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A Qualitative Study Identifying a School Leadership Model Promoting and Fostering Technology-Enhanced Teaching and Learning

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A QUALITATIVE STUDY IDENTIFYING A SCHOOL LEADERSHIP MODEL PROMOTING AND FOSTERING TECHNOLOGY-ENHANCED TEACHING AND LEARNING

by

Lisa Flanders-Dick, B.A., M. Ed.

A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Education: Educational Leadership

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We hereby recommend that the dissertation prepared by

Lisa Flanders-Dick, B.A., M.Ed.

entitled **A Qualitative Study Identifying a School Leadership Model Promoting and Fostering Technology-Enhanced Teaching and Learning**

be accepted in partial fulfillment of the requirements for the degree of

Doctor of Education, Educational Leadership Concentration

Richard Shrubb
Supervisor of Dissertation Research

Dustin Hebert
Head of Curriculum, Instruction, and Leadership

Doctoral Committee Members:
Dustin Hebert
Joanne Hood

Approved:

Don Schillinger
Dean of Education

Approved:

Ramu Ramachandran
Dean of the Graduate School

ABSTRACT

Technology-enhanced teaching and learning (TETL) is the integration of technology into teaching and learning practices to improve the quality of learning outcomes. This is an essential strategy for improving educational quality. School leaders significantly affect the integration of effective TETL in the classroom. The International Society for Technology in Education (ISTE) provides Standards for Leaders that serve as a framework for innovation in education. Situational Leadership Theory contends that one leadership style cannot be applied to all leadership tasks. This study expands upon the current use of SLT to help derive characteristics needed to develop a school leadership model that promotes and fosters effective (TETL) in PK-12 education.

This study employed a qualitative, multi-case study to investigate highly effective TETL public school districts in Louisiana. A multi-level approach in research was taken to avoid the risk of ignoring influence within its complex layers. The district and school leaders in these districts were interviewed to explore TETL, leadership, perception, skill, and self-efficacy to uncover characteristics needed to promote and foster TETL. A structured interview approach was taken during this study. This approach increased the ability to compare responses between the various school districts.

Results of this study lead the researcher to develop a School-Level Leadership model for effective TETL, which includes the following elements: vision, empowering future leaders, fostering growth, support, student-centered strategies, and curriculum

focus. This model also consists of the overlapping partnership between the school-level leader, school TETL team, and district leadership team.

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DEDICATION

To my husband, Mike, for always inspiring me to chase my dreams, supporting even the craziest of ideas, and providing laughter in the most stressful of times. I am blessed to spend life's adventures with you!

To my dad for instilling the expectation and desire to learn while pushing me to find the solutions on my own. As a teenager, I may not have appreciated being directed to a shelf of books after asking questions about our first computer or not being led directly through the steps of various equation solutions, but I have great appreciation now.

To my mom for always being my biggest cheerleader. It didn't matter whether I was baking a cake, trying out for a team, or beginning a new project, you have always been there to cheer me on! Thank you for believing in me.

To my kids, Lauren, Taylor, and Zackry, I love you more than you will ever know. I am proud of the adults you are and look forward to what God has in store for your future adventures. Just stay focused on His plan because there is nothing in this life you cannot accomplish!

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This journey began before I even knew I had a desire to be on this path. Several God paved journeys led me to a casual pop-in to Dr. Dawn Basinger's office where I was told it wasn't if I was getting a doctorate but instead when. I cannot thank you enough for your guidance and friendship over the years!

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Thank you to my study participants. Without you this would not be possible. It was amazing to see the commonality between all three of the districts leading the way in technology enhanced teaching and learning right here in the state of Louisiana! You are rock stars! Thank you for everything you do for our teachers and students!

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CHAPTER 1

INTRODUCTION

Public schools and the public-school systems are complex, and leaders can not apply a single leadership style to all situations while producing positive results (Blanchard et al., 1993; Hersey & Blanchard, 1972; Hersey, 1985). The school system consists of multiple levels, including the classroom, school, district, and state. The decisions at one level affect other levels and stakeholders within the system. Researchers must pay attention to the school system's multi-level structure to avoid the risk of ignoring influence within its complex layers (Law et al., 2016; Liu et al., 2016).

Technology-enhanced teaching and learning (TETL) is the integration of technology into teaching and learning practices to improve the quality of learning outcomes (Law et al., 2016). It is an essential strategy for improving educational quality, and school-level leadership directly affects TETL (Ghavifekr & Rosdy, 2015; Law et al., 2016). Despite research validating the benefit of TETL to aid and support students' learning, integration of technology differs vastly between classrooms, schools, and districts (Ghavifekr & Rosdy, 2015).

This qualitative study investigated highly effective TETL public school districts in Louisiana. The district and school leaders in these districts were interviewed to explore

TETL, leadership, perception, skill, and self-efficacy to uncover characteristics needed to promote and foster TETL.

Problem Statement

The problem under investigation in this study was school leadership characteristics that increase teachers' abilities to integrate technology into their classrooms effectively.

School leaders significantly affect the integration of effective TETL in the classroom (Chang, 2012). TETL is considerably beneficial for both teachers and students (Ghavifekr & Rosdy, 2015) and has been identified as an essential strategy for improving educational quality (Law et al., 2016).

According to the United States Department of Education, billions of federal funds are spent yearly on classroom technology and training for educators with little evidence that these funds increase teacher effectiveness (United States Department of Education, n.d.). Almost one hundred percent of the public schools in the United States have computers with Internet access. Though technology access across the nation is practically a non-existent barrier for TETL, barriers still exist (United States Department of Education, 2014).

TETL is significantly influenced by various factors including the educator's perception (Cope & Ward, 2002), skill, and self-efficacy (Ghavifekr & Rosdy, 2015). Since educators' perception of technology is vital to successful TETL, current research needs to broaden to include this factor (Koszalka & Wang, 2002; Law et al., 2016). One of the most substantial barriers preventing effective TETL is the lack of educator's skills (Ertmer et al., 2012). Ghavifekr and Rosdy's (2015) study found that

teachers are not given enough time to learn and be comfortable using technology in the classroom; this time could be provided by school-level leadership. Teacher efficacy is directly linked to school leadership and culture (Ghavifekr & Rosdy, 2015). Therefore, school leaders are crucial in the school system's multi-level infrastructure to promote and foster TETL (Kincaid & Feldner, 2002; Law et al., 2016).

Purpose of the Study

The purpose of this qualitative study was to develop a school leadership model that promotes and fosters effective technology-enhanced teaching and learning (TETL) in PK-12 education.

Theoretical Framework

Hersey and Blanchard's Situational Leadership Theory (SLT), known before the mid-1970s as Life Cycle Theory of Leadership, identifies four leadership categories: Delegate, Support, Coach, and Direct. According to SLT, there is no one best leadership style; instead, leadership style is task-relevant to the follower's ability and willingness. In delegate leadership, the group takes responsibility for the task; this style is an option when followers exhibit high perception, skill, and self-efficacy of the relevant skill. Support leadership emphasizes shared ideas and decisions; this style is best with followers with variable perception, moderate to high skill, and moderate to high self-efficacy. Coach leadership finds the leader in an active persuasive role; this style works when followers have a high perception, lack skill, but have self-efficacy. Direct leadership requires the leader to be in an active supervisory position; this style is an option when the followers lack perception, skill, and self-efficacy (Blanchard et al., 1993; Hersey & Blanchard, 1972; Hersey, 1985).

Further TETL research is needed regarding leadership in schools (Berret et al., 2012; Ghavifekr & Rosdy, 2015; Law et al., 2016). Due to school complexity, one leadership style cannot be applied to all leadership tasks (Blanchard et al., 1993; Hersey & Blanchard, 1972; Hersey, 1985). This study will expand upon the current use of SLT to help derive characteristics needed to develop a school leadership model that promotes and fosters effective technology-enhanced teaching and learning (TETL) in PK-12 education. Currently, when utilizing SLT, the leadership style is selected according to the followers' abilities and willingness with a particular task (Blanchard et al., 1993; Hersey & Blanchard, 1972; Hersey, 1985). What happens when SLT points to a directive leadership style, and the school leader doesn't have the abilities and willingness to direct effectively? This study will expand the use of SLT to look at the district and school leaders' abilities and willingness in the constructs of perception, skill, and self-efficacy in TETL. Additional predefined constructs include TETL and leadership.

Research Questions

The research questions to be answered by this study are:

RQ1: How do school leaders' perceptions influence their leadership characteristics to foster effective TETL?

RQ2: How do school leaders' skills influence their leadership characteristics to foster effective TETL?

RQ3: How do school leaders' self-efficacy influence their leadership characteristics to foster effective TETL?

Assumptions, Limitations, and Delimitations

Assumptions

The researcher poses two assumptions in this study. The first was that the sample is representative of highly effective TETL. Second, relative to data collection, it is assumed that participants responded honestly during interviews.

Limitations

A limitation of the study was that the interview data resulted from participant self-reporting. A second limitation is the balance of district participants. The small district only had two school leaders participate in the study instead of the three represented in the medium and large districts interviewed.

Delimitations

Three delimitations existed in this study. First, data are confined to the district and school TETL, leadership, perception, skill, and self-efficacy of public-school leaders. Second, participants were selected according to district leaders' perceptions of effective TETL in their district schools. Finally, participants were limited to Louisiana leaders within the public-school systems.

Definition of Key Terms

Followers: SLT refers to those being led as the followers (Hersey, 1985). In a school, this would describe the teachers.

Leaders: SLT refers to those in managerial positions as the leaders (Hersey, 1985). In a school, this would describe the principal, assistant principal, and positions such as instructional coaches.

Leadership Styles: How a leader's behavior pattern is perceived by others (Hersey, 1985).

Multi-level: The school system consists of various levels, including the classroom, school, district, and state (Law et al., 2016).

Perception: A person's attitude, value, belief, and disposition (Blanchard et al., 1993) concerning the use of technology in education for teaching and learning.

Performance Readiness: According to SLT, performance readiness is the ability and willingness of a follower in relation to a particular task (Hersey & Blanchard, 1972;). For this study, the task is TETL.

Self-efficacy: An individual's confidence in their ability to execute behaviors necessary (Hersey, 1985). For this study, confidence is related to TETL.

Skill: The ability to do something (Hersey, 1985). For this study, the abilities are related to TETL.

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this qualitative study was to develop a school leadership model that promotes and fosters effective technology-enhanced teaching and learning (TETL) in PK-12 education. TETL is an essential strategy for improving educational quality, and school-level leadership directly affects TETL (Ghavifekr & Rosdy, 2015; Law et al., 2016). The following review of literature provides an overview of current TETL studies as it relates to school-level leadership and factors influencing integration: educator's perception (Cope & Ward, 2002), skill, self-efficacy (Ghavifekr & Rosdy, 2015), and multi-level system (Law et al., 2016).

The literature review process of this study provides background and context for the research problem using a comprehensive search strategy. The date parameters of the search were set between 2010 and 2020 for peer-reviewed empirical research articles. The main databases used in the search were EBSCO, JSTOR, Google Scholar, and ResearchGate. A table of contents search was conducted on the current issues of the Educational Technology & Society research journal. Important initial search terms included technology, learning, teaching, TETL, TEL, leadership, principals, student achievement, technology-enhanced, barriers, and quality. Search techniques included quotation marks, Boolean operators, and specific year spans. After the initial search, possible gaps in the literature, as well as TETL barriers, began to surface. The following

search terms were added: multisystem, school leadership, belief, knowledge, ability, perception, skills, and self-efficacy.

The problem under investigation in this study was school leadership characteristics that increase teachers' abilities to integrate technology into their classrooms effectively. Literature found researching this problem was saturated in the positive effects of TETL on student achievement and teacher quality. Though the research was found related to the impact of school-level leadership on teacher quality and student achievement, limited empirical research was found concerning the leadership that promotes and fosters effective technology-enhanced teaching and learning. The need for multi-level research in the complex educational setting was discovered and further researched. Limited multi-level education empirical research was found, and none included TETL.

A linear organization strategy was utilized in the following sections of the literature review. The literature review began with looking at the theoretical framework for this study, Situational Leadership Theory, and other directly related theories. The following section establishes the background and importance of the study by examining TETL. This section is followed by a look at school-level leadership, including its influence on TETL. Next, a section identifying barriers, including the study's constructs, is found. Lastly, a conclusion section examines the state of the field's inconsistencies, and relevant patterns will be discussed as well as the practical significance of the previous research.

Theoretical Framework

Overview

Hersey and Blanchard's Situational Leadership Theory (SLT), originally known as Life Cycle Theory, suggests that there is no single best leadership style; instead, leadership style is task-relevant according to the follower's ability and willingness. The four leadership categories identified by SLT are as follows: Delegate, Support, Coach, and Direct. Each category requires different levels of leadership direction. Direct leadership requires the most leadership involvement with leaders providing specific directions and requiring close supervision of followers. Delegate leadership requires the least leadership due to responsibilities and decisions for implementation being turned over to an able and willing follower or group of followers. Hersey and Blanchard built upon previous theories and models to develop SLT (Blanchard et al., 1993; Hersey & Blanchard, 1972; Hersey, 1985).

Related Theories

The foundation of SLT was built upon Fiedler's Leadership Contingency Model. This model states that there is no one leadership style, and instead, the leader's success is based on the situation. According to Fiedler, three variables determine a situation's success: leader-member relations, task structure, and position power. A key differentiator between Fielder's model and SLT is Fielder's belief that the leader's style is fixed. SLT argues that a leader can change their style according to the task, followers' ability, and followers' willingness.

The dimensional aspect of SLT is rooted in the two-dimensional model created at Ohio State University. This was the first development of the four quadrants comparing

the initiating structure (tasks) and consideration (relationship), which resulted in four leadership styles contrasting the previously perceived autocratic/democratic model. Robert Blake and Jane Mouton's Managerial Grid grew from the Ohio State model but changed the comparison to concern for production and concern for people. The Managerial Grid also included a fifth point in the middle of the four quadrants representing the middle road managerial style. The difference between SLT, Ohio State Model, and Managerial Grid rests on SLT's multiple leadership styles producing success, whereas the Ohio State Model and Managerial Grid suggest a "best" style of leadership.

William Reddin developed the 3-D Management Style Theory based on Fiedler's situational approach. Redden's theory was the first to add an effectiveness dimension to previously existing models, such as the Managerial Grid, focusing on task and relationships dimensions. This expansion opened the possibility of various leadership styles being effective or ineffective depending on the task. Hersey and Blanchard's initial Life Cycle model built off this work, emphasizing the behavioral dimension and removing the normative labels from leadership styles (Hersey & Blanchard, 1972).

