerano, 2009). Students have the ability to participate in VLCs, synchronously or asynchronously, which

then provides opportunities for interaction and community building despite geographical barriers or time discrepancies (Cavanaugh et al., 2009; Hawkins et al., 2013). The impact of students engaging in virtual learning communities is important because it has been linked to virtual teacher's successfully providing autonomy supportive instruction to meet the student's psychological needs for autonomy, competence, and relatedness as outlined by the self-determination theory (Cheon et al., 2012; Jang et al., 2012; Jang et al., 2016; Reeve et al., 2004; Ryan & Deci, 2000a, 2000b; Skinner et al., 2009). Teacher leaders serve as a key factor in the creation and success of VLCs due to their focus on student success (Bowman, 2014; Brooks et al., 2004; Katzenmeyer & Moller, 2001) and their ability to act as influential change agents in their organization (Bowman, 2004; Danielson, 2006; Katzenmeyer & Moller, 2001; Muijs & Harris, 2003; York-Barr & Duke, 2004).

Research has noted that the design utilized in a specific study is dependent upon the questions being asked in the study (Noor, 2008; Yin, 2013). Gog (2015) expounded on this idea and posited that the research design of a study represents the specific framework utilized to analyze the collected data. For the purpose of this study, a mixed-methods design was utilized. Venkatesh et al. (2016) noted that mixed-methods research combines both qualitative and quantitative research for a deeper, richer, and more robust topic. The mixed methods strategy that best addresses the research questions in this study is an explanatory-sequential, critical single case study. In an explanatory-sequential design, the researcher begins by collecting a quantitative data phase followed up by further research into specific results with a subsequent qualitative phase to help explain the quantitative results (Creswell, 1994, 2007; Creswell & Plano-Clark, 2018; Tashakkori & Teddlie, 1998; Teddlie & Tashakkori, 2009).

This mixed methods study was designed to answer the questions of a) to what extent, if any, does student engagement in teachers' virtual learning communities correlate with student scores on unit tests; b) what pedagogical practices and instructional strategies are being utilized by teacher leaders with higher student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms; and c) what pedagogical practices and instructional strategies are being utilized by teachers with lower student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms. Research has noted that one of the critical aspects of a case study is that it is utilized to understand a real-world case with the assumption that the study will likely involve important contextual conditions pertinent to the case (Yin, 2013, 2018; Yin & Davis, 2007). A critical case test is defined as a study used to determine whether the propositions set forth by an established theory are correct or whether some alternative explanations could be more relevant (Yin, 2018). This study utilized the critical case, single-case study design by investigating the established propositions of the self-determination theory (SDT) and its link to student engagement in order to extend the current literature foundation on the theory's application in the virtual school setting (Yin, 2018).

Research has noted that a single method of data collection alone is not sufficient to capture the trends and details of complex situations such as student engagement in a virtual program (Creswell & Plano-Clark, 2018; Ivankova & Stick, 2007). In order to increase the data integrity of the study, data were gathered from several data sources, a noted trademark of case study inquiry (Baxter & Jack, 2008). A mixed-methods research design was chosen for this study because the research questions require a qualitative data set in order to further understand the quantitative data set. Utilizing Creswell's (2013) explanatory sequential design, the study progressed through the following steps:

1. Collect and analyze quantitative data

2. Analyze quantitative results
3. Report quantitative results
4. Collect and analyze qualitative data
5. Report qualitative results
6. Explain how the qualitative data explains the quantitative results

Quantitative Design: Archival Data

The quantitative portion of this study was used to answer research question 1: to what extent, if any, does student engagement in teachers' virtual learning communities correlate with student scores on unit tests? From this data set, the focus was on analyzing whether student engagement impacted their scores on unit tests in the virtual school environment. Archival student data from the 2019-2020 school year was collected by the participating teachers from the LMS and de-identified before being sent to the researcher. This archival data included student unit test scores, time spent in the LMS per course, and time spent in the LMS per test. The analysis of this data made up the quantitative portion of this mixed methods study and served to identify the general picture of the research problem (Creswell & Plano-Clark, 2018; Ivankova & Stick, 2007) on student engagement in the virtual setting, while the subsequent qualitative data and its analysis refined and explained the statistical results by exploring the participating teachers' pedagogical practices that precipitate increased student engagement levels (Creswell & Plano-Clark, 2018; Ivankova & Stick, 2007).

The purpose of analyzing the archival data was to learn whether increased levels of student engagement, as demonstrated by more *time spent in the LMS-per course*, and *time spent in the LMS-per test*, had a significant impact on student scores on unit tests. Research has shown that in order to achieve the goals of attaining an engaging online environment and building a

sense of community, students must actively attend the online school on a regular basis (Borup et al., 2012; Christenson et al., 2001; Ekmekci, 2013; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Ticknor et al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011). Previous research into attrition rates in virtual schools attributes the problem to the lack of engagement by students (Archambault et al., 2013; Borup & Stevens, 2017; Borup et al., 2014; Finn, 1993) and parents (Borup et al., 2012; Borup et al., 2015; Boulton, 2008) in the virtual school setting. This research emphasizes the importance of student engagement to their continued success in the virtual school setting. Research has also noted that although student attendance in virtual schools plays a key role in their success (Borup et al., 2012; Christenson et al., 2001; Ekmekci, 2013; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Ticknor et al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011), it is important that virtual schools develop their programs with the understanding that learning engagement is an important antecedent for positive learning outcomes (Hu & Hui, 2012).

Qualitative Design: Teacher Questionnaire and Focus Groups

A teacher questionnaire and subsequent focus groups were the research methods utilized to answer Research Question 2: What pedagogical practices and instructional strategies are being utilized by teacher leaders with higher student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms, and Research Question 3: What pedagogical practices and instructional strategies are being utilized by teachers with lower student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms. The qualitative portion of this study consisted of two parts and both focused on determining what pedagogical practices were utilized by teachers in their virtual learning communities during the 2019-2020 school year that contributed to higher levels of student engagement. For the first part

of qualitative data collection, data were collected through the use of a Google form questionnaire that was sent to all participating teachers who taught at Virtual School High (VSH) during the 2019-2020 school year. A Google form was utilized to administer the questionnaire due to the geographical distances between teachers at VSH who taught from their home offices across the state. Once the qualitative data from the teacher questionnaire was collected and analyzed, the second phase of qualitative data collection then commenced. In the second phase, I utilized focus groups to expound upon the information gathered by the teacher questionnaire in the first phase. More information on each type of qualitative methodology will be given under the qualitative analysis section.

The qualitative data phase was prioritized because of its focus on in-depth explanation of the results obtained in the quantitative phase in order to further stakeholder understanding of the link between engagement and pedagogy utilized in virtual learning communities (Creswell & Plano-Clark, 2018; Ivankova & Stick, 2007). The qualitative data drawn from the teacher questionnaire results and the focus group interviews was used to determine what pedagogical practices utilized by teachers in their virtual learning communities had the most impact on student engagement in the virtual school environment.

Population and Setting

The first population of this study consisted of the archival data of between 1500 and 2500 students enrolled at VSH during the 2019-2020 school year. Archival gradebook and LMS data were collected for this population so no direct interaction with students occurred for any portion of the study. Data were collected and de-identified by the participating teachers for each of their courses before being sent to the researcher for analysis. This population provided data to address the first research question related to how student engagement in teachers' virtual learning

communities impacts students' scores on unit tests. Additionally, this data provided insight into which teachers had the highest levels of engagement in their VLCs, which then allowed the researcher to identify the teachers that exhibited strengths in communication and interaction and label them as teacher leaders at VSH for the qualitative portion of the study.

The second population of this study consisted of 25 teachers at VSH who taught for the full 2019-2020 school year (i.e., started 8/19, ended 6/5). Teachers who started mid-year (after 8/30) or who left before the collection of qualitative data in the spring of 2020 were not considered for this study. Teachers who choose to participate in the study took part in a Google form questionnaire consisting of a mixture of Likert-scale questions and open-ended questions as well as participating in one of two focus groups designed to address Research Questions 2 and 3. These research questions were designed to determine which pedagogical practices were utilized by teacher leaders in their VLCs during the 2019-2020 school year in order to precipitate increased engagement in students at VSH. Teachers were informed that their responses were being recorded for the purpose of the study and that they could withdraw from the study at any point and for any reason with no penalty or repercussions from the researcher or the school. Additionally, teachers were informed that all information and opinions expressed in the questionnaire would be anonymized before publication and would in no way be viewed by school administration or officials other than the researcher before being de-identified.

Sample

The qualitative sample population of interest participated in an online questionnaire consisting of both Likert-scale and open-ended questions as well as one of two live virtual focus groups. The purpose of multiple question types on the questionnaire was to allow teachers to freely and accurately express their ideas and opinions prior to collecting more in-depth

information through the use of live virtual focus groups. Multiple studies have been considered while determining the correct number of participants for the qualitative portion of this study. Marshall et al. (2013) noted that creating an adequate sample size is one of the foundational aspects of establishing credible research; further expounding upon this idea by emphasizing that sufficient and relevant data are crucial to credible analysis and reporting. Mason (2010) posited the researcher may determine if a study has enough data by relying on the concept of saturation. Whereas saturation is a complex construct and there is much debate over what an appropriate sample size is (Mason, 2010), certain research has argued that a qualitative study reaches saturation after 12 participants (Guest et al., 2006). Additional studies have argued that an average qualitative study should utilize between 28 and 31 interviews to reach saturation (Mason, 2010). This study consisted of 25 participants from multiple departments at VSH meeting the minimum number of participants for saturation established by Guest et al. (2006) and nearing the average number established by Mason (2010). Given this information, the qualitative data portion was suitably addressed by a population of 25 teachers.

The majority of teachers who participated in this study reported to have 11 or more years of experience in teaching in both brick and mortar and virtual schools. Approximately 48% of teachers reported to having between 1-2 years of experience specifically teaching in the virtual classroom setting while 28% reported to being first year teachers in the virtual setting. Only 12% of teachers reported to having 6 or more years of experience teaching in the virtual setting. Table 1 identifies the demographic information from the participating teachers.