Situational Leadership Theory

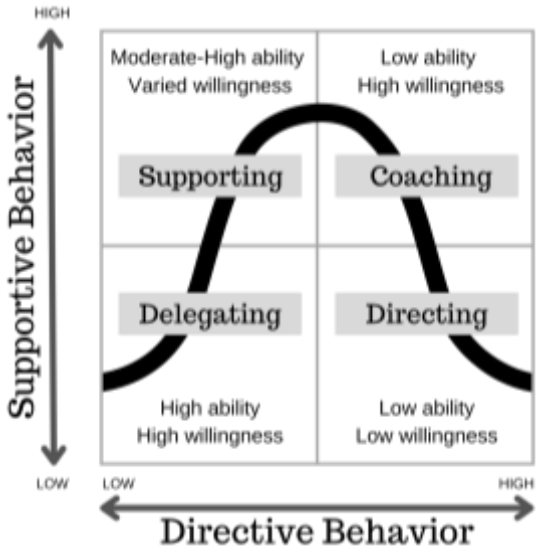
The Life Cycle Theory of Leadership, later known as SLT, first appeared in the ASDA Journal in 1969. This theory was built upon Reddin's 3-D Management Style Theory to address limitations Hersey and Blanchard felt existed. The Life Cycle Theory of Leadership was influenced by the variety of parenting leadership styles needed from infancy to adolescence to adulthood. Hersey and Blanchard felt the same was valid for managing workers in both educational and business settings. The Life Cycle Theory and

the subsequent SLT emphasize a curvilinear (bell-shaped) relationship between a leader's behavior and their followers (Hersey & Blanchard, 1972).

The relationship between the leader and follower is critical, and a key factor determining success is the leader's ability to assess the followers' readiness for a particular task. Readiness is the extent of a followers' ability and willingness to accomplish a specific task. Task ability includes the followers' knowledge, experience, and skill. Task willingness includes confidence, commitment, and motivation. SLT identifies four readiness levels and connects them to a leadership style to support a task (see Figure 2.1) (Hersey, 1985).

Figure 2.1

Situational Leadership Theory (Hersey, 1985)



In delegate leadership, the group takes responsibility for the task; this style is an option when followers exhibit high ability and willingness of the relevant skill. Support leadership emphasizes shared ideas and decisions; this style is best with followers who have moderate to high ability and variable willingness. Coach leadership finds the leader

in an active persuasive role; this style works when followers lack ability but have a high willingness. Direct leadership requires the leader to be in an active supervisory position; this style is an option when the followers lack ability and willingness (Blanchard et al., 1993; Hersey & Blanchard, 1972; Hersey, 1985).

Theory Critiques

Critics of Situational Leadership Theory recognize its popularity and possibly the most employed theory in the industry (Graeff, 1997). The issues with the SLT of the 1980s primarily rests in the followers' maturity moderating the effective leadership style (Blank et al., 1990; Graeff, 1997) and internal consistency problems (Aldag & Brief, 1981).

Due to limited and mixed empirical evidence to support SLT, Blank et al. (1990) developed a study to examine the followers' maturity moderating the effective leadership style. The study analysis did not support these assumptions.

The internal consistency problems derive from the lack of theoretical justification for the maturity components. The four levels of maturity consist of followers classified as M1 and M2 as being "unable" to complete the task and M3 and M4 as "able". The willingness of the followers only appears in M1 and M3 (Blank et al., 1990).

The current study avoided these issues by including followers with effective TETL, hence these followers possess high levels of ability and willingness. Additionally, this study is looking at the effective leadership style in relation to the leaders' ability and willingness by looking at their perception, skill, and self-efficacy of TETL.

Connection to Technology Enhanced Teaching and Learning

A school system's multi-level structure is complex; this structure includes the classroom, school, district, and state (Law et al., 2016; Liu et al., 2016). Real-life situations are frequently in a state of change and never static. No single formula can be applied to every situation (Hersey, 1985). The decisions at one level affect other levels and stakeholders within the system. Researchers must pay attention to the school system's multi-level structure to avoid the risk of ignoring influence within its complex layers (Law et al., 2016; Liu et al., 2016). Due to school complexity, one leadership style cannot be applied to all leadership tasks (Hersey, 1985), including effective technology-enhanced teaching and learning in the classroom.

The current study addresses both multi-level structure and varied leadership styles by including both district and school-level leaders as well as the previously mentioned ability and willingness by including perception, skill, and self-efficacy as three of the constructs.

Technology-Enhanced Teaching and Learning

The current digital revolution is filled with technological advancements (Berlinguer, 2012; Collins & Halverson, 2018; Cuban, 2010). The explosion of technology has impacted education (Collins & Halverson, 2018; Law et al., 2016; Trentin, 2012). In 1984, there were 1,000 internet-connected devices, and by 2019 this number had grown to 26.66 billion (Clark, 2014; Maayan, 2020). The percentage of public school instructional rooms with Internet access has increased from 3% in 1994 to 94% in 2005 (National Center for Education Statistics [NCES], 2006). Technology provides the opportunity to shift instruction from the traditional classroom with teacher-

led lessons to student-centered lessons focused on the active learning environment, which integrates the 21st-century skills of collaboration, creativity, critical thinking, and communication (Berlinguer, 2012; Daley et al., 2001; Law et al., 2016).

Technology-enhanced teaching and learning (TETL) is the integration of technology into teaching and learning practices to improve the quality of learning outcomes (Law et al., 2016). Effective TETL is an essential strategy for improving educational quality (Collins & Halverson, 2018; Ghavifekr & Rosdy, 2015; Law et al., 2016; Trentin, 2012). TETL is more effective than a traditional classroom because it provides an active learning environment with more engaging and beneficial lessons for both students and teachers. TETL in Malaysia is considered an essential element of future development in transforming the entire country (Ghavifekr & Rosdy, 2015).

International and National Focus

Various international and national agendas and standards promote the effective integration of TETL. In May 2015, the World Education Forum was hosted with over 1,600 participants from 160 countries. This forum resulted in adopting the Incheon Declaration for Education 2030, setting a new vision internationally in education for the next fifteen years. The final report of the World Education Forum of 2015 was published by United Nations Educational, Scientific, and Cultural Organization (UNESCO). Education 2030 aims for inclusive and equitable lifelong learning for all. This learning fosters creativity and knowledge, ensuring foundational literacy and numeracy skills, promoting analytical higher-order thinking skills, and developing interpersonal skills. Education 2030 promotes children's and adults' urgent need to build life skills aligned to our technology-driven world. This building of life skills requires pedagogical sound teaching and learning methods supported by technology, a focus on quality and

innovation requiring a strengthened STEM focus, and a promotion of lifelong learning and indicative strategies that include TETL (UNESCO, 2015). The Education for All Act of 2016 in the United States promotes sustainable, quality basic education, which includes digital literacy and strategies built from effective practices and standards to achieve quality universal education (Education for All Act of 2016, 2016).

The International Society for Technology in Education (ISTE) provides standards that serve as a framework for innovation in education. ISTE standards include standards for students, educators, leaders, and coaches. Standards for Leaders are broken down into the following sections: Equity and Citizenship Advocate, Visionary Planner, Empowering Leader, Systems Designer, and Connected Learner. The standards section for coaches is Change Agent, Collaborator, Learning Designer, Professional Learning Facilitator, Data-Driven Decision-Maker, and Digital Citizen Advocate (ISTE, 2018). The United States Common Core State Standards (CCSS) also include a focus on technology integration. In the CCSS in English Language Arts, students use technology to produce and publish writing, collaborate with others, and cite sources. In history, science, and technical subjects, students are asked to use technology to display information flexibly and dynamically to produce and publish writing products built both individually and collaboratively, which includes ongoing feedback (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). The Next Generation Science Standards (NGSS) include technology integration throughout the standards. NGSS breaks down each standard and performance expectation into three dimensions: Science and Engineering Practices, Disciplinary Core Ideas, and

Crosscutting Concepts. All three of these dimensions include technology integrations (NGSS Lead States, 2013).

According to the Technology Integration Matrix (TIM) framework which was developed by the Florida Center for Instructional Technology (FCIT) there are five interdependent characteristics of meaningful learning environments: active, collaborative, constructive, authentic, and goal directed. Each characteristic has five levels of technology integration: entry, adoption, adaptation, infusion, and transformation. TIM is used to guide the evaluation of technology integration in the classroom. Below is an overview of the five characteristics provided by FCIT (2019):

- Active - Students are actively engaged in using technology as a tool rather than passively receiving information from the technology.
- Collaborative - Students use technology tools to collaborate with others rather than always working individually.
- Constructive - Students use technology tools to connect new information to their prior knowledge rather than to passively receive information.
- Authentic - Students use technology tools to link learning activities to the world beyond the instructional setting rather than working on decontextualized assignments.

Junior High Biology Study

Research by Yang et al. (2015) studied the effectiveness of TETL on students in junior high biology. A quasi-experimental design was utilized for the study, which randomly assigned participating classes into two groups. The first group of students was divided into a conventional teacher-led learning environment with technology integration

limited to a projector display for PowerPoints. The other group of students was in an effective TETL environment, which was student-centered utilizing Interactive Whiteboard (IWB) technology. Four classes participated in the study, which consisted of 107 students. The research questions guiding this study are as follows:

1. Compared to a conventional ICT-integrated learning environment, how does an IWB-integrated learning environment improve junior high school student learning effectiveness for the topic of cell division?
2. Compared to a conventional ICT-integrated learning environment, how does an IWB-integrated learning environment influence students' attitudes toward the learning environment?
3. Compared to a conventional ICT-integrated learning environment, what differences does an IWB-integrated learning environment create in verbal interactions between teachers and students?

Prior to teaching cell division, students' knowledge was assessed. Cell division is a difficult topic for both teaching and learning at the junior high level. The teaching materials for each class contain the same content, but the delivery was different, comparing teacher-led with PowerPoints versus student-centered integrating IWB, including multimedia interactive learning.

Teacher interactions with students in all classes were noted and analyzed using the Flanders Interaction Analysis Categories (FIAC). FIAC is used to code and analyze verbal interactions between teachers and students in the classroom. Coding for this study consisted of sorting interactions into ten categories under the three major types of classroom interaction: teacher talk, student talk and silence, and confusion. Attitudes

towards the learning environment of students in both groups were collected using the Constructivist Multimedia Learning Environment Survey (CMLES). Both groups included multimedia but in different manners with the static use in the traditional classrooms and interactive engagement in the IWB classrooms.

The study found that the students in the IWB group exhibited significantly better learning effectiveness. The IWB group participants also had more positive attitudes towards their learning environment.

Supported Science Study

Research by Campbell et al. (2015) explored the impact of a professional development project supporting TETL in science classrooms. Study participants were teachers and students in sixth through eighth-grade science classes from two states: one eastern and one western United States. The eastern state participants were ten schools from two boroughs in New York. The western state participants represent a sample population in two school districts in Utah. Teacher participants totaled 27 for the intervention group and 30 for the controlled group. The time period for the study was from fall 2011 to spring 2012. The two research questions addressed in this study were as follows:

1. What is the impact of 1 year of professional development on:
    a. Reformed-based and technology-integrated instruction?
    b. Teacher learning?
    c. Teacher and student new literacy skills and ICT capabilities?
2. What is the impact of typical instruction versus professional development model supported instruction on student achievement?

This technology-supported science professional development project included 120 hours of professional development yearly. The professional development project emphasized TETL strategies, including literacy development and inquiry-based teaching. The professional development focused on instructional strategies using technologies to support new literacy development and inquiry-based science. The study's research design compared teachers who completed the professional development and their students to groups without professional development. Instructional practices of teachers were assessed with the Reformed Teaching Observation Protocol (RTOP) and Technology Use in Science Instruction. A post-professional development questionnaire was also incorporated which utilized the New Literacy Scenarios (NLS) and ICT instruments to assess teacher and student literacy and ICT skills. Student achievement was assessed on a criterion-referenced test (CRT) for those in Utah.

The research revealed positive teacher and student outcomes in TETL and student achievement in science. Low socioeconomic and non-white student populations seemed to benefit the most.

Despite research validating the benefit of TETL to aid and support students' learning, the integration of technology differs vastly between classrooms, schools, and districts (Ghavifekr & Rosdy, 2015). TETL is an important strategy for improving educational quality, and school-level leadership directly affects it (Chang, 2012; Ghavifekr & Rosdy, 2015; Law et al., 2016).

School-Level Leadership

School-level leadership improves teachers' effective TETL (Chang, 2012), and there is a need for research in this area (Berret et al., 2012; Ghavifekr & Rosdy, 2015;

Law et al., 2016). Current TETL research predominantly focuses on the classroom level. A comparison search on Google Scholar demonstrates the disproportion of research. Searching "teachers effect on technology integration in the classroom" and removing principal and leader results provided 153,000 articles, whereas a search for "principal effect on technology integration in the classroom" minus teacher and leader results produced 33,600 articles. Furthermore, a view of the first ten *teacher* search results only had one article not directly connected to teachers and TETL. The first ten *principal* search results only had one article directly connected to principals and TETL. Researchers must pay attention to the school system's multi-level structure to avoid the risk of ignoring influence within its complex layers. Valuable insight is lost without focusing on school-level leaders' role in TETL (Chang, 2012; Law et al., 2016; Liu et al., 2016).

School-level leadership must develop and implement a TETL vision and school plan (Chang, 2012; Ghavifekr & Rosdy, 2015; Law et al., 2016). The school plan should align with national, state, and district technology agendas (Raman et al., 2014).

The two greatest hindrances of TETL integration in the classroom found in Ghavifekr and Rosdy's (2015) research were top management with a mean of 2.08 and lack of time to learn with a score of 3.00. School leaders are crucial in the school system's multi-level infrastructure to promote and foster TETL (Kincaid & Feldner, 2002; Law et al., 2016). Future research needs to emphasize involvement and technology integration from leadership (Berret et al., 2012; Chang, 2012; Fisher & Waller, 2013; Raman et al., 2014).

Leadership Effect Secondary Schools Study

Research by Raman et al. (2014) examined the influence of principals on technology use. Random sampling of the secondary school principals and teachers in Kedah, Malaysia, provided the study population of 118 principles and 234 teachers.

The Principal Technology Leadership Assessment (PTL) was utilized to measure the principal's technology leadership representing the dependent variable. The Teachers Technology Use Survey (TTU) was used to measure the use of technology in the classroom representing the independent variable. SPSS statistics software was used for a simple linear regression analysis to discover the relationship between the two variables.

This study found that a principal's technology behavior could statistically significantly predict teachers' technology use. The regression formula (TTU) = -0.825 + 0.037 (PTLA score) indicates that one unit of change in the principal's technology leadership score could increase teachers' technology use in the classroom by 0.04.

Implementations of this study for principals is for them to be directly involved in the school's technology plan. This plan should align with the national, state, and district technology agenda. Further research is suggested, including quantitative and qualitative methodologies to produce a more robust relationship between the principals' technology behaviors and teachers' technology use in the classroom (Raman et al., 2014).

21st Century Principal Study

Research by Fisher and Waller (2013) examined the relationship between principals' technology leadership and teachers' ability to integrate technology in the classroom. Study participants were selected from Texas K-12 campuses, which were eligible for eRate funds. The selected population was found on all three of the following

reports: Texas Campus School Technology and Readiness (STaR) Chart, Texas Teacher STaR Chart, and No Child Left Behind (NCLB) Principal's Technology Self-Assessment. The selected campuses also scored Target Tech in the Infrastructure domain of the Texas Campus STaR Chart. The study population consisted of 328 principals and 303,950 teachers.