Table 1*Teacher Participant Demographic Information*

Demographics	<i>n</i>	%
Gender		
Male	7	28
Female	18	72
Years of Total Teaching Experience		
0	0	0
1-2	1	4
3-5	4	16
6-10	5	20
11+	15	60
Years of Virtual Teaching Experience		
0	7	28
1-2	12	48
3-5	3	12
6-10	2	8
11+	1	4
Subject Taught		
Math	5	20
English	4	16
Science	3	3
Social Studies	6	24
Electives	7	28
Participant Group		
Focus Group 1	10	40
Focus Group 2	15	60

Note. *n* = Number of participants.

Materials/Instruments

The data collection for this study was accomplished using three methods: collection of archival student data/LMS data from the 2019-2020 school year, qualitative questionnaires sent to teachers during the 2019-2020 school year, and live focus groups through the use of a virtual meeting platform (Zoom).

Quantitative Analysis: Archival Data

The purpose of the quantitative data analysis was to contribute to a greater understanding of how student engagement in VLCs impacts student scores on unit tests. For the quantitative portion of this study, engagement was measured by utilizing the archival data sets pulled from the LMS for the following variables: *time spent in the LMS-per course*, *time spent in the LMS-per test*, and *Student Test Scores-Course*. According to the literature review, prior research has established a connection between attendance and school engagement, outlining that student attendance and participation in activities is directly related to student performance (Borup et al., 2012; Christenson et al., 2001; Ekmekci, 2013; Finn, 1993; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Ticknor et al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011). Due to engagement's multi-faceted composition, it is extremely difficult to define, especially in the virtual setting where teachers are not able to directly see their students working on their course work. For this study, the established definition of engagement utilized stated that student engagement is an active, effortful, goal-oriented interaction with the learning environment (Skinner et al., 2008). This definition of engagement was chosen because it focused on students actively participating and interacting with their learning environment, an established factor of importance in the virtual educational setting (Borup et al., 2012; Christenson et al., 2001; Ekmekci, 2013; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Ticknor et

al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011). The active participation and interaction with the learning environment can be measured by the factors time spent in the LMS-per course, and time spent in the LMS-per test to determine to what level the student was engaged in a specific course. Based on school policy for the 2019-2020 school year, students were required to spend a minimum of 7 hours a day working in their courses which equates to 1 hour per course for a full course load of seven courses. This means that a student should be engaged in a specific course a minimum of 5 hours each week in order to be actively participating in the course. Due to the flexible nature of the program, students did not necessarily have to complete 1 hour per day and had the option to “chunk” the work (e.g., spend 2.5 hours in each English, Math, and Science on Monday and Wednesday, and 2.5 hours in each History, Language, and Electives on Tuesdays and Thursdays), but the minimum requirement of 5 hours per week per course was still the expectation. Additionally, the LMS provided a pacing calendar for students telling them what assignments they should do each day and each week in order to stay on track to complete the course by the end of the semester. Students should have fallen no more than five assignments behind in order to be “on pace” with the course calendar. This also ensured that students were actively participating and engaged in the course. The school’s LMS itself could be considered an instrument for data collection as it houses all archival student data that to be utilized in the study. I did not have access to directly manipulate the LMS data and so relied on the participating teachers to retrieve the archival data from the LMS for their courses.

Once engagement was measured, it was then compared to students’ scores on unit tests per course in order to determine if increased engagement led to higher test scores. The curriculum utilized by VSH is a TEA accredited curriculum created by a third-party curriculum development company and is administered to students through the use of the LMS. Unit tests

were chosen as the metric because they occur frequently throughout the curriculum (e.g., 5-unit tests per semester in 10-unit courses which constitutes the majority of VSH courses) and are integrated into the LMS so their data can be easily pulled for analysis. Unit tests are generally multiple-choice formative assessments consisting of between 15 and 30 questions and are based on the curriculum from the lessons within that specific unit. Unit tests are not cumulative and thus do not cover material from previous units unless that material is otherwise specified and expounded upon within the specific unit being tested. Certain subjects (e.g., English, Social Studies) may also include an essay or written short answer as part of the unit test for certain units. Tests that were not multiple choice or consisted of essays or more than one quarter of written short answer questions were not analyzed in this study.

State testing (STAAR) was not utilized because of its summative nature, only occurring once per year, and only collecting data for five core classes (i.e., Biology, Algebra I, US History, English I, and English II). Additionally, per TEA regulations in the state of Texas, STAAR testing must be administered at a physical brick and mortar location. Consequently, students who attend virtual schools must travel to an unfamiliar brick and mortar school in their area in order to take their state assessments which could be a limiting factor in their success. Due to the limited nature of STAAR testing paired with possible negative results due to unfamiliar testing environments for virtual students, the researcher felt that utilizing state assessments would limit the scope of the study and would not fit into this study's definition of a case study. A case study is utilized to understand a real-world case with the assumption that the study will likely involve important contextual conditions pertinent to the case (Yin, 2018; Yin & Davis, 2007). Case studies do not attempt to control the environment in which the study occurs (Yin, 2018), researchers design the study with an understanding that the context in which the study occurs has

implications on any results obtained throughout its course. In an attempt to understand how engagement impacts student academic success, the researcher feels that unit test scores within the LMS that students use daily will be a more accurate metric than the use of state assessments taken once a year at unfamiliar brick and mortar testing environments. In addition to these concerns, this study occurred during the 2019-2020 school year during the COVID-19 pandemic in which STAAR testing was cancelled and thus could not be utilized.

Qualitative Analysis: Teacher Questionnaire and Focus Groups

The qualitative data portion consisted of two parts: 1) a teacher questionnaire with both Likert-scale and open-ended questions and 2) live focus groups. The questionnaire utilized multiple questions types to allow teachers to respond freely in order to determine what pedagogical practices they utilized to engage students in their classrooms during the 2019-2020 school year. The instrument used to collect this mix of qualitative and quantitative teacher response data was a Google form sent to teacher's school email account. When creating the questionnaire, I developed the questions according to the guidelines in the VREP Rubric (Simon & White, 2016). After drafting the questions, the questionnaire and focus group question prompts was sent to the five campus directors of VSH who served as the panel of subject matter experts (SMEs). Three out of the five campus directors responded and filled out the VREP rubric. Each campus director has extensive experience in the field of education and varying levels of experience in the virtual school environment which quantifies them as subject matter experts. The SMEs then used the VREP Rubric to rate each question to determine if any modifications or revisions need to be made before the final questionnaire is sent out to teachers to complete. Based on feedback from the three responding directors the wording on a few questions was altered and finalized before being sent out to teachers.

When sending the questionnaire and focus group questions for review, I asked the campus directors to fill out a short set of questions to provide more information on their background and demographics. The first director indicated that she had 18 years of experience in education with two of those specifically in virtual schools. She has also served in the following positions during her time as an educator: teacher, curriculum writer, instructional specialist, instructional technology coach, vice principal, assistant principal, PIEMS coordinator, STEM principal, and campus director. The second director indicated that she had 20 years of experience in education but did not specify how many years in virtual schools. She has held positions as a teacher, department chair, vice principal, principal, and campus director. The third director indicated she had 7 years of education experience, but did not specify how many years in virtual schools. Her experience includes being a teacher, assistant principal, principal, and campus director.

When constructing the teacher questionnaire and focus group questions using the VREP Rubric, questions were structured to analyze the key components that attribute to the core problem of disengagement: communication and interaction (Borup et al., 2012; Foster et al., 2018; Lui & Cavanaugh, 2012; Ribón et al., 2013; Roybler & Marshall, 2002; Ticknor et al., 2017; Wilkens et al., 2014). Noted as an effective and commonly used method in data collection, a Likert rating scale was used on certain questions in the questionnaire to gather participant responses that were then analyzed and compared qualitatively (Sapsford & Jupp, 2006; Stokes, 2011; Wilson, 2014). A portion of the questions were formatted in a way that allowed teachers to rate the importance of each component on the overall engagement of students at Virtual School High through the use of the Likert-scale system. Other questions consisted of open-ended free response style questions that allowed teachers to expound upon specific pedagogical practices

that they utilized in their classroom during the 2019-2020 school year. This mimicked an interview-style of questioning where the researcher asks a specific open-ended question and then allows the participant to answer in detail and to the best of their ability. This pseudo-interview model allowed me to by-pass the opinions of the experts in the field in favor of going directly to those who experience the phenomenon itself (Hoffman, 2007) in order to determine what practices were actually working in context. A rich analysis of quantitative student data and teacher responses using information gathered via the teacher questionnaire allowed me to avoid fixating on a single data source and instead focus on the synthesis of multiple data pieces (Baxter & Jack, 2008). Additionally, as the core focus of this study revolved around the implementation of a virtual learning community, a final portion of questions will address the impact of the VLC on student engagement (Chia & Pritchard, 2014; Linton, 2016; Ticknor et al., 2017).

In the second phase of qualitative data collection, I utilized two live virtual focus groups in order to expound upon the information collected in the teacher questionnaire. In his foundational study, Krueger (1988) defined focus groups as planned group discussions with the intention to elicit perspectives from participants on a specific area of research interest. According to researchers, focus groups have been widely used to generate data across a range of subjects and social sciences as a means of engaging in needs assessments, developing public programs, and conducting exploratory analysis in case studies (Morgan, 2002; Peek & Fothergill, 2009; Rivera, 2019; Ryan et al., 2014). In this study, the focus groups were conducted through a virtual meeting room using the program Zoom and teacher participants will be split into two different focus groups: a) teachers with high engagement scores and b) teachers with low engagement scores. Engagement scores for the two groups were based off of the quantitative data gathered prior to the qualitative phase. Teachers were grouped based on engagement scores, a significant

homogeneous characteristic (Ryan et al., 2014) and form of purposeful sampling (Patton, 2002), in order to encourage increased responses from teachers with lower engagements scores who may have otherwise been overshadowed by the responses from their higher scoring peers in the virtual focus group environment. Teachers with engagement scores of 76,000 hours or higher were considered high engagement teachers (i.e., teacher leaders) and placed in Focus Group 1. Teachers with engagement scores of 59,000 hours or less were considered low engagement teachers and placed in Focus Group 2. As is protocol with focus group interviews, I acted as a facilitator of the focus group discussions in order to encourage all teacher participants to respond and provide their own personal insights (Schutt, 1995, 2019). After the focus groups were completed, I utilized the transcription software REV to transcribe the focus group interviews for further analysis. REV is a well-known and established transcription company that utilizes professional transcribers with nondisclosure and confidentiality agreements to transcribe qualitative data and recordings. REV is backed by CNBC, Forbes, TechCrunch, and the Wall Street Journal and all files are encrypted using bank-level security to ensure confidentiality. All focus group interviews were recorded for later transcription and teachers were notified in their letter of acceptance to participate in the study, as well as at the beginning of each session, that their responses were being recorded for research purposes.