Pearson correlations were conducted to analyze the relationship between principals' technology leadership and teachers' ability to integrate technology in the classroom. The L1 scores on the NCLB Principal's Technology Self-Assessment yielded the strongest correlation to all teachers' TL scores. The NCLB L1 scores represent proficiencies related to leadership and the vision of technology. This study found strong technology leadership positively correlates to teachers' ability to integrate technology effectively.

Implementations of this study are the need for school leadership to understand TETL methods and strategies. Further research is suggested to include longitudinal replication of the study, which also includes interviews transitioning the research to mixed methods (Fisher & Waller, 2013).

Barriers

TETL provides numerous opportunities for effective teaching, but its effective integration faces many barriers. Three factors that significantly influence TETL are the educator's perception (Cope & Ward, 2002), skill, and self-efficacy (Ghavifekr & Rosdy, 2015).

Educator perception of technology is vital to successful TETL (Cope & Ward, 2002; Koszalka & Wang, 2002; Law et al., 2016). Desired perceptions are educators

perceiving TETL as part of student-led teaching and tools that encourage deep learning (Cope & Ward, 2002). Educators have the ability to shape how students perceive technology (Pittman & Gaines, 2015). Leaders' positive TETL perception have the ability to promote successful teacher integration in the classroom (Machado & Chung, 2015; Webb, 2011). Current research needs to broaden to include this factor (Cope & Ward, 2002; Koszalka & Wang, 2002; Law et al., 2016).

One of the most substantial barriers preventing effective TETL is the lack of educator's skills (Ertmer et al., 2012; Ghavifekr & Rosdy, 2015; Raman et al., 2014). Increases in educators' TETL skills improve teaching methods and promote learning infused with 21st-century skills (Ghavifekr & Rosdy, 2015). Almalki's (2020) research found a direct correlation between educators' TETL skills and technology integration, which was statistically significant. School-level leaders' TETL skill growth of one unit could increase the teachers' technology use by .04 (Raman et al., 2014). Leaders who provide mentoring teachers with strong TETL skills promote higher levels of TETL on their campuses (Webb, 2011). Educators with high TETL skills have the self-efficacy needed to integrate the technology into the classroom (Hennessy et al., 2005).

Lack of educators' TETL self-efficacy is another barrier in its successful integration (El-Daou, 2016; Ghavifekr & Rosdy, 2015; Liu et al., 2016). Limited self-efficacy in TETL restricts its integration in the classroom (Liu et al., 2016). A strong relationship (r=0.99) between educators' self-efficacy and TETL was found in El-Daou's 2016 study. Educators are not given enough time to learn and be comfortable using technology in the classroom; time that can be provided by school-level leadership (Ghavifekr & Rosdy, 2015).

Summary

Technology provides the opportunity to shift educational instruction from teacher-led to student-centered lessons focused on the active learning environment integrating 21st-century skills (Berlinguer, 2012; Daley et al., 2001; Law et al., 2016). An essential strategy for improving educational quality is effective TETL (Collins & Halverson, 2018; Ghavifekr & Rosdy, 2015; Law et al., 2016; Trentin, 2012). Despite research validating the benefits of TETL to aid and support the student's learning, integration of technology differs vastly between classrooms, schools, and districts (Ghavifekr & Rosdy, 2015). School-level leadership improves teachers' effective TETL (Chang, 2012). To develop an understanding of the school-level effect on TETL in their schools, this chapter reviewed current TETL studies related to school-level leadership and factors influencing integration.

The literature review revealed a significant need for additional research on school-level leadership in relation to effective TETL (Berret et al., 2012; Ghavifekr & Rosdy, 2015; Law et al., 2016). The complexity of a school system drives the need for a multi-level approach in research to avoid the risk of ignoring influence within its complex layers (Law et al., 2016; Liu et al., 2016). Due to this complexity, one leadership style cannot be applied to all situations. Situational Leadership Theory identifies four leadership categories for various situations: Delegate, Support, Coach, and Direct (Blanchard et al., 1993; Hersey & Blanchard, 1972; Hersey, 1985). The literature reviews also revealed the need for the research on school-level leadership concerning effective TETL to include qualitative methodology (Raman et al., 2014), including interviews (Fisher & Waller, 2013).

TETL provides numerous opportunities for effective teaching, but its effective integration faces many barriers. Three factors that significantly influence TETL are the educator's perception (Cope & Ward, 2002), skill, and self-efficacy (Ghavifekr & Rosdy, 2015). Current TETL research needs to broaden to include perception (Cope & Ward, 2002; Koszalka & Wang, 2002; Law et al., 2016). Almalki (2020) and Raman et al. (2014) research studies found a statistically significant influence of educators' TETL skills on its integration into the classroom. A strong relationship (r=0.99) between educators' self-efficacy and TETL was found in El-Daou's 2016 study.

This study will add to the body of research on TETL by expanding it to include school leadership characteristics that promote effective TETL. Additionally, this study will examine the relationship between the district and school-level leaders' perception, skill, and self-efficacy of TETL in their leadership. Multi-level influences are revealed through the inclusion of district-level leadership. In the next chapter, the research methodology for this study will be described.

CHAPTER 3

METHODOLOGY

The purpose of this qualitative study was to develop a school leadership model that promotes and fosters effective technology-enhanced teaching and learning (TETL) in PK-12 education. Ghavifekr and Rosdy's (2015) study validates the benefit of TETL, yet the integration of technology differs significantly between classrooms, schools, and districts. School leaders have a substantial influence on classroom practices (Machado & Chung, 2015). The complexity of a school system directs the need for a multi-level approach in research to avoid the risk of ignoring influence within its complex layers (Law et al., 2016; Liu et al., 2016). This study examined district and school leaders' perceptions, skills, and self-efficacy of TETL using a framework based on Hersey and Blanchard's Situational Leadership Theory. The methodology is described in the following sections: Search Methods, Research Questions, Research Design, Sample Selection, Data Collection, Data Analysis, Validity and Reliability, and Assumptions, Delimitations, and Limitations.

Search Methods

Keywords: technology-enhanced teaching and learning, TETL, TEL, perception, skill, self-efficacy, multi-level, situational leadership theory, situational leadership model, leadership, principal, classroom.

Resources: EBSCO, Educational Technology & Society, Educational Technology Research and Development, Google Scholar, JSTOR, ResearchGate.

Search Techniques: quotation marks, Boolean operators, specific year span, file type, site-specific, synonyms of keywords.

Research Questions

The research questions which guide this study are as follows:

RQ1: How do school leaders' perceptions influence their leadership characteristics to foster effective TETL?

RQ2: How do school leaders' skills influence their leadership characteristics to foster effective TETL?

RQ3: How do school leaders' self-efficacy influence their leadership characteristics to foster effective TETL?

Research Design

This study employed a qualitative, multiple-case design. According to Merriam (2009), qualitative research focuses on "process, meaning, and understanding" (p. 14). A qualitative, multiple-case design approach was the most appropriate research design for this study because of its complex nature. This is a social science study, and the "most important" determinate among the social science research methods is the study's research question (p. 11). This study's research questions ask "how," which narrows the research method to case study, history, or experiment. The experiment research method requires control over the behavioral events, which is not possible with this study. The history

research method does not focus on contemporary events (Yin, 2018), which this study includes.

To adequately understand the complex nature of exploring school systems, a multi-level, multi-case study research was utilized. The case study method allowed the researcher to investigate the school leader in-depth and within their natural settings. Yin's (2018) embedded multi-case study design provides a framework appropriate for exploring TETL, leadership, perceptions, skills, and self-efficacy; these are the constructs that were analyzed.

Sample Selection

A purposeful sampling strategy was used to select participants for this study. Purposeful sampling is a form of non-probability sampling in which the selection of participants is based on population characteristics and the purpose of the study (Merriam, 2009).

The population characteristics considered for participant selection are Louisiana public school districts that are considered highly effective in TETL. The study districts were selected by the Louisiana Association of Computer Using Educators' (LACUE) board members based on their knowledge of the TETL in the districts as well as this study's defined district size: small, medium, large. For this study, a district was classified as small if the student population was less than 3,000. If the student population was 3,001 to 9,999, the district was classified as medium. Districts with a student population of 10,000 and over were classified as large. One school district from each size category was selected.

Selection Process

The sample selection process began with the creation of a Google Form that includes all Louisiana public school districts categorized into small, medium, and large [Appendix A]. LACUE board members identified up to three Louisiana public school districts per category that they felt promoted and fostered highly effective TETL.

An email went out to all LACUE board members requesting participation in the study (Appendix B). The email included a link to the Google Form. Two reminder emails were sent to the board members (Appendix C and D). Of the board members, 75% participated in the study. District 1 was selected by 72.7% of the respondents to represent the large district in the study. District 2 was selected by 100% of the respondents to represent the medium district in the study. District 3 was selected by 90% of the respondents to represent the small district in the study. Figure 3.1 displays large districts which receive at least one vote. There were 17 large districts included in the questionnaire.

Figure 3.1

Large District Case Selection

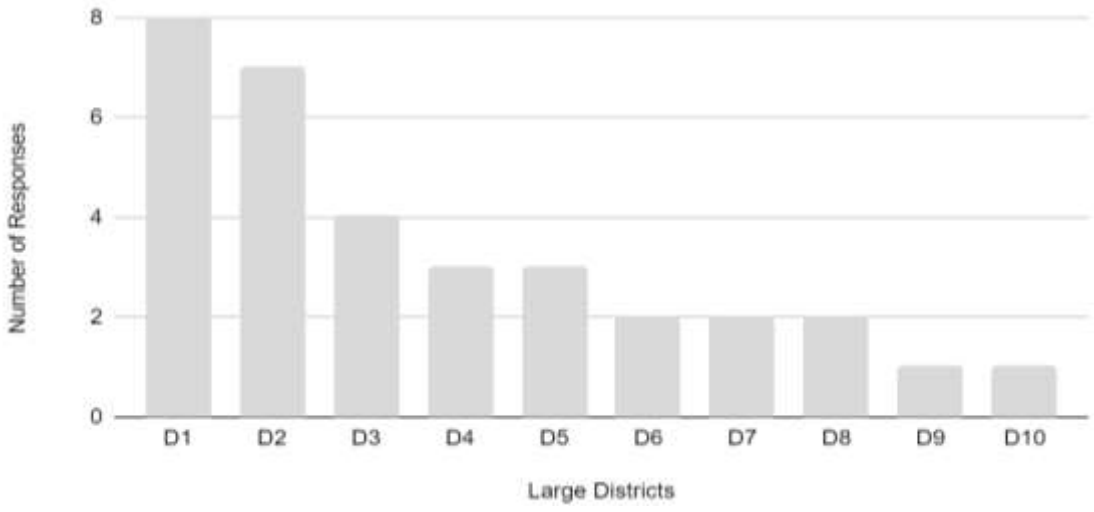


Figure 3.2 only displays medium districts which receive at least one vote. There were 29 medium districts included in the questionnaire.

Figure 3.2

Medium District Case Selection

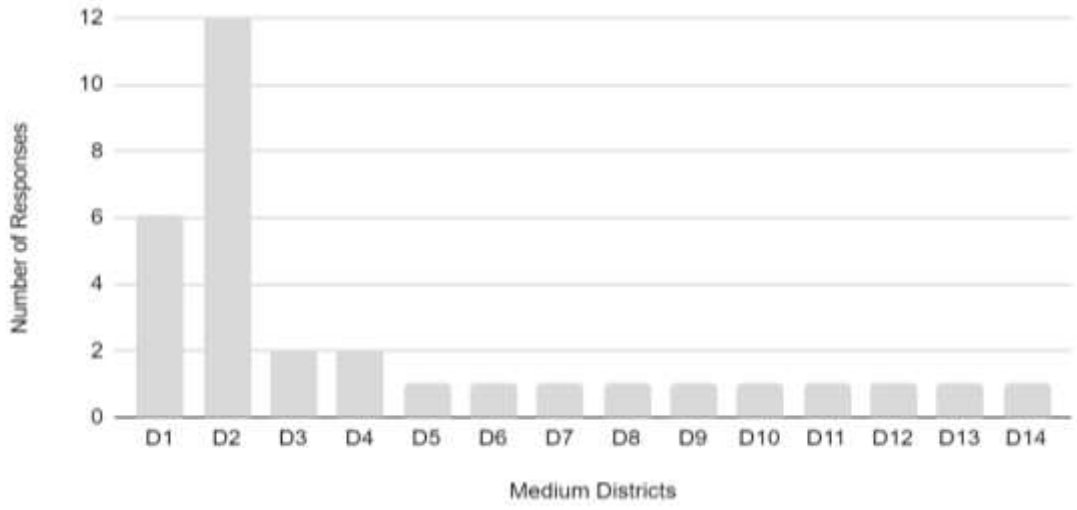
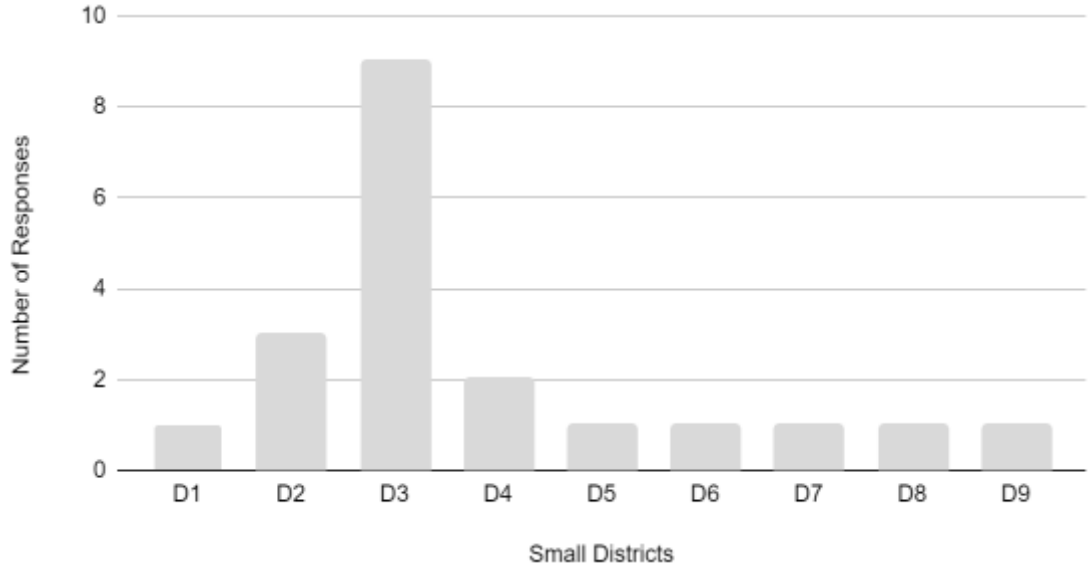


Figure 3.3 only displays small districts which receive at least one vote. There were 23 small districts included in the questionnaire.

Figure 3.3

Small District Case Selection



The case for this study were the districts selected from the complete LACUE form. The district TETL leader provided three schools within the district with effective TETL. The study's sample was determined according to the district selection and the district-identified schools which are the TETL district leader and the leader of each school.

Data Collection

The data collection methods for this study are multi-level interviews. The multi-level interview approach was selected due to the complexity of school systems in order to avoid the risk of ignoring influence within its complex layers (Law et al., 2016; Liu et al., 2016). Pseudonyms were used for districts, schools, and participants participating in the study to ensure confidentiality. A case study protocol was developed for this study which included the following four sections: an overview of the case study, data collection

procedures, protocol questions, and an outline for the case study report (Yin, 2018). See Appendix E for the case study protocol.

Interviews

Yin (2018) identifies interviews as "one of the most important sources of case study evidence" (p. 118). Interviews are targeted and insightful, providing opportunities to focus directly on the study topics and add depth to the data. The interviews carefully followed the case study protocol for questions. There are three case study interview types recognized by Yin (2018): prolonged case study interviews, shorter interviews, and survey interviews. For this study, the shorter case study interview was used, lasting about 40 minutes each (Yin, 2018).

A structured interview approach was taken during this study. This approach increased the ability to compare responses between the various school districts (Merriam, 2009). With the structured interview approach, the researcher develops questions and their sequence before the interview. Patton (1990) suggested six types of questions that were used to help generate quality interview responses. These question types are as follows: experience/behavior, opinion/value, feeling, knowledge, sensory, and background/demographics. Background/demographic questions were kept to a minimum (Patton, 1990). The sequencing of the questions began with more comfortable, straightforward questions that encourage descriptive responses to elicit greater detail (Patton, 1990). The questions were "open-ended, neutral, singular, and clear" (Patton, 1990, p. 295). The interview protocol consisted of 14 questions for district TETL leaders and 13 questions directly for school-level leadership [Appendix F and G]. Each question

was aligned with the constructs driving the research which are TETL, leadership, perception, technology skills, and self-efficacy.

The procedure for the interview process began with an email to each district leader notifying them of their district recognition as a top Louisiana district that promotes and fosters effective TETL and asking them to participate in the study. A general study overview was provided with the initial email [Appendix H]. Once the district leader agreed to participate in the study, they completed the IRB consent form and received a copy of the interview questions in a follow-up email [Appendix I]. Due to the current COVID-19 pandemic regulations, interviews were conducted virtually. The interviews were recorded with the permission of the participants and transcribed. During each of the district leader interviews, three district schools were identified and the contact information for each school leader was provided.

The procedure for the school leader interview process began with an email to each school leader notifying them of the district recognition as a top Louisiana TETL school and asking them to participate in the study. A general study overview was provided with the initial email [Appendix J]. Once the leader agreed to participate in the study, they completed the IRB consent form and received a copy of the interview questions [Appendix K]. Due to the current COVID-19 pandemic regulations, interviews were conducted virtually. The interviews were recorded with the permission of the participants and transcribed.

A case study database was created to store and organize all data from the study (Yin, 2018). A Google Form and corresponding spreadsheet were created to serve this purpose.

Data Analysis

An analysis strategy of the constructs was followed to analyze the study's data (Yin, 2018). Constructs drove the objectives, design, and research questions of this study and thus have analytic properties. The constructs to analyze for this study were TETL, leadership, perception, skill, and self-efficacy. Each of these was analyzed per case. This study's case is each district.

Deductive manual coding was used to analyze the interview transcripts and artifacts (Stake, 1995). Deductive coding refers to using a predefined set of constructs to be assigned to the qualitative data (Stake, 1995). The predefined set of constructs for this study are TETL, leadership, perception, skill, and self-efficacy. All five constructs are as they relate to the study topic of TETL.

An essential strategy for improving educational quality is effective TETL (Collins & Halverson, 2018; Ghavifekr & Rosdy, 2015; Law et al., 2016; Trentin, 2012). The integration of technology differs significantly between classrooms, schools, and districts (Ghavifekr & Rosdy, 2015). The construct of TETL is included in this study to provide a picture of its effective integration in the district and each school. Perception, technology skills, and self-efficacy constructs were selected due to their influence on TETL. A leaders' positive perception of TETL has the ability to promote successful teacher integration in the classroom (Machado & Chung, 2015; Webb, 2011). TETL skill growth of school-level leaders by one unit could increase the teachers' technology use by .04 (Raman et al., 2014). Lack of self-efficacy related to TETL is a barrier in its successful integration (El-Daou, 2016; Ghavifekr & Rosdy, 2015; Liu et al., 2016). TETL,

leadership, perception, technology skills, and self-efficacy on the district and school levels are constructs included in this study.

Both district and school-level leaders were included in this study due to the complexity of a school system, driving the need for a multi-level approach in research to avoid the risk of ignoring influence within its complex layers (Law et al., 2016; Liu et al., 2016). The decisions at one level affect other levels and stakeholders within the system. Researchers must pay attention to the school system's multi-level structure to avoid the risk of ignoring influence within its complex layers (Law et al., 2016; Liu et al., 2016).

The deductive coding in this study was done manually in lieu of utilizing the software. First, the researcher read through the data. Next, the data were color-coded for keywords and phrases representing the predefined set of codes. Next, coded data were categorized and then grouped by case to make assertions from the findings.

Next, the researcher conducted a cross-district comparison identifying common themes across districts. All data analyses were evaluated for analytical generalizations on which the school leadership model was developed. A case study report was created to share findings (Yin, 2018).

Trustworthiness

To ensure this study's trustworthiness, various strategies were employed for validity and reliability to minimize threats (Merriam, 2009). The four design tests mentioned by Yin (2018) that are common to social science studies were addressed in this study: construct validity, internal validity, external validity, and reliability. Since case studies can be utilized in qualitative and quantitative research, this study used terms as defined by Yilmaz (2013) for qualitative research: confirmability for construct

validity, credibility for internal validity, transferability for external validity, and dependability for reliability.

Confirmability

Confirmability is the degree to which inferences can be made due to operational measures (Yin, 2018). To minimize threats of confirmability, multiple-level interviews were collected throughout the multiple-case study. Triangulation of data was achieved through the ability of findings to be confirmed through various sources of data (Merriam, 2009). Additionally, the data collected were placed in a case study database.

Credibility

Credibility seeks to establish authentic relationships within a study. To reduce threats of credibility, pattern matching was included in the data analysis procedures (Yin, 2018).

Transferability

Transferability is the ability to generalize case study findings (Yin, 2018). To minimize transferability threats, ethical considerations included explaining the purpose of the methods selected, case study protocol, confidentiality, and informed consent (Merriam, 2009). The multiple-case study method for this study provides replication logic (Yin, 2018).

Dependability

Yin's (2018) "two highly desirable tactics" for dependability are included in this study: case study protocol and case study database (p. 44). Dependability refers to the case study's ability to be repeated with the same results (Yin, 2018). Clear communication with participants included sharing the case study protocol to reduce the

undependability of treatment implementation (Muijs, 2010). The same procedures and tools were utilized for both district and school-level interviews.

CHAPTER 4

RESULTS

The problem under investigation in this study was school leadership characteristics that increase teachers' abilities to integrate technology into their classrooms effectively. The purpose of this qualitative study is to develop a school leadership model that promotes and fosters effective technology-enhanced teaching and learning (TETL) in PK-12 education.

The purpose of Chapter 4 is to summarize the information collected to answer the research questions. This information is organized into four sections, one section for each of the three districts followed by a cross-case comparison. Within each district's section, there is a district leader section and a section for each school leader. Within the district leader section, the following information is reported: TETL in the district, district leader's leadership style, and the district leader's perception, skill, and self-efficacy related to TETL. Within the school leader section, the following information is reported: TETL in the school, school leader's leadership style, and the school leader's perception, skill, and self-efficacy related to TETL. The fourth section is a cross-district comparison noting similar themes found among the sample.

To provide confidentiality of study participants, a coding system was used. The first two letters DL or SL distinguish between the district leader and the school leader. The following digits 1, 2, or 3 represent the district. An example of the code is DL1. This refers to a TETL district leader in district 1. In most districts, this role would be the technology coordinator or a similar role. The lowercase letter at the end of the code for school leaders references the school. Another example of the code is SL1a. This refers to the school leader in district 1 at school a. For this study, that is the principal of the school. These codes are outlined in the Table 4.1.

Table 4.1

Participant Codes

Code	District	Description
DL1	1	District level leader in the large size district
SL1a	1	School-level leader in district 1 at school a
SL1b	1	School-level leader in district 1 at school b
SL1c	1	School-level leader in district 1 at school c
DL2	2	District level leader in the medium size district
SL2a	2	School-level leader in district 2 at school a
SL2b	2	School-level leader in district 2 at school b
SL2c	2	School-level leader in district 2 at school c
DL3	3	District level leader in the small size district
SL3a	3	School-level leader in district 3 at school a
SL3b	3	School-level leader in district 3 at school b

District 1

District Leader

Technology Enhanced Teaching and Learning

The district technology leadership hierarchy begins at the top with a superintendent. The superintendent for District 1 served on a committee that "evaluated all the learning tools and major systems being used" throughout the district (DL1). Participant DL1 is in charge of both Information Technology (IT) and educational technology. According to DL1, the IT side includes a "tech support network, tech support equipment, [and] tech help desk." The district educational technology side consists of a coordinator and six technology facilitators. The coordinator's duties include running the Technology Training Center. The coordinator also works with ten teachers in each school, which is a part of their building leadership model to ensure all schools are increasing technology integration into their curriculum. DL1 explains this program, called Impact, helps to "spread out the experts throughout all the schools." The impact program is led by the curriculum department, but the coordinator and technology facilitators conduct the training. The technology facilitators are assigned to specific schools and "work with teachers during PLC" time or even "teach lessons in the classroom with the technology" (DL1). Additionally, the district has "showcase teachers…a group of high tech model classroom teachers" who are paid to work with three schools a year (DL1). Each school also has a tech contact (DL1).

The district technology team doesn't "force the technology" but instead "gets the curriculum people involved in everything" (DL1). DL1 described this further, "In this district…we don't just use technology to use technology. The goal is to use technology to

enhance the learning and provide additional opportunities for the kids" (DL1). DL1's team focuses on technology having a meaningful connection to help teachers and students "work collaboratively…[and] help provide skills to think outside the box" (DL1). According to DL1, the "number one thing is to empower these kids with the ability to make their own choices" (DL1). While in the schools throughout the district, the district technology team pushes "differentiated instruction…to meet the needs…of all students," including the use of assistive technologies (DL1). All training provided by the technology coordinator and technology facilitators includes something related to differentiation and assistive technologies. In addition to the training, which includes webinars and face-to-face opportunities, the district provides a newsletter. The newsletter "previously had a mix of content and now focuses on one topic" due to DL1 feeling the "teachers were getting lost with the mixed content" (DL1).

District 1 has "quite a bit of technology" (DL1). The district is one-to-one; all of their students have a laptop. The district standardized with Microsoft 365 and Dell 3310 laptops for both the teachers and the students. The standard classroom is equipped with an interactive Promethean ActivBoard, but the "Title 1 department is helping with the shift to Promethean ActivPanels" (DL1). In addition to the standardized Microsoft suite, laptops, and interactive boards, classrooms also contain various equipment, including document cameras, video cameras, Swivls, and classroom amplification systems. The district also has a check-out system for equipment, including "tons of robotics and STEM equipment" such as 3D printers and AR/VR tools (DL1). The only requirement for equipment checkout is attending training on the item. For example, if a teacher wants to check out a 3Dprinter, and previously "attended an in-service with [them] on 3D

printing," they can check it out (DL1). "If a teacher has not had the professional development," one of the technology facilitators will conduct "a 30-minute training so that they can use it properly" (DL1). Technology facilitators will also facilitate various Microsoft Teams with groups of teachers. An example of this is the Canvas Team created when the district "made the shift after 23 years from Blackboard…[to] Canvas" (DL1). By creating a Microsoft Team, teachers not only have the option to meet with technology facilitators and have instant access to ask questions but also access to an environment providing a searchable resource for most questions teachers or administration would ask (DL1).

Teachers in District 1 can also purchase equipment for the classroom through points earned by attending training. Teachers "come to take classes and earn points for whatever equipment [they] want for the classroom" (DL1). Each hour of training earns one point. The most expensive item, an ActivBoard, costs 80 points (DL1).

An example given by DL1 of the connection between curriculum and technology is "a math teacher using Desmos calculator so that the kids are spending more time analyzing the data, instead of plotting points" (DL1). The decision to standardize with Microsoft boiled down to the local industry; DL1 explained, "The tools that [they] have in this district meet the needs of students in this area" (DL1). If you "talk to people who work at the plants, they're talking about their One Drives. Nobody…in the plants use Google" (DL1). If the students "can handle Microsoft Word, they can definitely handle the watered-down version of a Google Doc" (DL1). Another software DL1 uses is Brightbytes. Brightbytes is the data collection software used to "survey [the] district two times a year" (DL1).

DL1 has found "with all the movement to one-to-one, there has been a need for incorporating digital citizenship in all aspects…in real-time." DL1 desires teachers to understand "What does it mean to be a responsible user of [this] device?" in their classrooms. An example of the implementation of Brightbytes data connected with digital citizenship is the coordinator's use in grades 3 through 12. The survey has "data specifically about technology digital citizenship" (DL1). As a result, the technology coordinator can see "where the district needs to be with digital citizenship…because the kid's answer quite honestly" (DL1).

Leadership

Participant DL1's role in the district "is to provide a framework and the goals of what [they're] going to accomplish during the year," while looking "at the data to make sure that [they're] going in the right direction" (DL1). When DL1 first met the coordinator, it was during an InTech training. "After the training, DL1 told the superintendent, 'I found our next facilitator'" (DL1). The coordinator began as a model classroom teacher and then transitioned to a technology facilitator and now coordinator. Another example of participant DL1's leadership was at the "beginning of the pandemic…a big committee [was] pulled together with 50 people" (DL1). This committee brought together various district stakeholders, including parents, principals, and the superintendent. Participant DL1 led the committee with a goal to evaluate "all the learning tools and major systems" of the district (DL1).

Perception

Participant DL1's perception of TETL is that educators should "use technology to enhance learning," not "just use technology to use technology" (DL1). According to

DL1, effective TETL "all depends on the school leadership." DL1 provides context for the importance of TETL:

> [It is] essential and necessary for kids today. The world is changing, and if we don't push technology in the classroom, we wouldn't be meeting the needs of our students and what they need for the future...The idea of a learning management system…is vital even though [we] are…almost to a sense of normalcy [from the COVID-19 pandemic]. It's been neat to watch our teachers use it as a way to keep their students on the same page.

Skill

Participant DL1 describes their technology skills as advanced and is "always emerging and learning new things" (DL1). Participant DL1 uses word processing, spreadsheets, presentation software, and social networking regularly along with web 2.0 tools, learning management systems, and video conferencing. D1 relies a lot on Microsoft Teams as a district. Teams provide the ability to connect everyone throughout the district. The district learning management system, Canvas, is also used to a great extent. DL1 continues to learn through involvement with organizations such as ISTE, TCEA, and LACUE. TETL growth also happens through networking with "national experts like Matt Miller and Monica Burns" and subscribing to various listservs (DL1).

Self-Efficacy

Concerning self-efficacy, participant DL1's "biggest thing is…to serve as a model in the district" is not to just talk the talk, but "do things to prove what we believe in" (DL1). DL1 and the entire technology staff "got ISTE certified during the pandemic to

help combat the disconnection from missing live conferences" (DL1). The ISTE certification was a "great time for self-reflection and looking at leadership" (DL1).