Data Collection

Due to the mixed-method, explanatory sequential approach utilized in the study both quantitative (i.e., archival gradebook/LMS data) and qualitative (i.e., teacher questionnaire) data were collected throughout the course of the study. The participants for this study consisted of archival student data and LMS tracking data from the 2019-2020 school year and teachers from one virtual high school in Texas who were located across the state and work remotely from their

home offices. A formal letter (see Appendix A) requesting permission to utilize the specific institution once approval was granted through the IRB was written and approved by one of the high school Campus Directors. Emails were sent to high school teachers in the spring of 2020, inviting them to participate in the questionnaire/focus group process once approval was granted by both the school district and the ACU IRB.

Quantitative Data Collection: Archival Data

Data collection for the quantitative portion of the study consisted of submitting a formal request to the school for the archival student gradebook data and LMS data (time spent per course and time spent per test) from the 2019-2020 school year. I did not have access to pull the data from the LMS myself and as such I had to submit a formal request to the school's administrators asking teachers to pull and de-identify the data from each of their courses to be used in the quantitative portion of the study. Due to my role as a teacher during the 2019-2020 school year at VSH I requested that the teachers de-identify student data before allowing me access in order to avoid any FERPA or ethical violations when analyzing the data.

Qualitative Data Collection: Teacher Questionnaire and Focus Groups

The qualitative data portion of the study was collected through the use of a Google form teacher questionnaire and through live virtual focus groups. Due to significant geographical distances between teachers at VSH who teach virtually from their home offices across the state of Texas, a Google form was utilized to conduct the first phase qualitative data collection. Google forms are commonly used at VSH and teachers are familiar with the platform. The second phase of qualitative data collection occurred through the use of the virtual meeting platform Zoom. This is a program that teachers have used regularly and are familiar with. This familiarity assisted in ease of access for teachers attempting to complete the questionnaire and

also ensured that their responses were received in a timely fashion as well as allowing the teacher to be comfortable in the virtual interview environment.

Analytical Methods

In this section I discussed the data analysis for both the quantitative and qualitative data sets obtained in this study.

Quantitative Data Analysis: Archival Data

Quantitative analysis of student gradebook and LMS data allowed for Pearson's r bivariate correlation test to be run to compare the differences in scores on student gradebook data using variables Student Test Scores-Unit # and time spent in the LMS-per course, as well as Student Test Scores-Unit # and time spent in the LMS-per test. In this phase of quantitative analysis, time spent in the LMS-per course and time spent in the LMS-per test will serve as the predictor variables while Student Test Scores-Unit # will serve as the criterion variable. Results indicating a p -value of less than 0.05 indicated statistically significant results in the study (Mujis, 2011; Salkind & Wood, 2018).

Qualitative Data Analysis: Teacher Questionnaire

For the qualitative portion of the study, I utilized multiple iterations of theoretical sampling beginning with the responses on the teacher questionnaire. After collecting and analyzing data using the questionnaire, I developed an initial data coding set and then adjusted my follow up questions in the live focus groups to attempt to deepen the understanding of teacher responses from the initial data collection. Once I believed that I had met the saturation point where no new ideas are emerging from the data, I then utilized an open to axial approach to data coding and analysis for the qualitative, open-ended data portion. This approach to data analysis allowed me to compare the data from the open-ended teacher response questions as well

as focus group responses to the Likert-scale questions in an effort to attain a congruent idea of best pedagogical practices utilized by teachers in the virtual school setting.

I began with an open coding process in order to identify tentative labels for the data collected using the open-ended questions on the teacher questionnaire. Open coding is described by Goulding (1999) as the process of breaking down the data into separate units of meaning in order to categorize many individual phenomena. In open coding, separately categorized concepts are then clustered around a related theme to structure more abstract categories (Brown et al., 2002). After establishing tentative labels using an open coding process, I then utilized an axial coding process to identifying relationships amongst the open codes. Moghaddam (2006) described axial coding as a systematic analysis and constant comparison of data to reduce the number of codes in a way that shows a relationship between them. Axial coding allows for the identification of core categories in data which represent the central phenomenon around which other categories are related (Strauss & Corbin, 1990). In this way, axial coding allowed me to examine the dynamic interrelationships between the responses provided in the open-ended questions on the teacher questionnaire. Together the Likert-scale questions and open-ended questions allowed me to synthesize a composite list of the top pedagogical practices utilized by virtual teachers that precipitated student engagement in this virtual high school.

Researcher Role

A postulate of mixed methods research states that the role of the researcher is the instrument through which the data is gathered, analyzed, and synthesized (Marshall & Rossman, 2016). Additionally, Marshall and Rossman (2016) expressed that it is the responsibility of the researcher to conduct a study with three core principles: 1) integrity, 2) ethics, and 3) trustworthiness. I have devoted my career to education, my students, and the betterment of

educational practices through the use of technology in the classroom. When teaching at brick and mortar schools, I focused on integrating technology into the classroom utilizing the flipped and modified flipped models of instruction. When transitioning to the fully virtual classroom, I saw firsthand how impactful technology in education could be in the lives of students, both positively and negatively. I bring to this study not only my passion for education, technology, and students, but also the firsthand experience of a virtual teacher in Texas schools.

At the time of this study, I was teaching at VSH during the time in which data for the study was collected (2019-2020). During the 2018-2019 school year, I served as a science teacher, department chair of science, and one of two new teacher trainers. During the 2019-2020 school year, the school hierarchy restructured, and I served as a science teacher and assisted the campus directors with teacher questions and technical issues. I had extensive interactions with the other teachers that were involved in this study and as such, took measures to ensure that objectivity was maintained throughout the course of the study. Because I was directly involved in teaching students during the 2019-2020 school year, all student gradebook/LMS data were de-identified by the participating teachers before being sent to me in order to maintain objectivity.

I chose to focus on the issue of engagement in virtual schools due to my 3 years of experience teaching at the ninth-12th grade level in a virtual high school. When deciding on a topic for this dissertation, I began by looking at the major issues that I and my fellow teachers faced in our virtual school and dug into the existing literature from there. While certain themes emerged in terms of common issues across multiple virtual schools, the existing literature allowed me to view the problems in a different way. In this study, I attempted to dig deeper into the issue of student engagement in my virtual school and certain factors that may impact engagement in order to expand the literature base for future researchers. While it is reasonable

that I may have certain ideas on engagement in the virtual school setting based on my 3 years of experience, objectivity and subjectivity were paramount when I conducted this study.

Ethical Considerations

The researcher of this study sought the approval of the Institutional Review Board (IRB) of Abilene Christian University (ACU), and based on the nature of the research, certain ethical considerations were made. The most significant ethical consideration facing this study was the use of archival student data because most students are under the age of 18. Due to the researcher being a teacher at the school during the 2019-2020 school year, student data needed to be de-identified by the participating teachers before being accessed by me to avoid any conflicts of interest or FERPA violations as I am no longer accessing the student gradebook data for an educational reason related to the student's success. Due to the nature of archival data, parents of the students did not need to be contacted for permission as students were not directly involved with the study in any way and no identifying information was used in the study. The second ethical concern for the study is the anonymity of the teacher participants. Lewis (2003) noted that anonymity refers to the idea that the identity of the participants will not be known to anyone outside of the research team. This study accomplished anonymity by de-identifying the teacher data associated with student gradebook data (i.e., what courses were taught by what teacher) as well as the responses to the teacher questionnaire and focus groups after identifying numbers were assigned. I assigned teacher ID numbers based on their participation in the questionnaire and focus groups then removed any identifying nomenclature from the course information in the student's gradebook data by replacing it with the teacher's ID number. This allowed the gradebook data and the qualitative responses to be compared without risking ethical dilemmas when data analysis is performed. All quantitative data, qualitative questionnaire responses, and

qualitative transcriptions will be securely stored in a private file on the researcher's personal computer for a period of 3 years then will be permanently deleted in accordance with ACU's IRB requirements using a digital shredding program (BitRaser). For the audio recorded qualitative data, I utilized a transcription service (REV) to transcribe the audio responses of teachers during the live focus groups. Once the data were de-identified and transcribed, I utilized a digital shredding program (BitRaser) to securely destroy the audio recordings.

A formal letter was sent via email to the school administration for the school in which the research took place to gain consent for the mixed-methods case study to occur once approval was granted through the IRB. Once approval was granted, teachers de-identified and pulled their gradebook data before placing it into a secure Google Drive folder. For the qualitative portion, formal emails were sent to teachers in the spring of 2020 explaining the background of the study, the importance of the research, and asking them to participate after approval was granted from the institution. The emails to teachers also outlined the steps that would be taken to ensure privacy and anonymity throughout the research process as well as explaining that all responses, to the questionnaire as well as in the focus groups, would be recorded for the use of the study. Additionally, the letter made clear that participants could withdraw from the study at any time for any reason without penalty or repercussions. No data were collected until the IRB of ACU had fully approved this study in April 2020.

Limitations

Due to the nature of case study research, some limitations of the study should be noted. By design, case studies are centered on the idea of addressing a theoretical problem or phenomenon occurring in a real-world situation (Yin, 2013, 2018). This study was not designed to address a universal group or population but rather it was intended to provide insight into a

specific problem amongst virtual schools in order to add to the existing research base in this field. Data collection for this study took place at a single charter school in Texas. It is reasonable to assume that when compared to public virtual school programs or virtual programs in different states there may be differences in results. The relatively small scale of participants in this study could also lead to limitations that may prevent the findings of the research from being able to be generalized for future studies. However, this study is designed to provide insight into specific factors that impact student engagement in virtual schools in a manner that may allow future researchers to expound upon the ideas presented.