School Leader 1a

Technology Enhanced Teaching and Learning

According to Participant SL1a, several people assist with the school's TETL, including a technology facilitator "that oversees a number of schools, so [teachers] have a support person." The technology facilitator's assistance includes "support…in service…[and] PLC time" (SL1a). Each school also has teachers who serve as tech contacts. The district pays the tech contact teachers a small stipend. SL1a stated that the tech contacts are the "troubleshooting people at each grade level. You need people to be able to solve quick problems." In addition to the technology facilitator and tech contact, SL1a adds that the school also has "three main people that deal with just the organization of it all and the maintenance" (SL1a).

In District 1, there has been a big push for one-to-one devices. SL1a mentioned that at their school, "PreK through second grade are all supplied with iPads. Third through fifth grades, all have their own laptops." There is also a virtual program at the school, but SL1a stated that "it's really only about three kids right now. Post-hurricane it was over 100." In addition to the one-to-one devices, the school has classroom mic systems, document cameras, and charging stations for the devices. With the district's standardization of Microsoft 365, that suite of software is used heavily. There is also a separate contract with Zoom. SL1a notes a current initiative:

> There is a robotics push right now. We're at the very infant stages. This is really our first year. With so much new such as a new science curriculum, just returning from not only a pandemic but hurricane circumstances,

> [robotics wasn't prioritized]. We didn't want to overload anyone…I think we've kind of had a concerted effort not to put any real hard mandates on our teachers in the short term. [This] probably stems from them [teachers] being so open to incorporating new things.

Participant SL1a states, "As a school Classkick has been something that's been universally adopted. We've had positive feedback and its [Classkick] mainly just the teachers being able to interact in real-time with the students' work." SL1a describes this process as "the lesson gets uploaded into Classkick, all the students can be working on kind of like a whiteboard…the teachers are seeing the real-time work…it's a nice convenient tool, because then it collects data." This software provides a lot of interactivity which SL1a notes is a "thing that we expect" (SL1a).

Leadership

Participant SL1a is the principal of an elementary school in District 1. SL1a emphasized that "the district sets the tone [because District 1 has] always been at the forefront of technology integration…all of the schools have just been on board." DL1 mentioned, "Even before the pandemic, [SL1a's] goal was to have student devices for everyone, so they invested in the technology, and…professional development" (DL1). There has been a shift in the need for leadership assistance presently versus 14 years ago when SL1a joined the administration at the school. SL1a has found TETL to be "less reliant on the administration" as in previous years but notes that this "might not be across the board everywhere." An example provided was that years ago, SL1a was working directly in all aspects of TETL, including being the person to install all of the projectors in the school. Nowadays, it is much different; SL1a explains, "Teachers…can enroll in all

these different courses and our district does a good job of promoting and rewarding that," thus decreasing the need for school leaders to "really have to worry too much about that now at the school level" (SL1a).

SL1a "doesn't mind going into [a classroom to] troubleshoot when someone is having some difficulty," but the teachers "definitely know more about the tools that they're using" (SL1a). In addition, the district provides a technology facilitator, so the teachers have a direct district facilitator. The school also has designated technology contacts, and there are an additional "three main people that deal with the organization and maintenance…for each grade level" (SL1a).

When SL1a and other school leaders "see new things incorporated, when [they are] doing formal observations, or just see something creative being used and implemented…[they] try to share that [information] out. Faculty can then ask [the fellow teacher] further questions" (SL1a). During monthly principal meetings, SL1a points out, "[they will] introduce something that's either coming up or something for us to find out more about" (SL1a).

Perception

Participant SL1a attributes the prioritization of TETL as the reason why it feels "less reliant on the administration" now versus previous years (SL1a). At SL1a's school, integrating technology in the classroom is partly due to "kind of peer pressure…you have to get on board, or else you can't talk the same language" (SL1a). Teachers attend district training and come back excited. This spreads to other teachers as they observe each other or in team meetings. SL1a observes, "[students are] less resistant to doing work if it's on

a device, rather than just on a worksheet. That's been pleasant to see as [we] go through the classrooms."

SL1a explains that no one in District 1 "really digs in their heels and is resistant to it [TETL]. The [COVID-19] pandemic…fast-forwarded that thinking if anyone was in that frame of mind because you had to shift...There was no other way around it" (SL1a).

Skill

Participant SL1a describes their technology skills as above-average using numerous tools such as word processing, presentation software, web 2.0 tools, and social networking. Due to the district standardizing with Microsoft 365, Google is not used as much, but SL1a can use them. SL1a doesn't "use design software as much" (SL1a).

To keep up with the ever-changing world of technology, SL1a uses the observations as a time to also learn from the teachers. SL1a also adds, "The district does a good job of training us on things we use…Our district does put on a technology conference every year." As a teacher, SL1a attended the ISTE conference to help stay up to date with the technology (SL1a).

Self-Efficacy

Concerning self-efficacy SL1a states, "The best people and best leaders have to have a pretty extreme amount of self-efficacy, especially with the changing landscape [in education]." Participant SL1a is "willing to jump in and try to figure it [technology] out" when there is technology not known or something new (SL1a).

School Leader 1b

Technology Enhanced Teaching and Learning

District 1 provides a lot of assistance, training, and resources. According to SL1b, "The technology department at the central office does a wonderful job of getting stuff out to us…like rolling out Canvas and Microsoft 365. All this good stuff." The district also provides a technology facilitator assigned to the school. The district doesn't depend solely on principals to deliver the information to the school. Teachers get trained by the district and bring it back to the school. At SLB's school, "four or five teachers…call[ed] tech team leaders, make sure everything happens" (SL1b). Participant SL1b describes one of these tech team leaders as regularly doing this in the field with teachers daily. When they have a question, she finds an answer if she does not already know it. The school also utilizes students to serve on a "tech team" to assist with troubleshooting (SL1b).

The school has "been BYOD [bring your own device] for years" prior to the district being fully one-to-one with technology (SL1b). SL1b explains this early adoption further:

> We wanted to use technology in the classroom, so we went to the school board and got approval…they [students could] use their cell phones because we didn't have technology…We were already kind of on the edge of technology that way. The other schools [in the district] got on board [BYOD] over the next couple of years.

An example of cell phone use was Quizlet, so students could participate in interactive quiz activities. This is the first year the school has been one-to-one with computers. SL1b

notes, “Every student has a laptop, a Dell computer…All of our teachers have desktops in their classroom, and many of them have…four or five iPads.” All classrooms have Promethean ActivBoards, and special education classrooms have Promethean ActivPanels.

The technology is being used “as a tool to help facilitate learning” (SL1b). Most of the teachers use Microsoft 365. OneNote houses all of the assignments, such as their slides and everything needed for lessons. It is used in a similar manner as Google Classrooms. Another tool being incorporated in the senior classes is Modern States. SL1b explains the Modern States integration:

> We’re trying to incorporate Modern States, which is the program taught online that our teachers are facilitating. Not only are they [teachers] teaching it, but they’re pulling something out of Modern States and showing the clip [in class] or where they can take the quiz. At the end of the year, not only will they be finished with English but they’ll have a voucher to go get college credit. This not only helps our test scores but helps the students save a little bit of money in college.

Another Microsoft application being regularly integrated is Forms. An example of this was an ugly sweater contest with the teachers. The students completed the form to pick the winner. SL1b describes this experience, “Our teachers and our kids got that conversation going together, and it’s fun for both parties.” One way the teachers use technology is to motivate the students. For example, students might need to find information on the Internet; then, they would fill out a Microsoft Form with the information found (SL1b).

Leadership

Participant SL1b is the principal of a high school in district 1. As a principal, SL1b describes their TETL "role is …to delegate. You have to have somebody else in charge of technology…you can't do it all on your own." SL1b feels they fall more in a role of support and remarks they are "definitely not instructing [teachers] on the technology. They know more about it" (SL1b). DL1 described this principal as "a technology advocate…[SL1b] was on the [technology] committee when we were looking at Google or Microsoft and all these learning management systems…We did surveys and polls to determine what was best for our district, and then we came up with the ones that we're going to use."

The district provides a lot of assistance and support. SL1b stated, "You can sign up for anything under the sun…[and] accumulate points. After so many points…you can [spend them on] an iPad or clickers." There is a district technology facilitator that assists the school as well as teachers who are technology contacts at the school. Additional teachers also help promote TETL. One teacher specifically helps the special education department, especially their new teachers (SL1b).

Perception

Technology should be used "as a tool to help facilitate learning…There's a difference between having it [technology] in the classroom and effectively integrating it" (SL1b). Participant SL1b describes the Microsoft and Canvas rollout as "good stuff…[central office] did an outstanding job. They had the teachers come in to learn about this, so it wasn't totally on us as principals." SL1b has found it "amazing how many emails we get now directly from kids. Used to they would never ask the question."

SL1b explains the need for students to experience technology:

> [Students] need to know that [technology] is very important because it's a great thing but also it could land you in jail…It's important for us to have digital citizenship, do's and don'ts of technology.

Skill

Participant SL1b would describe their technology skills as "moderate, maybe advanced compared to others." However, when SL1b actually talks about all the technology tools being used, it is hard to believe the amount. SL1b thinks, "gosh, I didn't know I knew that much. I just watched a video," referencing district and internet resources. This directly contrasts SL1b's time in the classroom as a health and PE teacher. According to SL1b, "We didn't use technology much…just watched Richard Simmons' videos." The list of tools regularly used by SL1b includes everything Microsoft. They are in their first year using Canvas as their LMS, learning management system. Both Teams and Zoom are used for video conferencing. SL1b also teaches an online class. SL1b reads blogs and wikis, and networks on social media such as Facebook and Twitter. Not much time is spent on design software, but SL1b has used Canva to make a banner (SL1b).

Self-Efficacy

Regarding self-efficacy, SL1b feels "you just have to find the time to look for it; everything's there." SL1b provided context for this concept:

> When I had my first question about Canvas…they [the district] were like we have a [Microsoft] Team just for Canvas for any question. I joined and now anytime anyone in the parish has a question posted, I get an alert and

> can read the question and the answer. I have found that most of the time I don't have to ask the question…you are able to just search [the Canvas Team]. Everybody has the same question honestly" (SL1b).

School Leader 1c

Technology Enhanced Teaching and Learning

SL1c feels when it comes to school TETL, the "key person is DL1 [who] pushed this district into the 21st century. [DL1] definitely…has a vision of where she wants to go and where she sees us." There are numerous opportunities for professional development provided at the district level. SL1c's school has its own technology facilitator. SL1c states, "We can call [the technology facilitator], for example, to train the staff. She reaches out to us often." The school's assistant principal also helps with the school TETL as well as "seven technology contacts on campus. We have one on each hallway. We have somebody stationed at each grade level. The district assigns them to the schools based on population" (SL1c).

With the district being one-to-one, all students have their own laptops. SL1c notes, "Our teachers go through Impact training to receive laptops. Some teachers still use desktops in addition to laptops. We almost have a surplus, at this point." Each classroom has Promethean ActivBoards or ActivPanels. SL1c explains the future TETL equipment plan:

> To get Promethean panels in all classrooms. I want to bring my school into the 21st century. It will take time because we are not a Title 1 school.

There are numerous other tools at the school, including "iPads for administration and students, document cameras in math classrooms, 3d printers in the library, and

robotics" (SL1c). The robotics program at the school is run through their BETA club. SL1c mentioned, "Our curriculums now in Louisiana math and science are scripted curriculums. They all have a technology component" (SL1c).

A variety of school TETL examples was mentioned by SL1c, "[The] anticipatory set [and] bell ringer is probably going to be on the laptop, as well as to continue [pieces of] the lesson, where they have their independent learning or collaborative learning…One teacher just absolutely lives by the Microsoft Notebook [OneNote]." Another example of technology integration provided by SL1c was with their Amplify curriculum:

> Our 7th-grade science class is the highest-scoring in the district...We have Amplify this year…Amplify gives you data when you take the pretest and the post-test…it's color-coded. That is absolutely necessary. The data that we can receive using online platforms to test is immediate. We don't have to wait for a benchmark or LEAP scores in the summer. We can get the data in real-time.

SL1c also referenced the full-blown student discussions possible through the integration of technology:

> A lot of times students who will not speak up in class will comment digitally, and it is good comments. You [the teacher] know that they're [students] paying attention and they're listening.

As far as future plans connected to TETL, SL1c wants "to get Promethean Panels…to bring my school into the 21st century" (SL1c). SL1c acknowledges that this "will take time because we are not a Title 1 school." It is standard equipment in Title 1 schools. SL1c's school does have a pod of classrooms with the panels (SL1c).

Leadership

Participant SL1c is the principal of a middle school in district 1. SL1c expects "for the technology to be used…We [administration] set the [TETL] expectations. The administration uses Bullseye for walk-throughs. We call it 'Snap Throughs.' Technology use is part of the Bullseye [program]" (SL1c). DL1 provided a description of SL1c:

> A very good leader, who also promotes the use of technology with our principals' use of a walkthrough called Bullseye. They're constantly looking at how the lessons are going and how [teachers] are using the technology or how kids are involved and engaged."

According to SL1c:

> If I walk down the halls and I see that you are rarely ever using technology, and I pull up a lesson and it calls for technology, I need to know why you're not using it…This is how the children learn. This is their world.

Recently, the teachers completed a survey concerning a program, and SL1c was talking to an administrator at another school concerning the survey. SL1c mentioned, the other administrator "was going through the survey…seeing how many times this particular word was appearing. I said, 'Friend, why don't you just put that in a Wordle [word cloud]? Let's work smarter, not harder" (SL1c).

Perception

When Participant SL1c was asked about their thoughts on TETL, the response included, "In 2021, how could you not use it? I love paper and pencil. I love a good book, but this is how the children learn." In 2021, SL1c "can't see not using…technology in the

classroom…If it can be done digitally, let's do it digitally…A digital platform is what they're [students] accustomed to and they are more willing to participate on the digital platform" (SL1c). DL1 is accredited as a key element of the school's TETL success. Without DL1's support, resources, and equipment, SL1c stated, "as a principal, it probably would have taken me probably seven years, because we have so many students, and we're not a title school" (SL1c).

Skill

Participant SL1c would rank themselves as around 7.5 in technology out of 10. SL1c doesn't "do a whole lot of social networking" but can use word processing and presentation software as well as web 2.0 tools (SL1c). SL1c remarked, "As far as web design, as a principal, I don't use it. When I was in the classroom, I read other people's blogs, but I don't create my own" (SL1c). To remain current, SL1c tries "to attend as many tech trainings as possible that the district offers, and I am completely obsessed with reading national principal blogs. I love to read the different ways principals use technology at their schools across the country" (SL1c).

Self-Efficacy

During SL1c's time in the classroom, the curriculum was not scripted like Amplify and others are now. According to SL1c, "There was a lot more freedom, but that means you have to go that extra mile…to go out and find it" (SL1c).

District 2

District Leader

Technology Enhanced Teaching and Learning

The technology leadership hierarchy in the district begins with the superintendent sharing "edtech findings that might be helpful" and Participant DL2, who is "in charge of both Information Technology (IT) and educational technology for the district" (DL2). The district IT side "is provided basic working knowledge of classroom edtech as relates to IT, troubleshooting, and classroom basics" (DL2). This knowledge helps IT know the importance of tech requests, such as those referencing that it is an observation day for the teacher (DL2).

For the educational technology side of the district, there are two district technology facilitators who work directly with the schools. Each elementary and middle school has instructional coaches. One of the facilitators' content focus is math/science, and the other is EELA/social studies. According to DL2, "Numerous professional development offerings are available in virtual and face-to-face formats." District 2 has "contracted with a national educator, author, speaker, and coach [whose] philosophy aligns with the district" to work with the instructional coaches and administration on both the district and school levels (DL2). For the second year of the contract, the national educator will begin working with teachers from each school. The district technology team meets each year to create goals (DL2).

All classrooms include a Promethean ActivPanel, a teacher Windows computer, and one-to-one student devices. Many have document cameras. DL2 described the checkout option also available within the district:

> In addition, [teachers] have items to check out…digital microscopes…iPads…Lego kits for robotics…indoor planetarium…ClassVR. We have a lot of variety. Our science material center just merged with technology. [Teachers] go to the tech page to order and it is delivered to their school.

Technology is integrated purposefully. DL2 explains, "Content comes first; technology is a tool. While grounded in backward design, we look at what teaching strategies are highly effective according to Hattie's research and then what tools can enhance it" (DL2). An example of this is a group of third-grade teachers dressed up like astronauts to kick off the beginning of their unit on space. The kids were able to go to space through the integration of ClassVR in the lesson. The content is space and that is what is most important (DL2). "Virtual reality and those types of things break down walls allowing our kids and teachers to think more globally and experience things they couldn't otherwise" (DL2). Another example provided by DL2 is connected with a curriculum:

> [The curriculum was] labeled by the state as personalized learning, but it wasn't. We aligned NearPod tools with key highly effective teaching strategies according to Hattie and then worked with instructional coaches and teachers to integrate it into the curriculum to provide personalized instruction. They are seeing a difference because the kids are now using tech as a tool for feedback, to jigsaw information, and in assessment. It is direct instruction that works.

"Future [TETL] goals include exploration of tools and alignment of them with Hattie such as the Boardworks software discovered by the superintendent" (DL2).

Leadership

DL2 feels, “There are two different types of leadership. Those leaders who want everything to go through them with them being the expert and other leaders sit back, smile, and get excited when their person can answer the question.” DL2 prefers the latter and explains,” In the end, [the] credit is given in the background, because you’ve helped prop this person up.” The leadership style of Participant DL2 “is not a checklist leadership. It is a visionary leadership trying to get everything working together” (DL2). DL2 works “as a team member to provide vision, develop goals, support, and encouragement…Teachers are encouraged to brand themselves, network, and become experts, not passive learners” (DL2). DL2 explains this further:

> I look for and encourage teachers to present and as they get comfortable, continue to push to larger audiences such as state conferences and they bring stuff back and get excited…You don’t want a teacher to say I can’t do that because I’m not part of the tech team. If we’re propping up our teachers, saying look what you’ve done, I mean right? Amazing, you know! Then you’re not passive anymore (DL2).

One example of a teacher that was empowered by DL2 is SL2a. SL2a provides context to this: “I wouldn’t be here [principal] if it wasn’t for [DL2] seeing me in the classroom. [DL2] tries to ensure that it is not just [them] and [their] team that gives all of the training. [DL2] saw the potential in me to lead, so she had me leading” (SL2a).

Participant DL2’s district leadership changed around eight years ago, and described it as almost having an epiphany when they realized they were trying “to figure

out every little piece of software or every little piece of something. In case someone asked a question…during a training" (DL2). DL2 further explained:

> We realized half of the time, we don't use that. It was becoming more about the software and not about the tech integration, so we changed. We go through the regular functions of the software and [focus on] how they [attendees] walk out of the training. No matter whether it's a webinar or face to face, [teachers] have something that they can utilize or change in their classroom that is content-driven.

Perception

When asked about the perception of TETL, DL2 felt, "The TIM Framework sums up what we're trying to do [in District 2] ...Use technology as a tool…for it to kind of be in the background. Technology should enhance the content" (DL2). It has been a challenge, but DL2 is starting to see a change in the overall environment recently. DL2 contributes this change to the "push of lessons when we train and [the national educator] coming in and saying the same thing" (DL2). An example provided is the district team and national educator talking "about jigsaw and how to use it or feedback and how to use it." Another example is the national educator "brings in NearPod and [the district is] pushing NearPod integration too for the same strategies" (DL2).

A caution DL2 mentioned is not turning technology into a checklist. If a teacher is using Kahoot, then some leaders might check that off as effective TETL. DL2 explains, "It is more about the teaching strategy and the content. Integrating technology doesn't mean it is being used effectively" (DL2). Additionally, it is essential for educators to network. "As educator's network, they think more about how technology is used as a tool

which is very, very important" (DL2). DL2 and their team push teachers "to reach out to the national folks like tagging [in social media] ClassVR and that type of thing, and they're starting to see recognition from outside of [District 2] for what they're doing" (DL2). A benefit DL2 has found in their district is

> Getting the EdTech [educational technology] and IT, both sides of those houses, to work together. The IT guys understand the importance of a teacher sending a message saying, 'I'm being observed in the morning, and my Promethean board *something*.' They understand this is a priority and talking to those outside of my district that are in my position that's their biggest headache. They are either just in charge of EdTech or just in charge of IT but putting them together, I think, has really helped us.

Skill

DL2 would classify their educational technology skills as advanced but would classify IT skills as knowledgeable. DL2 stated, "As a leader, you need to be able to recognize what you don't understand." DL2 often asks IT "can you give that in [DL2] speech" (DL2). Participant DL2 uses word processing, spreadsheets, and presentation software regularly along with web 2.0 tools, social networking, learning management systems, and video conferencing. "Probably the thing we [students, teachers, personally] use least of all is databases" but the "SIS person does…In fact, right before [the interview], the SIS person used a database, pivot table, and Excel. We were looking up some data for a civil rights report" (DL2).

DL2 feels, "People who don't stay current with their leadership and don't stay current with technology…it gets bland. They're doing the same thing over and over and

over again." DL2 networks at international, national, state, and district levels through social media, groups, and conferences. DL2 elaborates on this:

> [The] biggest thing that has helped me stay current honestly has been Twitter. Twitter is a great way to not only build your community but to see what other people are doing…LACUE helps a lot because you stay involved and on top of things. This is also true with some involvement with other organizations such as ISTE and TCEA. That helps you to stay relevant plus you get to see who are the new and upcoming national voices.

Additionally, continuing to teach has helped DL2 stay current. The graduate-level courses they teach are on professional development and distance education. DL2 explains, "You have to stay current [which] also means you're constantly having to find articles and read things to stay on top of things" (DL2).

Self-Efficacy

Being a visionary leader working to empower educators, DL2 has to clearly know and communicate "this is the expectation, this is the level we expect. [This is] probably one of the hardest parts…sometimes you think, is it easier for me to lower my standards a little bit and then just check it off?" (DL2). DL 2 realizes, "If we're going to stay on top, we gotta cross all the t's and dot all the i's." It is a matter of knowing you are "doing the right thing, because ultimately it helps a kid, and that's our goal for everything" (DL2).

School Leader 2a

Technology Enhanced Teaching and Learning

The district provides "guidance, a wealth of resources, training, purchase materials, fix the Chromebooks, [and] keep the network up" (SL2a). The technology leadership hierarchy in the district begins with the "superintendent promoting[ing] technology as important" (SL2a). According to SL2a, "[DL2] tries to ensure that it is not just [them] and [their] team that gives all the training. [DL2] is a curriculum-minded person. [DL2] and [their] team provide numerous professional developments, webinars, Twitter Chats...[and] technology challenges." SL2a has appreciated the district's collaboration with a national educator, and expressed that, "it's been fabulous to have him personally coach us" (SL2a). The two district technology facilitators also work directly with the instructional coaches. The professional developments offered by the district are available in face-to-face, blended, and virtual formats. The leadership strategy used with the instructional coaches is a train the trainer model. SL2a explains this further, "The instructional coaches on campus really help to promote how to integrate the technology within the classroom [and] provide professional development as needed" (SL2a). In addition to the district facilitators and school instructional coaches, Participant SL2a as well as the assistant principal help to promote and support the school TETL. SL2a also mentioned "a rock star teacher who does a great job of sharing what she learned. She's certified in Brain Pop and…everything under the sun" (SL2a). The school also has a media specialist instead of a librarian (SL2a).

The school is "one-to-one, so every child has a Chromebook that they carry to each room" (SL2a). The classrooms have a Promethean ActivPanel, desktop computer,

and Elmo. SL2a further explained the resources available, "The technology department actually has numerous resources that the teachers can check out like a class set of VR [headsets], BreakoutEDU boxes and a set of iPads" (SL2a). The district also provides a school webpage and software such as WeVideo, OnCourse, and NearPod (SL2a).

SL2a provides context for the effective TETL at the school:

> Technology integrated in a way that's meaningful…to enhance instruction but instruction comes first, so it [technology] is a tool…Teachers know their content, know their curriculum. We look at what teaching structures can be used so our kids and our teachers become more proficient. Then we start looking at possible [technology] tools to enhance [instruction/learning]. We focus on the ones [teaching structure] that John Hattie researched to give you the maximum impact.

SL2a has noticed "a big increase in teachers easily being able to utilize NearPod…and the teachers and kids like the activity variety." This school was selected by the district to pilot NearPod. The district technology team connected NearPod and the Illustrated Mathematics curriculum and built lessons for each unit (SL2a).

One class uses WeVideo to produce morning announcements, and another regularly uses BreakoutEDU. According to SL2a, "Teachers use OnCourse, our learning management system, to create their assessments and share resources." Students are also creating apps through *Project Lead the Way* (SL2a).

Leadership

SL2a is the principal of a middle school and feels that "it is very important to give…opportunit[ies] to share…[then] they are invested…because they get to be a part of

it." SL2a stated that the school's TETL "starts at the top. The superintendent promotes the importance of technology" (SL2a). The superintendent, district technology team, school instructional coaches, media specialist, along with "a rock star teacher, [SL2a], and the assistant principal help promote and support the school TETL" (SL2a). Concerning TETL, SL2a explains their role is to "help give ideas [and] show teachers how to use something or direct them to somebody on campus that knows how to do it better." Additionally, SL2a "enters the work orders when things are broken" (SL2a). The campus also tries "to help out the school district by seeing if [they] can troubleshoot" on their own to help alleviate user error issues (SL2a).

Perception

Technology at the school is used "to enhance instruction, but instruction comes first. Technology is a tool, so if it's not going to be a tool to help teachers to help students to master that content, then it's not worth using" (SL2a). According to SL2a, "The teachers really do buy into the idea of using technology to enhance learning…[with] technology hand in hand [with] curriculum." There are a variety of ways the technology is integrated into courses where students can use it as a collaborative group or individually (SL2a).

SL2a expressed that District 2 is "the best in technology…Technology has changed a lot over the years and especially as we have gone one-to-one…in today's society [TETL] is vital." The teachers need to "model [technology use] to show kids the right way it should be used" (SL2a).

According to SL2a, two items to continue to work on in District 2 are digital citizenship and offering a computer science pathway in high school. SL2a feels that

"digital citizenship lessons [need to be put] on the top shelf." Students are weak in "technology reasoning…therefore…kids are terrible users of social media" (SL2a). SL2a explains further the need to work on "informational technology…[to] teach kids the why behind certain things." There have been "numerous conversations with DL2 concerning this [and] we agree [on this] as a district" (SL2a). With the middle school offering app development through *Project Lead the Way*, SL2a finds there is a need to include:

> A computer science pathway in our district for high school…Our district CTE is looking more into that…Because we're such a small district, it is really hard when it comes to offering kids a variety of pathways [due to] limitations [such as] space (SL2a).

Skill

SL2a has a master's in educational technology and their previous roles include being a teacher, instructional coach, and now principal. SL2a has advanced technology skills using numerous tools such as word processing, presentation software, web 2.0 tools, and "lots of blogs. Lots of social networking…Video conferencing is also used a lot" (SL2a). For databases, SL2a explains, "[the] district dives into data for us. If I have something that I need, they provide it" (SL2a).

To continue to grow in TETL, SL2a "increases [their] professional learning network [through] social media" and other opportunities (SL2a). As a Milken award winner, SL2a mentioned, there is a "network within [themselves]. The Milken educator group, along with virtual opportunities throughout the school year, provide opportunities to talk with others throughout America to figure out what's working or not working, things like that are really helpful" (SL2a).

Self-Efficacy

SL2a tries "to share as much as [they] can about what works well and why it works well" and stay up-to-date through various opportunities, including expanding their professional learning network, moderating Twitter Chats, and participating in virtual Milken Educator opportunities (SL2a). In reference to our NearPod pilot, that opportunity was available because "[DL2] knew I was the kind of person that would try to ensure that our teachers would use it in a beneficial way" (SL2a).

School Leader 2b

Technology Enhanced Teaching and Learning

The district technology department is "second to none" (SL2b). Participant SL2b has worked in other districts previously and "never had the support that we have at our disposal [in district 2]" (SL2b). In addition to the district team, the school has instructional coaches and "six to eight teachers that assist with professional development and troubleshooting… [which includes a] computer teacher who is absolutely phenomenal" (SL2b). According to SL2b, these teachers are "on fire, when it comes to their technology, and they stay current by going to LACUE" and participating in other opportunities (SL2b). SL2b explained, "They are my big Tweeters." There are several teachers who blog and host webinars (SL2b). SL2b elaborated about the technology integration:

> The beauty on this campus…[TETL] is kind of organic in that teachers discover things and they're so excited in their PLC [Professional Learning Community] to share with the other teachers what they've discovered they can do with technology.

When COVID-19 hit, everyone "stepped up and helped their colleagues to get it together pretty quickly…we have a team here" (SL2b).

The school has a one-to-one initiative with Chromebooks except the PreK and Head Start classrooms also have iPads. "All instructional classrooms are [also] equipped with a Promethean ActivPanel and a teacher desktop computer" (SL2b). The computer lab includes tools such as digital cameras and 3D printers. SL2b also mentioned the numerous tools at their disposal from the district which includes virtual reality headsets, robotics equipment, and Little Bits. The district provides this equipment to be checked out. In reference to the resources available for checkout, SL2b said, "[There are] all kinds of things that enhance what we're doing."

The technology integration is not used "for technology's sake…We…plan effective lessons and then we ask ourselves where this lesson could be enhanced" (SL2b). Presentations such as PowerPoint or Google Slides are not used a great deal. SL2d expressed, "Google Docs are used extensively on this campus…grades four through eight use Google Classroom a great deal with a vast majority of the work done through that." Spreadsheets are created from Google Forms and utilized for disaggregating data. One of the computer classes "produces a monthly student of the month presentation" (SL2d). There are also a lot of coding activities in the school's computer lab. When the school was built, it included a "very tiny library" making it difficult to "house books from head start to eighth grade" (SL2d). SL2d's solution for this obstacle is a digital library. SL2d explained further, "We are currently working to build a digital library…checking out Kindles to kids and helping all of our students have library cards for the public library."