Delimitations

This study was designed to attain a deeper understanding of factors that impact student engagement in the virtual charter school setting and how teacher's pedagogical practices impact those factors. This study was not designed to address factors that affect student engagement outside of the scope of what virtual teachers can impact through pedagogical practices. Extensive research has already been performed outlining the various factors that impact student engagement and this study was not designed to address all of those factors. Rather, this study was designed to further investigate lesser researched factors that affect student engagement in a specific sub-population of the educational research foundation (i.e., virtual charter schools).

Summary

In this chapter I have provided insight into the purpose, design, and methodology for this explanatory-sequential, mixed methods, critical case study. The purpose of the study was to attain deeper insight into specific factors that impact student engagement in the virtual school setting and the correlation between teacher's pedagogical practices and increased levels of engagement in virtual students. The idea of student engagement being directly impacted by

teacher support and pedagogical practices is foundationally based in self-determination theory (SDT), where students' psychological needs, specifically autonomy, competence, and relatedness, are inherent motivational assets that impact their education as a whole (Jang et al., 2016; Ryan & Deci, 2000a; Ryan & Deci, 2017), but understanding of how teacher's pedagogy impacts virtual student engagement is still limited.

In order to address the issue of limited research on how virtual teacher pedagogy impacts student engagement as well as the research questions developed by this study, an explanatory-sequential, mixed methods, critical case study design provided the most effective research process. Creswell and Plano-Clark (2018) emphasized that mixed methods research provides a way to harness the strengths and offset the weaknesses of either quantitative or qualitative research alone which can result in meta-inferences into the collected data; an idea supported by significant foundational research (Creswell, 2009; Tashakkori & Teddlie, 2003; Venkatesh et al., 2013; Venkatesh et al., 2016). Yin (2018) described an embedded-single case study as one that involved multiple units of analysis at more than one level within the same organization. Further defining the single-case study design, a critical case test of existing theory is eminently justifiable according to Yin (2018). This study utilized the critical case, single-case study design by investigating the established propositions of the self-determination theory (SDT) and its link to student engagement in order to extend the current literature foundation on the theory's application in the virtual school setting (Yin, 2018).

Chapter 4: Results

This research aimed to identify and gain a deeper understanding of specific pedagogical strategies utilized by virtual teacher leaders and how teachers perceived those practices as impacting student engagement in the virtual school setting. There were three primary data collection methods utilized to address the following research questions posed in this study:

Q1: To what extent, if any, does student engagement in teachers' virtual learning communities correlate with student scores on unit tests?

Q2: What pedagogical practices and instructional strategies are being utilized by teacher leaders with higher student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms?

Q3: What pedagogical practices and instructional strategies are being utilized by teachers with lower student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms?

This chapter aims to report the results of the data analysis gathered from archival student grade book data from the 2019-2020 school year, the teacher questionnaire, and the live virtual focus groups. This chapter is structured as follows: introduction, review of research focus and processes, analysis of data, and summary. In this chapter, I will report the quantitative data collected and the qualitative data and discuss how the data addresses the research questions.

Review of Research Focus and Processes

This study utilized an explanatory-sequential, mixed methods, single case study approach to data collection. First, I sent a Google form teacher questionnaire to participating teachers to determine what pedagogical strategies teachers felt had a significant impact on student engagement. Next, I conducted live virtual focus groups to expound upon the data collected by

the questionnaire and further investigate what pedagogical practices impacted student engagement in this particular virtual charter school. Lastly, once the school year ended, quantitative archival student data from the 2019-2020 school year was de-identified and collected to determine a correlation between time spent in the LMS, time spent per assignment, and student scores on unit tests.

Twenty-five teachers in the chosen virtual charter school volunteered to participate in this study. Participating teachers were 28% male and 72% female. Teachers who chose to participate came from all school content areas: 20% Math, 16% English, 12% Science, 24% Social Studies, and 28% Electives. The majority of teachers who participated in this study reported having 11 or more years of experience teaching in both brick and mortar and virtual schools. Approximately 48% of teachers reported having between 1 to 2 years of experience, explicitly teaching in the virtual classroom setting, while 28% reported being first-year teachers in the virtual setting. Only 12% of teachers reported having 6 or more years of experience teaching in the virtual setting. Table 1 displays the demographics of teacher participants for this study.

The collection and analysis of quantitative archival student data addressed Research Question 1. Data were pulled from the LMS and de-identified by teachers before being accessed by me for analysis. Quantitative data pulled included time spent in the LMS-per course, time spent in the LMS-per test, and Student Test Scores-Course. Utilizing a Pearson's r correlation test using the SPSS software, the quantitative data were analyzed.

For the qualitative portion of this study, participants first received a Google form teacher questionnaire that asked both Likert-scale and free-response style questions to determine which pedagogical practices teachers utilized in the virtual setting. Once the questionnaires were completed and reviewed, I then held two live virtual focus groups using the Zoom platform in

order to refine and explain the statistical results from the quantitative data by exploring the participating teachers' pedagogical practices that precipitate increased student engagement levels (Creswell & Plano-Clark, 2018; Ivankova & Stick, 2007). I designed the teacher questionnaire and live virtual focus groups to address the second and third research questions.

When constructing the teacher questionnaire and focus group questions using the VREP Rubric, questions were structured to analyze the key components that attribute to the core problem of disengagement: communication and interaction (Borup et al., 2012; Foster et al., 2018; Lui & Cavanaugh, 2012; Ribón et al., 2013; Roybler & Marshall, 2002; Ticknor et al., 2017; Wilkens et al., 2014). Noted as an effective and commonly used method in data collection, a Likert rating scale was used on specific questions in the questionnaire to gather participant responses that were then analyzed and compared qualitatively (Sapsford & Jupp, 2006; Stokes, 2011; Wilson, 2014). After drafting the questions, the questionnaire and focus group prompts were sent to the five campus directors of Virtual School High (VSH), three of whom responded, who served as the panel of subject matter experts (SMEs). Each campus director has extensive experience in education and varying levels of experience in the virtual school environment. Demographic information for each campus director that responded and submitted the VREP rubric is located in Chapter 3. The SMEs then used the VREP Rubric to rate each question to determine if any modifications or revisions need to be made before the final questionnaire was sent out to teachers to complete. The use of SMEs ensured that all questionnaires and focus group questions were appropriate for the data collection portion of this study.

Presentation of the Findings

In this section, I will discuss the data analysis and research findings for both the quantitative and qualitative data sets.

Quantitative Data Analysis and Research Findings

An analysis of the quantitative data collected provided descriptive statistics to answer Research Question 1: To what extent, if any, does student engagement in teachers' virtual learning communities correlate with student scores on unit tests? To determine the strength and direction of the correlation between student engagement and scores on unit tests, the SPSS software calculated the correlation coefficients. Student engagement was measured using the variables time spent in the LMS-per course and time spent in the LMS-per test. The Pearson's r bivariate correlations reported to indicate whether there was a statistically significant correlation between student engagement in teacher VLCs, as measured by time spent in the LMS, and student performance measured by student scores on the unit tests within the LMS.

In order to determine whether there was a statistically significant correlation between the variables, a Pearson's r bivariate correlation was calculated using the unit test scores on units 1-5 for Semester A courses and units 6-10 on Semester B courses as collected by the school's LMS. Time spent on each test and the total time spent in the course were collected by the LMS and used to represent student engagement in the teacher's VLC for this study. A total of 25 teachers participated and submitted their de-identified grade book data for analysis.

RQ1, Time Spent in the LMS-per Test. Research Question 1 asks to what extent does student engagement in teachers' virtual learning communities correlate with student scores on unit tests? I tested the linear relationship between the variables *time spent in the LMS-per test* and *Student Test Scores-Unit #* using a level of statistical significance (0.05). The level of statistical significance (p -value) showed values less than .05 were significant for unit tests 1-5, 7, 9, and 10. unit 6 and unit 8 tests had p -values greater than .05, and thus there was not a significant relationship for those two tests.

Unit tests 4, 5, 9, and 10 each show a statistically significant, weak correlation between the time spent in the LMS-per test and the unit test score. Unit tests 1-3 and 6-8 showed no correlation between time spent in the LMS-per test and the unit test score. The design of a specific course's curriculum could cause a lack of correlation between time spent in the LMS and unit test scores on units 1-3 and 6-8. Some teachers noted the first two to three units of each semester course consisted primarily of a review of material that students would have learned in a previous course, and thus the material would not have been entirely new to them. The review-style nature of specific units could have caused a lack of correlation between the two variables as students would be able to rely on prior knowledge to answer the test questions for these review-style units rather than relying on spending time learning the information within the curriculum. Table 2 shows a summary of the Pearson correlation (r) results and level of statistical significance (p -value) for the variables time spent in the LMS-per test and Student Test Scores-Unit #.

Table 2*Correlation Results for Time Spent per Test and Student Test Scores-Unit #*

Unit Test	Pearson Correlation Results		
	<i>r</i>	<i>p</i> -value	<i>n</i>
Unit 1 Test	-.061	.026	1336
Unit 2 Test	-.099	.001	1159
Unit 3 Test	-.084	.008	999
Unit 4 Test	.214	.000	1106
Unit 5 Test	.207	.000	965
Unit 6 Test	-.035	.165	1555
Unit 7 Test	-.069	.011	1364
Unit 8 Test	-.038	.183	1214
Unit 9 Test	.367	.000	1498
Unit 10 Test	.367	.000	1359

Note. *n* = Number of student test scores

RQ1, Time Spent in the LMS-per Course. Research Question 1 asks, to what extent does student engagement in teachers' virtual learning communities correlate with student scores on unit tests? I tested the linear relationship between the variables time spent in the LMS-per course and Student Test Scores-Unit # using a level of statistical significance (0.05). The statistical significance (*p*-value) showed that values less than .05 were significant for both unit 5 and unit 10 tests compared to time spent in the LMS-per course. The level of statistical significance (*p*-value) for the unit 5 test was .000. Since the *p*-value was less than .05, there was a significant relationship between time spent in the LMS-per course and the student scores on the unit 5 test. The Pearson's *r* correlation value of .295 indicates that while the results were statistically significant for the unit 5 test, there exists only a weak correlation between the two variables. The level of statistical significance (*p*-value) for the unit 10 test was .000, indicating a

statistically significant result. The Pearson's r correlation value of .466 indicates a moderate correlation between the time spent in the LMS-per course and the student scores on the unit 10 test.