The Kindles were purchased through grants and the public library has a digital lending program for books which will be utilized by the students.

Currently, the school is working to "enhance the understanding of the use of Chromebooks for third grade" for preparation of the digital state testing, but Participant SL2b's also stated, "[the] biggest goal right now is to get what we need for our STEM/Makerspace classroom. Last year that [teaching] position was lost, but I'm getting that teacher back next year…" through a district grant (SL2b).

Leadership

SL2b described their experience when faced with being a new principal at a new campus combining an elementary and middle school, "I interviewed current teachers during the summer [and found] there was very little Internet access in the area [and] no technology…so the kids really didn't know computers." At the time, the "forward-thinking superintendent" asked what was needed "to make the school move" from a D school (SL2b). SL2b said, "The first thing I need is a computer lab and a computer teacher." SL2b was "lucky enough to find a great computer teacher who has a passion for what she does" (SL2b). They began with "a computer lab and within two years had Chromebooks in everyone's hands" (SL2b). In addition to the request for a computer lab and teacher, SL2b "insisted on a makerspace [to be included] in the plans for the school" (SL2b).

When SL2b first became principal at the school, the "teachers were just hungry to be led" (SL2b). SL2b further explained that the school was filled with "great people…They had big hearts; they were intelligent. They just weren't all moving in the right direction." SL2b's first focus was to give "them very clear direction…[by] taking

the curriculum and saying what's important and what do we need to do to get to that big picture" (SL2b).

When asked to describe their current role in TETL at the school, SL2b explained, "[It is] to facilitate the acquisition of what they need. I always tell them, 'if you dream it then it's my job to make it happen.' I work for them, and it's my job to provide what they need." This support includes helping them to write grants and communicating needs with the tech department (SL2b). At the school, there are two "faculty meetings a month; one is a faculty meeting, and one is a school-wide PLC" (SL2b). SL2b also mentioned working "very closely with the instructional coaches. [They] meet once a week to talk about the direction they are taking" and include ways technology can be used to enhance the learning (SL2b).

Perception

SL2b had a "sense of urgency" concerning "what we do with technology on campus…after attending a Model Schools Conference" (SL2b). According to SL2b, a big push at the conference was "what will these learners need from us in the next 10 years." SL2b feels, "it's essential for us to be able to prepare kids for what comes next…Curriculum across the board has always been incredibly important [along with understanding] technology and how it benefits teaching and learning" (SL2b). Technology is not the "end all be all;" it should be used to enhance learning (SL2b).

SL2b has found it "absolutely amazing…to watch kids grow through technology" (SL2b). According to SL2b, the school's effective TETL is accredited to the district support, the willingness of the staff, instructional coaches, and a school team of teachers that are technology-centered (SL2b). SL2b said, "[this group was] vital to us when we

left for COVID and had to go all digital." The experience with COVID-19, SL2b stated, "forced many of my teachers out of their comfort zones and [helped them become] even more comfortable with technology which has been a great thing." SL2b feels the school "couldn't have done that [gone virtual] had all the teachers not known how to use the technology" (SL2b).

Skill

Participant SL2b has been in the education field for 36 years primarily in two districts in roles ranging from teacher to curriculum coordinator. SL2b also was a "curriculum writer for the state for years" (SL2b). SL2b stated they "primarily use Google Docs for gathering information [and] Google Slides…I along with two of the teachers run the Facebook and Twitter pages for the school." Additionally, Zoom is used regularly as well as "Blackboard Connect to reach parents" (SL2b). SL2b describes their technology skills as average. The school technology team is "far more technologically savvy than I'll ever be…[They] drop in periodically to share what they're trying in the classroom…There are probably six to eight people on campus I could call on who could come and troubleshoot pretty easily" (SL2b).

When asked how they continue to grow in technology knowledge, SL2b explained, "[I] work with my teachers to find out what they're using and how they're using it [and attend] conferences to continue to grow in my understanding of the role of technology" (SL2b). Additionally, every couple of years, SL2b makes "[TETL] one of [their] PGP goals…[and] spends more time researching" (SL2b).

Self-Efficacy

SL2b said, “It is important to stay relevant [and] to continue to understand technology and how it benefits teaching and learning…[I] can’t let things pass me by” (SL2b).

School Leader 2c

Technology Enhanced Teaching and Learning

According to SL2c, TETL in their school “definitely starts at the top with our district. DL2 and [their] team are fabulous. They provide us with a wealth of resources and professional development.” Many of the teachers attend the district professional development and then “branch out and grow themselves” (SL2c). The LACUE conference is also regularly attended, and two have presented there. Numerous people are involved in TETL at the school. The computer literacy teacher and media specialist “are very tech-savvy and help keep everyone abreast” (SL2c). Additionally, there are “a good handful of teachers that are very techie and love to learn and grow in those areas” (SL2c). These teachers attend professional development and then have “opportunities to present to the staff” (SL2c). There is one person in charge of web design (SL2c).

The school is one-to-one, and the teachers have the most up-to-date ActivPanel and document cameras. The district technology center provides resources to check out, such as VR headsets and BreakoutEdu kits. SL2c explains, “If they [district] don’t have it, and we tell them what our big ideas are, they usually can make it happen.” The district also provides “programs such as NearPod. Half of the math class time is spent on Chromebooks” (SL2c).

Technology at SL2c's school is "used to enhance the learning, not just to use it or to throw it in" (SL2c). The STEM class works on coding. SL2c describes one resource in more detail:

> Teachers have really enjoyed…building their lessons through NearPod…The kids really like…the opportunities to watch more interactive videos, manipulate things on the computer, and simulate different things that they can't do in the classroom.

An example of TETL integration is last year's party with the Pelicans. During which the Pelicans "read aloud with our students and did question/answer [time]. It was in a little book tasting" (SL2c). Last year programs were done virtually through "live stream or put them up on YouTube with links and parents had access to them in a different way but [they] could still see their kids perform" (SL2c).

Leadership

SL2c has experience as a classroom teacher, interventionist, and school principal. The first year SL2c was principal at this school was during COVID-19. Concerning the school's TETL, SL2c tries "to be a bridge that helps them collaborate" (SL2c). The "computer literacy teacher…media specialist [and] tech-savvy [teachers] love to learn and grow in those areas" (SL2c). These teachers participate in "professional development and bring it back [and] we give them opportunities to present to the staff" (SL2c). SL2c mentioned this provides opportunities for teachers "who either might be a little nervous to go attend somewhere else or feel more comfortable with their peers sitting down next to them" (SL2c).

SL2c works "to keep abreast of what they're doing…[by] attend[ing] presentations" by the technology experienced people from the school, so they "can learn with them [and] share with others" (SL2c). Effort is given by SL2c to connect teachers with each other. For instance, "you need to go talk to 'so and so' she did a lesson with that" (SL2c). SL2c "always tries to help [teachers] make…ideas come true" (SL2c).

SL2c provides opportunities for teachers to "experience [technology] as a student" (SL2c). When SL2c conducts meetings, activities include modeling effective TETL by providing ways for teachers to "get engaged in their learning versus just sitting there listening to [them] talk" (SL2c). An example of this engagement is professional development provided when moving into the new school. SL2c explained, "[The] first day together, we did a scavenger hunt around the school [using] Goosechase'' (SL2c). A couple of our teachers help SL2c insert Kahoot, Goosechase, and Pear Deck into staff meetings (SL2c).

Perception

SL2c works to "encourage [TETL] to enhance [student] learning of a subject" (SL2c). SL2c feels TETL "definitely has a place…if it's used correctly" (SL2c). Students need to "know how to appropriately use it or how to use it to learn," SL2c said it is "wasting everybody's time and energy" if the technology is not used effectively (SL2c). SL2c wants teachers to be able to answer questions such as "How did you use NearPod to enhance learning today to meet your academic objective? Not to just say 'I used technology', but 'I used it purposely'" (SL2c). SL2c describes this further:

> Students know a world with cell phones and high-speed internet…They're learning so differently through the computer…As our students grow, that's

> going to be their world, so we can't ignore it. It has to be a part of their life. We just have to make sure we integrate it the right way.

Skill

SL2c's TETL skill is proficient in what is used daily as a principal but "average in the world of technology" (SL2c). Technology that is regularly used includes "all the Google tools [and] …definitely social networking" (SL2c). SL2c mentioned, "We use Facebook to publicize the school a good bit, and I follow a lot of Facebook groups with principals" (SL2c). SL2c said, "If something sounds interesting, I'll look into it and then share it with one of my techie teachers." Additional technology tools used include video conferencing, Zoom, On Course, and Blackboard Connect. SL2c does not have "much experience with web design…One person is in charge of that" (SL2c).

Participant SL2c is "familiar with different technologies, [but] not as much the instructional ones [with their] role as a principal…As a classroom teacher and interventionist, I tried to stay abreast of all of the technology" (SL2c). As a principal, SL2c keeps "in touch with my teachers and hears what they're using and trying to learn" (SL2c). To stay current, SL2c also checks out "what…our district pushes…it's usually something pretty good" (SL2c). To continue to grow, SL2c plans to get a little more hands-on with instructional technology (SL2c).

Self-Efficacy

SL2c believes self-efficacy somewhat hinders their approach to TETL due to not being "as confident as I used to be, and so I don't want to guide my teachers in the wrong direction" (SL2c). To aid in this, SL2c listens "a lot to those who do know [such as] ...our tech department and to my teachers who invest in that time" to learn and keep up with

TETL (SL2c). Though SL2c is "not as comfortable with it [instructional technology] as [they] used to be [SL2c tries] to be open to it" (SL2c).

District 3

District Leader

Technology Enhanced Teaching and Learning

Participant DL3 began the interview with a background of the parish:

> Because [it]... kind of dictated where we are…The [parish] is tiny. We have a little over two thousand students in our whole pre-K through twelfth grade…There are no private or parochial schools in our district, so the whole parish comes to these…schools, all on the same street.

DL3 describes this district as "a unique place to be [and] connected…It's easy for me to put something in place and have it flow, pre-K through twelve because we're so tight."

DL3 explains, TETL in District 3 "is truly from the top down. The superintendent is an advocate for technology [and] makes sure [the] budget is well funded, within reason." The superintendent may not know the educational technology side, but "he knows what he wants the kids to have in their hands and what he wants the teachers to be able to do to get that education across" (DL3).

> There's a lot of…historic poverty. There are a lot of kids that never leave [District 3] It's very important for us to use those technologies to give them real-life experiences outside of our little town.

DL3 is the only one on the educational technology side of the district but works with the curriculum department as well. There is also "an instructional coach/technology facilitator at each school" (DL3). On the IT side is DL3 and "a network administrator, a

data guy, [and] one desktop person" serving all schools (DL3). DL3 provides additional context:

> I think my close relationship with school admin and teachers helps my tech department address issues, make needed changes, and implement new technologies with ease. We are so close due to our size that I feel our faculty trusts us and knows they can always reach out to us with questions and they know we have their backs. This trust helps us implement new things into the classroom easily and monitor that they are being used with fidelity.

The general setup for the elementary classrooms is one-to-one with "Dell Chromebooks and in high school we move to the Dell laptops" (DL3). The teachers currently have "two laptops in their classrooms," but DL3 is "moving to Surfaces…It just gives freedom" (DL3). There are also document cameras, and the classrooms have wireless projectors. DL3 said, "We don't have a lot of [interactive Promethean] boards. The elementary schools did purchase [interactive Promethean] boards back about ten years ago…[the] lower school has interactive projectors and in a couple of rooms Promethium panels" (DL3).

DL3 mentioned, OnCourse is the district "LMS, the SIS, the assessment, the data warehouse. It was a really big deal for me to have one platform for my teachers [a] one-stop-shop" (DL3). The teachers use the LMS and the assessments in On Course regularly. "That's where all the information is" (DL3). District 3 standardized with Microsoft Office. DL3 describes the district as having:

> A ridiculous amount of online resources and my goal two years ago was to start whittling them down, as far as what was most important in the classroom, then COVID hit. I was like, we need everything we can shoot at this.

Examples of online resources available to the teachers and students include Edulastic, SeeSaw. Read 180, Renaissance, Nearpod, Renaissance, IXL, Freckle, and Flocabulary. DL3 added that "Ingenuity [is integrated] at the high school or alternative school. We use Clever for them to link [to one account] ...Some teachers have favorites. The chemistry or science classes bought a program for digital experiments" (DL3).

Each school in District 3 has a STEM teacher. DL3 describes this further:

> The [STEM] teachers have things in their rooms like 3-D printers and…robots…At the lower school, [the teacher] has a million things including WeeBots. The middle school has the Spheros. [The teacher] does a very good job getting those babies excited and started. Elementary has struggled to find a teacher that fits and this year we found one. She is killing it! Same thing at middle school. We got a little girl right out of college. High school has a drone class for FAA certification [and] a lot of programming things.

DL3 feels TETL is

> Something that's used every day with the exception of maybe Pre-K and K. First through twelfth is touching it every day." When the district first became one-to-one years ago, the students took the device home. DL3 stated, "We have since pulled back and are no longer doing that. We don't have broadband in several areas of our parish since we are so rural. Our

> parents, back when we [sent home] iPads, were complaining that all the kids were doing [at home] was playing games. They couldn't do homework without internet access. There's no quality in that.

When the district provides a cart for every classroom, it costs a lot more than kids taking one home. "Last year the school went back one-to-one with laptops, and…We're taking them home at high school, but [not in] all lower grades" (DL3).

The equipment and resources provide District 3 teachers with numerous avenues to integrate technology. An example of OnCourse and Office integration is a high school student who "looks on the OnCourse LMS for assignments [and then] goes into Teams to complete it, then turn it in" (DL3). Digital Arts is a course "at the high school. We also just started a sports marketing class this year" (DL3).

Leadership

DL3 was a classroom teacher who earned a master's but stated knowing at that time "I didn't want to be a supervisor or a leader" (DL3). Later, the computer teacher left, and DL3 decided to move to that position. When the governor provided Apple computers for a sixth-grade class, the superintendent requested them for the whole sixth grade due to the district size. This was approved, and it was DL3's job to manage those computers. After this, DL3 joined the district office as their TETL supervisor. DL3 described the district position,

> When I first came into this job, technology was its own silo. It was like this is the technology [department] and this is the curriculum [department]. I have tried hard to mold one support to the other…work towards a common goal…I've also tried to insert myself into things more,

but it's a work in progress to make sure the district knows I'm here to help with the curriculum, not just to make sure your computer turns on.

DL3 feels, "Good communication helps us address everything…Our principals aren't afraid to say what they want, nor are my teachers. Everyone is involved." The technology facilitators at each school are "teachers all day, but also help [D3] hands-on, in the afternoons…They let us know where we're lacking" (DL3). The technology facilitators also handle the professional development if it is "curriculum-based or online" (DL3). DL3, the accountability person, and the supervisor of schools also provide professional development. This district communication is described as "very open and honest" (DL3). For example, while "trying to find a wireless projector that worked with the Chromebook," DL3 went to a principal asking which teacher to talk to in order to "figure out whether it's going to work or not" (DL3). Open communication isn't limited to needs and testing solutions. Dl3 explains further, "We have a very good open relationship where they are not afraid to tell me that [technology] isn't working for their goal [or]...they put in requests about something and have gotten nothing back" (DL3).