Table 3 shows a summary of the Pearson correlation (r) results and level of statistical significance (p -value) for time spent in the LMS-per course and test scores for the unit 5 and unit 10 tests. The total time spent in the LMS-per course was only compared to the final test for each course, not unit tests 1-4 or 6-9 because it represented the total time spent throughout the course at the end of which the unit 5 or unit 10 test was the summative assessment.

Table 3

Correlation Results for Time Spent per Course and Student Test Scores-Unit #

Unit Test	Pearson's Correlation Results		
	r	p -value	n
Unit 5 Test	.295	.000	949
Unit 10 Test	.466	.000	1249

Note. n = Number of student test scores

Qualitative Data Analysis and Research Findings

The qualitative data portion of this study consisted of two parts: 1) a Google form teacher questionnaire with Likert and free-response questions and 2) two semistructured live focus group sessions using the Zoom online meeting platform. The use of a single case study approach in this study focused on addressing Research Questions 2 and 3:

- a. What pedagogical practices and instructional strategies are being utilized by teacher leaders with higher student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms?
- b. What pedagogical practices and instructional strategies are being utilized by teachers

with lower student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms?

The data were collected using 25 high school teachers from one virtual charter school in Texas who volunteered to participate. Data collected from the teacher questionnaire were analyzed and then used to aid in questioning used during the live focus groups to try to attain a deeper understanding of teacher responses. To protect the anonymity of teacher participants, all teachers were assigned an ID number, and all identifiers removed.

Teacher Questionnaire Results – Likert Questions

In preparation for the live focus groups, all participating teachers completed the Google form Teacher Questionnaire. The teacher questionnaire's purpose was to lay a foundation for the questions that I would expand upon in the live focus groups by allowing teachers to reflect on their thoughts and feelings towards student engagement and virtual practices and pedagogy before the live groups met. Teachers were able to rate various factors that impact student engagement and success on a Likert scale, ranging from significant negative impacts to significant positive impacts. Additionally, the questionnaire contained open-ended questions that allowed teachers to respond freely based on their experiences.

Reviewing the data from the Likert questions regarding factors that impact student engagement indicated the following factors as having the most significant impact on student engagement: 1) fostering communication, 2) attendance in 1:1 tutoring, and 3) attendance in live 1 hour instructional sessions. Within the factor found to be most significant, fostering communication, phone calls and text messages to parents had the most impactful with email communications having the second most significant positive impact. Table 4 displays a summary of the responses to factors that positively impacted student engagement.

Table 4

Summary of Responses for Positive Impact on Student Engagement

Factors that Impact Engagement	Significant Negative	Mild Negative	No Impact	Mild Positive	Significant Positive
Providing additional resources	0	0	0	14	11
Fostering communication	0	0	1	4	20
Providing written feedback	0	0	2	16	7
Attendance in 1-hour live sessions	0	0	7	7	11
Attendance in 1:1 tutoring sessions	0	0	0	6	19
Email communications	0	0	3	16	6
Phone calls/texts to parents	0	0	0	13	12

Of the factors found to impact student success, based on teacher's responses to the Likert questions, the following had the most significant negative impact:

- Students not engaged/working in the content
- Students do not understand how to use technology
- Students are working but do not understand the content
- Students not attending live sessions or 1:1 tutoring

Table 5 displays a summary of the responses to factors that negatively impacted student engagement.

Table 5*Summary of Responses for Negative Impact on Student Engagement*

Factors that Impact Engagement	Significant Negative	Mild Negative	No Impact	Mild Positive	Significant Positive
Not engaged/working in content	23	2	0	0	0
Does not know how to contact teachers	15	6	4	0	0
Working but struggling with content	15	9	1	0	0
Does not feel connected to peers/teachers	11	9	5	0	0
Not attending live sessions/1:1 tutoring	15	8	2	0	0
Does not understand how to use the technology	18	7	0	0	0
Does not contact teacher for help	15	6	3	0	1

Teacher Questionnaire Results – Open-Ended Questions

Participants answered both Likert scale questions and open-ended, free response style questions on the teacher questionnaire. On the open-ended questions, teachers were provided a question and allowed to respond freely with as much or as little response as they felt necessary for that question. This style of questions also asked teachers to reflect on what factors impacted student success and engagement in the virtual classroom based on their experiences to address Research Questions 2 and 3.

Reviewing the data from the open-ended questions, specific trends emerged despite teachers being able to respond freely. While the wording of responses varied, numerous factors emerged within teacher responses. The first question asked teachers to describe the biggest obstacles to student success in the virtual setting. The top three responses to that question were

student accountability, lack of genuine interaction between teachers and students, and the need for more communication. Eighty percent of teachers responded that students who communicate regularly are more successful in the virtual school setting than those who do not communicate regularly. Next, teachers rated how they felt they impacted student's engagement during the year. Eighteen teachers reported communication made the most significant impact, and nine directly attributed their work with students in 1:1 tutoring or live sessions to their success. Lastly, when asked to rate which form of digital interactions between teachers and students they felt was most impactful on student engagement, teachers noted that text communications to students or parents were most impactful. Simultaneously, other methods such as phone calls, bulk emails, and written feedback in the grade book were not very impactful on student engagement and success.

Focus Group Responses. For the live focus groups, I split teachers into two different groups based on the engagement levels of their students. For these observations, engagement was measured by the total amount of time spent in the LMS by students per course. After teachers submitted their engagement numbers per course, the numbers were totaled and then averaged so that teachers who had six courses did not have an arbitrarily higher engagement number than teachers who only had two courses. Teachers who had engagement numbers of 76,000 hours or higher were grouped into Focus Group 1 and deemed high engagement teachers. Teachers who had engagement numbers of 59,000 hours or less were grouped into Focus Group 2 and deemed to be low engagement teachers for this study.

After grouping teachers, the live focus group sessions occurred in a 1-hour time slot after school on two separate days using the virtual meeting platform Zoom. Teachers primarily utilized the audio feature though some chose to use the chat feature as well. After recording the focus group sessions, recordings were sent to REV for transcription and de-identified by

removing identifiers and replacing them with the teacher's assigned ID number before analysis began.

By creating a semistructured, interview-style environment, teachers were able to respond to the question prompts openly, which allowed for numerous themes to evolve that would address Research Question 2 and 3 respective to each focus group. Research Question 2 focused on high engagement teachers who made up Focus Group 1 while Research Question 3 focused on low engagement teachers who made up Focus Group 2. The data analysis for the focus groups was grounded in an inductive approach that allowed for themes to develop organically rather than to prove or disprove a theory. Transcriptions of each focus group were color-coded depending on identified themes within each respondent's observations. Identified themes within the teacher questionnaire provided a basis from which other themes emerged or became more detailed. The codes were then placed in a data matrix (see Appendix B) so that occurrences and themes may emerge. The emergent themes from the focus groups sought to address Research Questions 2 and 3.

Fostering Communication. The first theme that became evident was the importance of fostering communication in the virtual setting. Communication in virtual schools can occur through a variety of methods, and, based on teacher responses, there were five main methods of communication utilized by high engagement and low engagement teachers. Foremost was the idea of building relationships with students. The importance of building relationships with students in the virtual school setting was identified 10 times by teachers in the high engagement group and 11 different times by teachers in the low engagement group. Of all the methods of fostering communication identified in this study, teachers indicated building relationships as key to student success and engagement more than any other theme.

The other methods of fostering communication included emails, phone calls, texts, and utilizing a combination of two or more methods in conjunction. On these types of communication, responses varied between the high engagement group and the low engagement group. Regarding emails, the low engagement group tended to favor the use of emails with seven indications of the positive impact of emails on student engagement compared to only two indications from the high engagement group. Phone calls had an equal number of positive indicators, with two per each group indicating that phone calls were effective. However, 12 teachers in the low engagement group noted that phone calls were ineffective and did not support student engagement, whereas only two teachers from the high engagement group indicated phone calls were ineffective. Additionally, text messages were noted as an effective form of engagement by two teachers in the high engagement group and four in the low engagement group. Lastly, five teachers in the high engagement group and two in the low engagement group noted the use of two or more of the aforementioned methods in conjunction had a positive impact on student engagement.

The respondent's data about fostering communication seemed to demonstrate that both high engagement teachers and low engagement teachers found building relationships with virtual students to be the most critical method of fostering communication in virtual schools. The use of VLCs, where students interact with the teacher through a variety of synchronous and asynchronous methods, could help build relationships in virtual schools. Analysis of the data on the other methods of fostering communication suggested that high engagement teachers preferred to utilize a combination of calls, texts, and emails to engage their students rather than using one of those methods exclusively. Teachers from the lower engagement group indicated a preference for using email above the other communication methods.

Providing Resources. In addition to the trait of fostering communication, teachers noted the provision of resources as an essential strategy towards engaging students in the virtual setting. While the LMS itself houses the content for each course, many teachers found themselves providing students with additional resources, videos, supplemental materials, and the option for extracurricular activities to boost student engagement in the LMS housed curriculum. Teachers from high engagement and low engagement groups emphasized the need to provide supplemental instructional videos and materials in five instances in the high engagement group and six instances in the low engagement group. The use of videos or materials varied by teacher, content, and subject area, but the overall indication was that students needed the teachers to provide supplemental resources outside of what was written into the curriculum to be successful and remain engaged in the content. Some teachers also offered extracurricular activities, such as art shows or virtual museum tours, to aid in engaging students, but those numbers were low (one in the high engagement group and two in the low engagement group) due to the requirement of administrative approval prior to offering these activities.

Providing Feedback. The use of feedback, both written and audio-visual, was an area of contention amongst teachers of both groups. Feedback from teachers came in the form of a small textbox within each assignment in the LMS. Teachers had the option to submit written, audio, or video feedback to students on each assignment submitted within the LMS. While some teachers had positive results from the use of written feedback, two in the high engagement group and three in the low engagement group, a significant number of teachers also felt that the written feedback was the least effective method of engaging students required during the school year, one in the high engagement group and five in the low engagement group. Teachers who felt that the written feedback was not effective noted the potential for it to have been effective had

students known about it, how to access it, or could respond to it. Audio and video feedback were located within the same area as the written feedback and thus suffered the same problem of students not knowing about it or how to access it. Only three teachers from the low engagement group reported using audio or video feedback in this area, none from the high engagement group reported using that feature with a positive outcome, while one teacher in the low engagement group reported that it was ineffective. Overall the use of feedback, whether written, audio, or video, was indicated to be the least effective form of engaging students in the virtual setting for this specific virtual charter school. Factors such as difficulty accessing the feedback and no way to respond to the feedback may have played a role in the ineffectiveness of feedback in this setting.

Live Instruction. The use of live instruction in the virtual setting was an essential pedagogical practice to boost student engagement through high engagement and low-engaging teacher groups. Both 1-hour live sessions and 1:1 tutoring sessions were indicated to be beneficial to engaging students and often led to better communication and building relationships, which was the most critical factor in engaging students virtually. In the high engagement group, teachers indicated that 1:1 tutoring was more beneficial to students than the 1-hour live sessions. Four teachers preferred the use of 1:1 tutoring, while only one indicated a preference for the hour-long sessions. In the low engagement group, the use of 1:1 tutoring was the highest indicated factor to impact student engagement, even over building relationships, and was indicated sixteen times as highly impactful. Low engagement teachers also indicated seven times that the use of the 1-hour live sessions was beneficial to the engagement of their students. Overall, the use of live instruction was indicated to play a pivotal role in student engagement and often linked to an increase in communication, student response to teacher feedback, and use of

teacher-supplied supplemental resources compared to students who did not attend any form of live instruction.

Focus Group Data Results. The resulting data from the two, hour-long focus group sessions indicated that teachers in the high engagement and low engagement groups had many similarities between pedagogy and practices utilized with their students but often put different emphasis on the use of specific methods by themselves in conjunction with other methods. While both groups rated building relationships as a crucial factor in engaging students in their virtual learning communities, there was some disparity in how teachers from each group chose to build those relationships.

For high engagement teachers, the use of supplemental materials and combining multiple methods of communication were the top two pedagogical practices that they utilized to engage their students. While some teachers indicated a preference to email or text over phone calls, most indicated that the use of two or more methods generally yielded the best results when attempting to engage students. These teachers also varied in the type and amount of supplemental materials provided, but most indicated the provision of those materials as a critical factor in engaging students in their courses regardless of the content area. However, the use of video resources (e.g., showing how to work a practice problem via document camera) was one of the main types of supplemental resources utilized by high engaging teachers in addition to providing written examples and step sheets.

While low engagement teachers also focused on building relationships in the virtual setting as key to student success, the pedagogical practices they indicated differed from the high engagement teachers in several ways. First, the low engagement group indicated a higher preference for 1:1 tutoring than the high engagement group. The focus on 1:1 tutoring may have

resulted in lower engagement numbers because teachers focused on a smaller subset of students who attended those sessions rather than reaching out to a larger group of students who did not attend 1:1 tutoring. While teachers indicated great successes with students who did attend the 1:1 sessions, the number of students a teacher could meet with 1:1 in a day is limited, and thus, this may have caused a limitation on the number of students they could engage within a week.

Additionally, low engagement teachers indicated a preference for the use of emails above the other communication methods, which could also have attributed to lower engagement scores as students who are disengaged tend to disregard emails sent from the school staff. Fewer teachers in the lower engagement group indicated the use of a combination of multiple contact methods when attempting to reach students which may have resulted in lower engagement numbers overall.

The data suggested that different teachers' use of different pedagogical practices yielded significant differences in student engagement numbers; however, there was no clear engagement method that would work for every teacher. Instead, the use of a combination of communication methods in conjunction with building relationships with students played a pivotal role in increasing student engagement across the board. While the use of 1:1 tutoring and live instruction was critical in student success for those students who attended the sessions, perhaps the focus on the small number of students that attended the 1:1 help sessions was a limiting factor on overall student engagement for teachers across the board.

Summary

This chapter began with a review of the purpose of the study and the investigated research questions. Then came a review of the research purpose, focus, and the process utilized to ensure the validity of the analysis process. I first discussed the quantitative analysis, followed

by an in-depth discussion of the qualitative data results. Quantitative data indicated some correlations between time spent in the LMS and student test scores to answer Research Question 1. This data determined that there was no correlation between time spent in the LMS-per test and unit test scores for unit tests 1-3 and 6-8. There was evidence suggesting a weak correlation between time spent in the LMS-per test and the unit test scores for unit tests 4 and 5 as well as 9 and 10. This lack of correlation could derive from the fact that specific courses contain two to three units serving as a review and refresher of material from previous courses while the final two units presented new material that would indicate a need for more time spent by students working in the LMS. Lastly, the quantitative data indicated a weak correlation between time spent in the LMS-per course and the unit 5 test scores and a moderate correlation between time spent in the LMS-per course and the unit 10 test scores. The course design's review-style nature may impact the correlation data but implies that the amount of time spent working throughout the entire course had a more significant correlation to final unit test scores than the time spent per test correlated to each individual unit test.

Analysis of qualitative data also yielded significant themes that I identified and discussed to answer Research Questions 2 and 3. Overarching themes included: fostering communication, providing resources, providing feedback, and live instruction. Within those themes were specific pedagogical practices that teachers from Focus Group 1 and Focus Group 2 indicated a preference for when engaging students in their VLCs. Teachers from Focus Group 1, the group with higher student engagement scores, indicated that fostering communication by building relationships was the most critical factor in engaging students in the virtual setting. This group achieved this by using a combination of calls, emails, and texts to reach out to and foster communication with students. Additionally, the high engagement group emphasized providing

videos and other supplemental resources to students as a critical factor in engaging students in their VLCs. Thus, the use of multiple communication methods to build relationships with students and the provision of videos and supplemental resources is the answer to Research Question 2.

Teachers from Focus Group 2, the group with lower student engagement scores, also indicated the importance of building relationships to engage their virtual students. However, this group differed in their focus on which pedagogical methods they used to engage students in their VLCs. The lower engagement group preferred using email rather than a combination of communication techniques to reach out to students with a significant number of teachers indicating that phone calls were ineffective and a waste of their time. This group indicated a primary focus on the use of 1:1 tutoring to engage their students with an additional focus on providing videos and supplemental materials. Thus, lower engaging teachers' focus on building relationships and establishing contact using primarily email, the use of 1:1 tutoring sessions, and the provision of videos and supplemental resources answer Research Question 3.

With so much emphasis placed on 1:1 tutoring by Focus Group 2, the overall engagement numbers could be less than those in Focus Group 1 because teachers could only meet up with a set number of students 1:1 within a week. This limiting factor could mean that teachers had valuable and significant interactions with students in their 1:1 tutoring session, but the total number of students who were engaged was lower than it could have been had the teachers spent more time fostering communications with a larger group of students. The grouping of teachers by engagement scores is a limitation of this study because the teachers were grouped based on total time students spent engaged in their course work, not the level of success based on the engagement numbers (i.e., a student could spend 500 hours working in the course but pass only

4/10 assignments vs. a student spending 300 hours in the course and passing 7/10 assignments). Additional limitations to the data include teacher-input test scores for transfer students, where the time spent on the test would show minimal time spent numbers with the potential for high scores. Teacher-input test scores occurred when students transferred in from other school districts with grades, and teachers went into the LMS and manually added their test scores, reflecting high scores and low times. From the data collected, I was unable to identify when this would have occurred, and thus, I could not rule it out from the quantitative data analysis leading to the potential for skewed results in the negative direction. Uncompleted tests, tests with a score of 0, and which had 0 time spent were not included in the data analysis. The following chapter contains a discussion of the summary of the findings, implications, and recommendations for future research, and conclusion to the study.

Chapter 5: Discussion, Conclusions, and Recommendations

Social presence and personal connections established via engagement in meaningful interactions with teachers can be a prerequisite to positive cognitive outcomes in students in the virtual school environment (Borup et al., 2014; Garrison et al., 2000; Shea & Bidjerano, 2009). The ability of teachers to provide engaging online learning opportunities in the virtual school environment, while still meeting the students' needs for autonomy support outlined in the self-determination theory (SDT), is aided by the use of technology and flexible scheduling in the virtual school environment (Berge & Clark, 2005; Boling & Beatty, 2010; Curtis & Werth, 2015; DiPietro, 2010; Rosa & Lerman, 2011; Russell, 2004; Savery, 2005). However, the core issues continuing to surround virtual schools, higher attrition rates and lower academic growth (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013), indicate a need for further research into what pedagogical strategies are most impactful on student engagement in virtual schools.

The purpose of this explanatory-sequential, mixed methods, single case study was to gain a deeper understanding of a) how student engagement in teachers' virtual learning communities correlate with student scores on unit tests; b) what pedagogical practices and instructional strategies are being utilized by teacher leaders with higher student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms; and c) what pedagogical practices and instructional strategies were utilized by teachers with lower student engagement scores in their virtual learning communities in ninth-12th grade virtual classrooms? In this study, I utilized quantitative archival data collection and analysis to answer research question 1 and the teacher questionnaire and live virtual focus groups to answer Research Questions 2 and 3.

This chapter focuses on interpreting the findings for both the quantitative and qualitative data portions of the study and future research recommendations. I will discuss the correlation between time spent in the LMS-per course and Student Engagement and time spent in the LMS-per test and Student Engagement. Additionally, I identify and discuss teachers' specific pedagogical strategies that significantly impacted student engagement in this chapter. I will end the chapter with recommendations and conclusions.

Discussion of Findings in Relation to Past Literature

Existing research into student success in the virtual school environment attributes the core issues of higher attrition rates and lower academic growth in virtual students (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013) to those students' lack of engagement (Archambault et al., 2013; Borup & Stevens, 2015; Borup et al., 2014; Finn, 1993). I designed the following research questions to further investigate the issue of lack of engagement in virtual schools. In this section, I will discuss the study's findings in relation to the research questions and their connection to past literature.

Discussion of Research Question 1

In Research Question 1, I sought to determine the correlation between student engagement in teacher's virtual learning communities and their scores on unit tests. According to the theoretical framework of the self-determination theory, there are three critical components to student success in the classroom: a) teacher motivational style (e.g., autonomy support vs. teacher control); b) student motivational style (e.g., need satisfaction vs. need frustration) and c) student functioning (e.g., engagement vs. disengagement; Reeve et al., 2004; Ryan & Deci, 2000a, 2000b; Skinner et al., 2009). Additionally, a significant body of research, ranging from the early nineties until 2019, has indicated that teachers providing an autonomy-supporting

learning environment fosters the satisfaction of students' core psychological needs, which in turn enhances their ability to achieve the intended learning outcomes (Deci et al., 1991; Hsu et al., 2019; Jang et al., 2012; Levesque-Bristol et al., 2006; Levesque-Bristol et al., 2010; Reeve, 2012; Williams & Deci, 1996). After noting engagement as a critical element to student success in school, Fredricks et al. (2004) further described engagement as tri-faceted, composed of behavioral, cognitive, and emotional engagement. Behavioral engagement refers to involvement in learning tasks and environments, such as a VLC; cognitive engagement refers to psychological investment in the process of learning, such as the use of learning strategies; and emotional engagement refers to affective reactions to learning tasks and environments, such as emotions (Fredricks et al., 2004).

For the quantitative portion of this study, I attempted to measure behavioral engagement through the amount of time students spent in the LMS. After analyzing the data, I found that all but two unit tests showed statistically significant p -values; however, the resulting correlations between student engagement in teacher's VLCs and student's test scores varied with each unit test. The first unit tests per course (i.e., 1-3 and 6-8) showed no correlation between time spent in the LMS-per test and the unit test score. The latter units for each course (i.e., 4, 5, 9, and 10) each show a statistically significant, weak correlation between the *time spent in the LMS-per test* and the unit test score. Overall, a lack of correlation in the data indicates little significance between virtual students' behavioral engagement and their success on unit tests. The resultant correlational analysis in this study differs from prior research findings that established a clear link between engagement and student academic success.

One possible cause of the lack of significant correlations in the resultant data could be the course curriculum's design. The majority of the course curriculum at the research site comes

from one company that uses a similar curricular design for most courses. The lessons in each unit serve to review content from prior courses and introduce new content for students before they attempt the unit tests. The first one to two units in most courses consist of primarily review-style content, meaning that students have likely seen the content before in previous courses and are merely reviewing and refreshing their knowledge by completing the lessons before taking the unit tests. Approximately 60-70% of each of these unit tests consist of a review from previous courses. Each course varies, some courses may have more review content than others, but generally, the first two units have a large portion of review questions while introducing more brand-new content as students proceed further in the course.

For example, all science courses begin with unit 1 reviewing the scientific method, lab safety, and lab equipment regardless of which course students are taking. This setup allows students to successfully take the unit test and spend little to no time reviewing the lessons or completing the test because that content is familiar. As such, this review-style nature of the content curriculum means that students could potentially spend less time working in the course, little time completing the tests, and still be successful in passing the first two unit tests simply because they already knew and understood the information from prior courses taken. This review-style curriculum design would then impact the correlation between time spent in the LMS and student test scores because students would not need to spend much time in the course or on the tests to pass, thus resulting in little to no correlation. The idea that course design impacts the correlation results in this study could support the fact that the latter units in each course (i.e., units 4 and 5 as well as units 9 and 10) did display increased correlation between the time that students spent working and their scores on the unit tests due to latter units containing less review-style questions and more new content that students would not have learned in prior

courses. Consequently, students would be required to spend more time working in the course and more time completing the unit tests to pass due to new content composing the majority of latter units. Ultimately, the course design utilized at the research site could be the cause of the study's results differing from past research.

Discussion of Research Question 2

In Research Question 2, I sought to determine what pedagogical practices and instructional strategies were utilized by teacher leaders with higher student engagement scores. In his foundational study, Moore (1993) considered distance learning systems and identified three critical elements that impact the transactional engagement of online learners: 1) the structure of the environment, 2) the degree of meaningful communication (i.e., dialogue) that the structure permits, and 3) the degree to which the learner can mediate choices and decisions regarding personal learning goals and trajectories. These three key factors provide a foundation for research into online education today as well as tying into student's three core psychological needs described by the self-determination theory (i.e., autonomy, competence, and relatedness) (Jang et al., 2016; Ryan & Deci, 2000a; Ryan & Deci, 2017). Following the ideas founded in Moore's theory of transactional distance, researchers (Bernard et al., 2004; Roblyer et al., 2007) proposed that one factor that impacts student success in online learning environments is the delivery format for content and interaction with students. In the qualitative portion of this study, I sought to determine what pedagogical and instructional strategies were being used by virtual teachers to deliver content and interaction. Using a Google Form Teacher Questionnaire and semistructured focus group interviews with participating teachers, I answered this question.

From the Likert-scale questions, teachers responded that the following factors had the most significant impact on student engagement: 1) fostering communication, 2) attendance in 1:1

tutoring, and 3) attendance in live 1-hour instructional sessions. Historically, researchers have found that fostering communication amongst virtual students has been a critical factor in their success in a virtual school (Borup et al., 2012; Christenson et al., 2001; Ekmekci, 2013; Foster et al., 2018; Moje & Lewis, 2007; Roblyer & Marshall, 2002; Ticknor et al., 2017; Xie & Ke, 2011; Xu & Jaggars, 2011). The resulting data supports the idea that fostering communication between virtual teachers and their virtual students plays a pivotal role in student engagement and success in virtual school programs. Findings for the Likert-scale questions were agreed upon by both the high engagement and low engagement teacher groups, with eighty percent of teachers emphasizing that students who communicate regularly are more successful in the virtual setting.

After the questionnaire responses were analyzed, I grouped participating teachers into two groups: high engagement and low engagement, to determine the differences in pedagogical and instructional strategies between the two groups. In analyzing the data from the focus group responses, multiple themes emerged. Foremost, while both groups emphatically noted the importance of fostering communication through building relationships, teachers in each group went about fostering communication with their virtual students differently. Data from the high engagement teachers' group indicated that most teachers preferred to use a combination of calls, texts, and emails to engage their students rather than use one method exclusively as was preferred by the lower engagement group. The combination of multiple methods to outreach to students may have been more impactful in building relationships with students because different students have different preferred methods of communication and thus were more likely to respond when teachers utilized all three rather than just one method. Additionally, the use of multiple methods to outreach to students allowed teachers to reduce negative factors often found in virtual school environments such as geographical distance and stakeholder fluency (Ribon et

al., 2013) by establishing a safe online learning environment through the use of virtual learning communities (Duncan-Howell, 2010; Linton, 2016; Ribon et al., 2013). Through their combined outreach, the relationships built by teachers provided students with a sense of community within the virtual school setting, which benefited students both academically and socially (Berry, 2019; Lai, 2015; Lovitts, 2001; Rovai, 2003).

Additionally, both groups of teachers indicated the importance of providing supplemental resources to their virtual students. Five teachers in the high engagement group noted that additional resources such as instructional help videos and equation sheets were necessary to boost student engagement in the virtual curriculum. Additional resources varied by teacher and subject but were necessary tools in increasing student engagement. However, teachers in the high engagement group indicated a preference for using video resources, such as utilizing a document camera to work out practice problems in real-time, compared to other supplementary resources. This data indicates that teachers who provided additional video resources explaining the content or working practices problems resulted in students engaging in the content more than those whose teachers did not provide it.

Prior research supports the success of utilizing multiple contact methods and the provision of additional resources. Asynchronous methods allow teachers to engage students when not in real-time sessions and can allow students to work at a pace and access the materials and information at a time that fits their specific environmental learning needs (Fulton & Kober, 2002; Panigrahi et al., 2018; Setzer & Lewis, 2005; Showalter et al., 2017). Thus, the methods utilized by the higher engagement group correlate with previously established methods that successfully increase student engagement in virtual schools. The specific use of a combination of contact methods and the provision of additional video resources separate the pedagogical

practices utilized by higher engagement teachers and represent the most impactful methods utilized by teachers in this study.

Discussion of Research Question 3

In Research Question 3, I sought to determine what pedagogical practices and instructional strategies were utilized by teacher leaders with lower student engagement scores. As noted in the discussion for Research Question 2, both the high engagement and low engagement groups had many similar preferences for pedagogy and instructional practices in the virtual setting. However, certain practices were preferred by lower engagement teachers that could be the reason for lower student engagement scores in their courses. While lower engagement teachers also emphasized the importance of building relationships in the virtual setting, they differed from the high engagement teachers' pedagogical practices. First, teachers in the lower engagement group indicated a higher preference for 1:1 tutoring than the high engagement group. While the 1:1 tutoring was noted by both groups to have a significant impact on the engagement of students who attended the tutoring sessions, an idea supported by previous researchers (Cavanaugh et al., 2009; Hawkins et al., 2013; Linton, 2016), the time spent focusing on only one student per session could have potentially caused teachers who prioritized 1:1 tutoring to have lower engagement numbers overall. While prior research indicated the importance of creating authentic and relevant learning experiences in virtual schools (Manasia & Parvan, 2015), the time spent cultivating that relationship with only one student in a 1:1 session could have been spent contacting and engaging multiple students using a different form of communication. Thus, although the direct impact of 1:1 tutoring sessions was significant for those who attended, the data indicated the high engagement teachers who spent the same amount

of time contacting multiple students through other communication methods could reach more students and thus attain higher engagement scores overall.

Teachers in the low engagement group also indicated a preference to email over the other forms of communication (i.e., calls and texts). This preference towards using email as the primary, sometimes sole, communication method could be an attributing factor to their lower student engagement scores. Cheng and Zeng (2016) noted that certain factors such as learning motivation, learning attitude, prior knowledge, learning styles, and learning environment all play a pivotal role in virtual students' engagement and success. Cheng and Zeng's (2016) research supports the idea that students who are generally unengaged in the curriculum are more likely to ignore an email from a teacher than a call or a text to a parent. Consequently, the teachers who solely utilize email to outreach and build relationships with students are more likely to not receive reciprocal communication from the student or parent, resulting in the student remaining unengaged. According to Manasia and Parvan's (2015) research, virtual teachers must create authentic and relevant learning experiences for students in the virtual school environment to get them started and keep them engaged. For teachers in this study, utilizing email as the primary means of communicating with students was not effective in creating authentic and relevant learning experiences, as indicated by the lower engagement scores for teachers who relied solely on this communication method.

Prior research has shown that once teachers have built relationships and trust amongst their students within their VLC's, the in-depth and thought-provoking communication allowed through a community aspect can occur (Booth, 2012; Crisp & Jarvenpaa, 2013; Schiller et al., 2014). In this study, I found that email as the lone communication method to build meaningful relationships with students was not sufficient. Mayes et al. (2011) emphasized that purposeful

interactions amongst instructors and students are more significant in an online setting due to a separation of time and space than in traditional brick and mortar schools. While email may establish purposeful interaction between teachers and students in the virtual setting, it can also be easily ignored by students who are already disengaged and feeling disconnected from the virtual school. Additionally, the prioritization of 1:1 tutoring sessions significantly impacted the students who attended the sessions; however, data indicated that utilizing other communication methods allowed the higher engagement teachers to reach more students within the same time frame.

Implications

This study's findings have the following implications for the virtual charter school studied and the virtual education community as a whole. First, the study site teachers need to shift their focus from the use of email as a primary communication method toward the use of a combination of communication methods to engage students in their virtual learning communities. Building meaningful relationships with students has been proven as a protective factor against online attrition rates in virtual schools (Angelino et al., 2007; Berry, 2019; Tirrell & Quick, 2012), and the results of this study have indicated that these relationships are developed most effectively through the use of multiple communication methods. Prioritizing the use of multiple communication methods is something that can be easily adjusted at the study site but may be more difficult to attain at other virtual schools depending on the tools and contact information at their disposal. However, it is necessary to ensure increased engagement in virtual students and ultimately decrease virtual schools' attrition rates.

Secondly, teachers need to place significant emphasis on the creation and provision of supplemental resources. Teachers at the study site are all highly qualified, certified Texas

educators who are experts in their content areas. With knowledge and years of experience on how students learn the content in their field, these highly qualified teachers are uniquely qualified to scaffold, discuss, and expound upon the curriculum's content in a variety of ways to help students understand and engage in the content within the LMS. By providing supplemental resources, teachers may meet the needs of students that were not being met by students solely reading through the content in the LMS and thus increase their engagement overall. It is reasonable to assume that other virtual schools also employ highly qualified educators and could also benefit from their teacher's expertise and their creation of supplemental resources.

Limitations

While the data collected in this study primarily supports the existing literature foundation, it is essential to note the findings' limitations. This study was not designed to address a universal group or population. Instead, it was intended to provide insight into the specific problem faced by virtual schools, high attrition rates, and low academic growth by investigating the specific issue of student engagement in virtual charter schools. This study did not investigate other factors that could impact the core issues of high attrition rates and low academic growth (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013). This study's data collection took place at a single charter school based in Texas's DFW metroplex area. The relatively small sample size of participants in this study, although meeting the requirements for a valid case study size (Guest et al., 2006), could also lead to limitations that may prevent the findings from being generalized for future studies. Despite the small sample size, the study sought to provide an insight into specific pedagogical and instructional practices that impact student engagement in virtual schools to allow future researchers to expound upon the ideas presented.

Additionally, data collected in this study came from a virtual charter school (Watson et al., 2004), and it is reasonable to assume that compared to public virtual school programs or virtual programs in different states, there may be differences in results. The availability of different resources in different virtual schools may also limit results. The use of a student management system (SMS) that housed student and parent contact information enabled participating teachers to more easily reach out to students and initiate contact to build relationships needed to increase student engagement in this study. It is reasonable to assume that the student management systems at different virtual schools may have different features than the one utilized by the school in this study, which could yield different results for researchers attempting to investigate teacher's pedagogical practices in virtual communication.

Recommendations for Practice

After reviewing the data from this study, there are several recommendations for teachers, administrators, and other stakeholders in virtual schools to consider. These recommendations intend to help improve the pedagogy and practices being utilized in virtual schools to maximize student engagement. The first recommendation for virtual school stakeholders is to normalize multiple communication methods rather than rely on one single method. Data from this study indicated increased success in engaging a larger number of students when teachers utilized multiple outreach methods to students rather than relying on one single method. If this multiple method approach becomes the norm for virtual teachers, schools may see more success in engaging a larger number of their otherwise disengaged students. The use of multiple communication methods may also help teachers more successfully develop their virtual learning communities, which is key to reducing the likelihood that a student will drop out of an academic program (Berry, 2019; Ke & Hoadley, 2009).

The second recommendation for virtual school stakeholders is to provide dedicated times during the school day for student outreach and time for 1:1 sessions between students and teachers. Teachers who participated in this study from both the high and low engagement groups indicated that 1:1 sessions with students had a significant impact on students who attended the sessions and successfully built a meaningful relationship with that student, which led to their continued engagement in the curriculum. However, teachers who prioritized 1:1 sessions over other outreach methods had lower overall engagement scores due to the amount of time spent working with only one student. As such, I believe it is essential for virtual schools to set out a set amount of time each day for teachers to devote to student outreach without interruption. Having a dedicated time for teachers to focus solely on outreach and building meaningful relationships with students, a proven factor in increasing student engagement and preventing dropouts (Angelino et al., 2007; Berry, 2019; Tirrell & Quick, 2012), could allow them to be more successful in increasing student engagement for a larger number of students.

The third recommendation for virtual school stakeholders is to encourage virtual teachers to create and share resources and help videos for their students. Teachers who participated in this study indicated that providing additional resources (e.g., help videos, equation sheets, worked out example problems) increased student engagement in their courses. Most virtual charter schools in Texas employ highly qualified, certified educators who are experts in their content areas and can provide valuable insights into their course content by creating supplemental resources. I would recommend that virtual schools take advantage of their teachers' expertise and encourage them to create and provide resources to students that scaffolds the course content, teach the content using different methods, or extends or deepens student understanding of course content.

Recommendations for Future Research

Based on the finding of this study, there are several recommendations for future researchers to consider. The first recommendation is for future researchers to further examine the role of single communication methods such as email, calls, or text compared to combining two or more on student engagement in virtual schools. While data indicated that a combination of multiple methods was more impactful on student engagement than email alone, it would be beneficial for researchers to compare the use of calls and texts as sole forms of communication. Future research could help determine the most efficient combination of communication methods to allow virtual school administrators and staff to be more efficient and purposeful with communication to students.

Second, researchers may further investigate the use of supplemental resources on increasing student engagement. For example, this study has shown that teachers who provided supplemental resources to their students, primarily in the form of video examples, yielded higher student engagement scores than those who did not provide supplemental resources. It could be valuable to attain a deeper understanding of how supplemental resources play a role in increasing student engagement, especially in courses where teachers rely heavily on working out practice problems such as math and science courses.

The third recommendation for future research is to investigate the correlation between the time students spend working in a course and their success on formative and summative assessments. This study's findings were somewhat inconclusive due to the curriculum's design at this specific virtual school. While the school in this study did not require students to complete the lessons before completing the unit tests, it is reasonable to assume that other virtual schools with lesson submission required prior to testing might yield different results in showing

correlations between the time spent in the course and student academic achievement. Further investigation could determine a correlation between the amount of time spent working in a course and student success in virtual schools, which would then allow virtual school administrators to create school policies based on facts rather than ideas or opinions on the efficacy of requiring students to complete lessons in the virtual curriculum before completing the assessments.

This study has laid a foundation for determining how time spent in the school's LMS impacts student academic achievement on unit tests and what pedagogical and instructional practices virtual teachers utilize to engage students in the virtual school setting. However, this study merely serves as a foundation for future researchers to deepen their understanding of the issues investigated. Future research may investigate different types of virtual schools in different states and allow the education community to see a broader scope on these issues than what could be addressed by this single case study.

Conclusions

The purpose of this study was to provide additional data on the factors that impact the core issues (i.e., high attrition rates and low student academic growth) afflicting virtual schools across the country (Borup et al., 2013; Gill et al., 2015; Hawkins & Barbour, 2010; Miron & Gulosino, 2015; Rice, 2006; Watson et al., 2013). Utilizing an explanatory-sequential, mixed methods, critical case study, I was able to a) gain a deeper understanding of the association between student engagement in virtual learning communities and student scores on unit tests and b) the association between teacher leaders' use of specific pedagogical teaching practices and engagement in 9-12th grade virtual school students. Data were collected at one virtual charter

school from 25 participating teachers through archival grade book data, a Google Form Teacher Questionnaire, and two live virtual focus groups.

Quantitative data collected from the LMS yielded only weak correlations between five-unit out of ten unit tests and the amount of time spent in the course per test. Only one unit test, the final unit test in the second-semester course, showed a moderate correlation to the total time spent in the course. The course content's nature at this specific virtual charter school and its policy that did not require students to complete the lessons before attempting the unit tests could have skewed the resulting data. Qualitative data results indicated that higher engaging teachers emphasize fostering communication with students by utilizing multiple communication methods rather than relying on only one method as was preferred by the lower engaging teacher group. Teachers with higher engagement scores also noted the importance of providing supplemental resources to students, usually through video examples, on increasing student engagement in their virtual courses. Ultimately, addressing high attrition rates and low student academic achievement in virtual schools is a complex and multidimensional issue. This study sought to investigate one specific aspect of these overarching issues (i.e., student engagement) and determined that certain pedagogical practices, when utilized by teachers, could yield an increase in student engagement in virtual schools.

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Appendix B: Focus Group Coding Matrix

Trait	Pedagogy/Practice	Occurrences in Focus Group 1 Discussion	Occurrences in Focus Group 2 Discussion
Fostering Communication	Building Relationships	10 total occurrences	11 total occurrences
	Emails	2 positive occurrences. 2 negative occurrences.	7 positive occurrences. 1 negative occurrence.
	Phone Calls	2 positive occurrences. 2 negative occurrences.	0 positive occurrences. 12 negative occurrences.
	Texts	2 positive occurrences.	4 positive occurrences.
	Combination of 2+ methods	5 positive occurrences.	2 positive occurrences.
Providing Resources	Supplemental Materials/Videos	5 positive occurrences.	6 positive occurrences.
	Extracurricular Activities	1 positive occurrence.	2 positive occurrences.
Providing Feedback	Written Feedback	2 positive occurrences. 1 negative occurrence.	3 positive occurrences. 5 negative occurrences.
	Audio/Video Feedback	No occurrences.	3 positive occurrences. 1 negative occurrence.
Live Instruction	1-hour Sessions	1 positive occurrence.	7 positive occurrences.
	1:1 Tutoring	4 positive occurrences.	16 positive occurrences.