Perception

TETL is "important…because it's where the kids live; it's their future; it's where the jobs are going to be. They must know how to use this technology properly and for good, not evil. It's our job to teach them that" (DL3).

Skill

Participant DL3 describes their technology skills as very average to above average but notes that "it's one of those, how deep are we talking? Are we talking SQL? There's none at all. [Technology] is not my background" (DL3). DL3's skills include the

Microsoft Office tools, OnCourse, social networking, Web 2.0 tools, video conferencing, but not much web design. When they moved to a new web provider, DL3 wanted to get away from just a website and move more toward an app. “At the district level, we have Facebook and Twitter. At the school level, they have Facebook, Twitter, and Instagram” (DL3).

To continue to grow, DL3 is “a member of LACUE and that network is huge…As a state, we have a technology leader Google group. We share questions and issues” (DL3). Additionally, DL3 subscribes to various listservs and attends TCEA (DL3).

Self-Efficacy

DL3 is “very open to listen to or work on anything and try anything” (DL3). An example is that Participant DL3 will “take calls from vendors or reach out when something sparks interest. I will try one for a year or purchase one to see if it’s a fit. I’ll give anything a chance because you never know what’s going to work out” (DL3).

School Leader 3a

Technology Enhanced Teaching and Learning

SL3a “wouldn’t necessarily say there are just a few people spearheading technology…I’d say it’s spread throughout our whole staff” (SL3a). Before COVID-19, SL3a explained, “we had a couple of gurus, but now we all have that knowledge of digital learning.” During COVID-19, the “virtual teachers got together and decided on Microsoft Teams and On Course classes” (SL3a). At the SL3a’s school, there is one virtual teacher in each hall. The other teachers know they need to have a “plan if we have to go virtual” (SL3a). The staff has had “many in-house PDs [professional developments] ...If there’s a teacher using See Saw and she loves it, if others are interested, we’ll have

an after-school special to learn how she's achieving that growth with her students" (SL3a). The teachers "almost always have to vet it [professional development] through [SL3a] and tell their purposes first" (SL3a).

The school is a one-to-one elementary school. "Everyone has their own Chromebook [that] travels with them from class to class" (SL3a). Each classroom has a projector and document camera. They also utilize Microsoft teams in the classroom. "This is our last year at this school, so we aren't putting in anything new. We don't want to put up a Promethean or Smartboard that could get outdated" (SL3a).

TETL at the school "looks different in each grade level, [but it is] used to enhance our lesson and bring up that engagement piece…It's kind of a mixture of old school, new school" (SL3a). The third grade still take paper LEAP tests, but the fourth and fifth "have to do it online, so we try to make many of our assessments on the computer" (SL3a). Walking around the classrooms, you will see technology integration, "especially with students in small groups [using] Zearn and things like… Moby Max" (SL3a). SL3a describes further:

> During the actual classroom time…our teachers may use something like NearPod with a collaborative board, just to get a really quick check and feedback…They're using the Nearpod slides and they've [teachers] embedded the lessons, so that the students see the main screen, but they can also see it on their screens. They can refer back to it if they're doing a project.

This is a *Leader in Me* school, and students use Microsoft Teams for data notebooks. SL3a explains further:

> The students have to track their own data and that helps us when they set their goals and track their progress within those goals…Second and third [grade] still do the traditional data binders. We have certain data points we want the students to track, so whether it is their school or personal Lexile score, to match their reading abilities or their math data, their AR data, their behavior data. Any data points, really, all the way from their soft skills to their instructional goals.

SL3a "wants [students] to know how to log into Clever and access their email and grades, so that they can show their families" (SL3a). To address this need, SL3a said, "we have a multimedia course in our ancillary offerings. The first nine weeks is just getting them getting really well versed in those online learning tools." The tools covered for each grade are those "their grade mostly uses, whether it's NearPod or Microsoft Teams" (SL3a). This takes "the burden off of the homeroom teacher by teaching [students] how to use that, and then they move onto how to be safe online and how to cite sources" (SL3a). SL3a explains, "We give them [students] phones or tablets at home, and they can do the craziest things on there. Now let's do it in an educational environment and give them a set of parameters and expectations and see where we can go" (SL3a).

Leadership

SL3a has experience as a teacher, assistant principal, and principal. "As a teacher, I was more of a guinea pig, and I was on the cusp. I was one of those who wanted to try [things out], and now I'm the one the teachers come to, and they're so excited" (SL3a). Participant SL3a describes their TETL "role is to make sure I'm facilitating an environment where we know what our resources are and to foster the love of exploration" (SL3a). SL3a provides additional context:

> Pushing the comfort zone of not just doing the same thing and trying to be smart with engagement strategies and how we can enhance our lessons. We have to be smart about using technology because it's the standards of the lesson goals. Technology is just the avenue used to do it. Whether technology is used in all lessons? I'd say there are somewhere I wouldn't want it used at all. That's really not important. My role is just to facilitate that ongoing learning.

During COVID-19, the school used technology "[with both] traditional school and the virtual option. We never went completely virtual, so that was huge. We picked one homeroom teacher from each grade level to do just virtual. So no teacher had to do two jobs" (SL3a).

Perception

SL3a's thoughts on TETL in education, "I love it [TETL]! I definitely know we're moving towards the digital age, but still, you have the benefit of pencil and paper. We need to find the technology to fit our goals. Using technology is not the goal" (SL3a). When it comes to TETL, SL3a expects teachers

> To use [technology] to enhance. I do not expect them to use it for the sake of using it. Sometimes you can be resource-rich, but you can forsake really good instruction because you're just trying to have something incorporating technology. We have a plethora of resources, but I don't demand that [teachers] use them. I ask that they are smart about what we have and use them the way it best fits into the objective of their lesson.

Teachers at the school do not use technology "because it's cute. [Instead if its] a really good formative check, then we'll absolutely use it" (SL3a). SL3a feels TETL "has a positive effect in the age we're in and the jobs, including engineering fields, which are the things we're trying to prepare our students for. That's something that's necessary" (SL3a).

Participant SL3a feels "very blessed in this district to have a lot of applications and software, a lot that's research-based" (SL3a). SL3a explains DL3 "does a really good job of keeping us abreast. We're really intentional about what we get, and I like that because it's almost like less is more at this point. While I say less, it's things meaningful for the kids. There are some people who want me to learn about their programs, and I'm like, 'That's not rigorous enough'" (SL3a).

Skill

SL3a describes their technology skills as "above average" (SL3a). District 3 has standardized with Microsoft 365. They use Word and PowerPoint. "We, as the teachers, use Canva…for social networking, Facebook, and also letters to go home, things like that" (SL3a). Participant SL3 "follows educational gurus on Twitter and things like that, but I don't really follow people's blogs" (SL3a).

To continue to grow in TETL, SL3a explains, "We try to do a lot of book studies… [and attend] technology conferences like LACUE. If we see something there [LACUE], a few of us may do our own research and see if it's beneficial." SL3a added, "I'm also in principal groups and constantly reading. I've asked tons of questions about programs and systems used for kids struggling in reading" (SL3a).

Self-Efficacy

SL3a is "really good at figuring it [technology] out. Google is my BFF so, what I don't know, I will find out" (SL3a). If needed, SL3 will call the technology company for support and finds themselves to be "pretty savvy" [and surrounds themselves] with the smartest people, so if I don't know, they will" (SL3a). Participant SL3 feels that technology "brings so many opportunities, so with my own confidence and capabilities, I don't shy away from it" (SL3a).

School Leader 3b

Technology Enhanced Teaching and Learning

When asked about the school TETL, SL3b said, "[DL3] is one of the big reasons we're so successful, along with my superintendent. [DL3] is always at the forefront of what's out there. Anything we need, [DL3 will] get or try to find the money for." SL3b further explains DL3 has the same "small staff of people as when I was hired…in 2001 when all we had was a desktop and computer for each teacher [and technology has] grown astronomically." The school includes its own technology facilitator. SL3b said, "Mine is my math interventionist. Every week she'll send me a tech tidbit, and I'll put that in my memo. One of my assistant principals is the point person" for virtual learning. Additionally, SL3b has "good teachers who love technology, and when we do professional development and things like that, they are given the option to present those to staff members" (SL3b).

Since Governor Blanca, the school has been a one-to-one school. "We've modified that a little bit in that we don't allow the students to take their devices home" (SL3b). The sixth period is homeroom allowing students to "charge [Chromebooks] in

the evenings, pick them up in the mornings, and carry them from class to class during the day" (SL3b). Additionally, each teacher has a document and touch projectors in the math classes. "It's almost like a Smartboard but through the projector itself. We're trying to use something more cost-effective than Smartboard or Promethean" (SL3b). Students and teachers have access to Microsoft 365 "allowing students to have access to their work and ability to be streamed into the classroom" using Microsoft Teams (SL3b). If a student is going to be out, they "team up with a buddy in the class, so I can participate in a live stream in the classroom" (SL3b). SL3b provides additional context:

> We're a *Leader in Me* school and put a lot of responsibility back onto kids. We try to get them to be helpful to their peers. OnCourse allows our teachers to implement all assignments. It's kind of a big umbrella for a lot of things…learning management and a great communication tool for grades and lesson plans. Parents can access their [student] grades live. Some teachers use [Microsoft] Teams for keeping Notebooks.

SL3b stated, "Each sixth grader takes a high school credit class called Cyber Society. The purpose is to learn about digital citizenship so they understand what the expectations are. It's not just a gaming device or for YouTube videos." There is also a "digital communication class for seventh graders. These are the kids who make our morning announcements, so they have access to video editing and camera technology as well as green screens" (SL3b).

Participant SL3b expects when walking into a classroom

> To see a highly engaging lesson in multiple ways. I was a teacher who believed in the utilization of technology for a variety of reasons. Our

> students are born into this age of technology. They don't really understand what it was like being in a classroom prior to that. They're natives, but not very good at using what we have at our disposal. They're good at applications because we give them iPads and iPhones at a young age, but when it comes to utilizing Chromebooks or laptops for research purposes or how to present to peers…If we're not exposing that on a regular basis, then we're not teaching them.

Instead of just using PowerPoint for presentation, teachers "…use NearPod. We can put in video clips, build polls with questions, and [add] discussion topics" (SL3b). SL3b expects "to see Chromebooks being used. I don't want these to be like paperweights. All of our tests are done through technology. No paper-based testing" (SL3b). As a *Leader in Me* school, SeeSaw is used for student digital portfolios.

> This allows us to use it for assignments and data tracking, and the students will track their own data. COVID has kind of shut this down, but I want to hopefully bring this back in March with student-led conferences so they can show their parents what they're working towards and areas in which they've excelled. It helps students take more responsibility for their own learning (SL3b).

Leadership

Participant SL3b's TETL "role is supporting their [teachers] efforts to make things a reality" (SL3b). This role has changed from a classroom teacher to a technology facilitator to an administrator. As a technology facilitator, SL3b's "job was helping teachers learn how to use technology…as a principal; you don't have as much time to

coach as you'd like to. I need to be able to put people in the best places for them" (SL3a). SL3b continues, "If my teachers want to go to LACUE, I try to find ways to enable that. If they want to do a site visit, I try to set that up." SL3b classifies themselves "as a coach… hands-on involvement is my major role" (SL3b).

SL3b provides an example of utilizing technology in the most appropriate environment:

> One of the first things done as principal was we started a Z-Space lab, which is a virtual lab, …because I didn't think we were using it as effectively as we should here, I talked to the high school principal and got it moved over there so they could use it for their JumpStart program. They use it for engines. With the high school being right across the street, we can just walk over if we need to access it.

When SL3b's administration team visits classrooms, "…we look at the technology and try to coach. How else could we have done this? Or could we have used this tool to bring this into reality for the kids? I think it's a school vision I had" (SL3a). SL3b explains further:

> Our task is to create young people who become citizens running this country, and if we don't prepare them for every aspect, which technology is a significant aspect of that, then we're doing them a disservice. It's also something I'm passionate about, because I know how it affects me as a learner, and I know how it can make your class so powerful.

"My staff and faculty know I have two main goals…1. Every student that enters high school needs to be on grade reading level. 2. Everyone needs to be successful and

ready for Algebra I. That is a tremendous struggle. We have kids coming into the sixth grade that Lexile is below the beginning level" (SL3b). To help with that, "we have Read 180 that has a technology component…and System 44, which is for our lowest level readers" (SL3b). The software "helps identify areas that we need to support. Plus, we have a period every day in our master schedule that's called Read to Lead, where every student in the school is reading" (SL3b).

Perception

> SL3b feels technology is a major aspect of preparing students for life.
>
> I think my team…has a mindset of wanting to see kids engaged and utilizing these tools. A lot of these kids come from poor areas and most of their knowledge comes solely from school. We have to show them what's out there at their disposal, even if they don't have access to them at home.

SL3b feels "all kids learn differently. I was the type to have to get up and move around" (SL3b). SL3b tries "to remind my teachers of that. Some kids can watch a YouTube video and some of our teachers will produce their own videos, kind of like TikTok, but…some kids that doesn't help" (SL3b). An example provided was of those students that "tend to drift off and daydream if they're stuck in front of a screen" (SL3b). To change this up a teacher "can play review games with kids and get their minds working differently" (SL3b). At this school, they especially see a decline in writing. "Writing is a challenge now for kids, and then they get in high school the ACT hits them, so having technology at our disposal allows us to work on things like that. We're always looking for new ways to use it" (SL3b).

In the future, SL3b "would love to truly go green and paperless If we can turn this device into a complete product, where we have all of our workbooks, texts, worksheets, all in one device. Where teachers are comfortable using it [such as] being able to shoot out a PDF to a kid and they are able to shoot it back to them to grade it" (SL3b). Participant SL3b acknowledges that this is "a lofty goal, [but feels] the more we use it, the more we can move towards that goal" (SL3b).

Skill

Participant SL3b has been a teacher, technology facilitator, and principal. SL3b does not classify their technology skills as "an expert, but I feel comfortable and adequate in what is needed" (SL3b). Technology software used includes the Microsoft Office suite, which includes presentation tools, a word processor, and spreadsheets. For Excel spreadsheets, SL3b can run the basics. Microsoft Access experience is on a very minor level. Databases is the tool SL3b uses the least. Creative software uses includes video clips, sound-bytes, and Audacity software. SL3b uses "Audacity to help with the bell system [and to] program in audio announcements" (SL3b). School 3b has Facebook, Twitter, and Instagram and uses "social networks to communicate with parents and others in the community" (SL3b).

To continue to grow in TETL, participant SL3b is "a member of professional organizations" (SL3b). One example is SL3b's membership in LACUE. SL3b has "presented on technology at LACUE [and is] a good, solid user" (SL3b). SL3b tries "to go to the [LACUE] conference each year. If it comes down to money and it's me or someone else, I try to opt for someone else to go" (SL3b). SL3b also networks "to keep up with key educators through Twitter, Instagram, and TikTok" (SL3b). SL3b admits it

took “a while to join the TikTok fan club. It’s a cool way to get little clips very fast” (SL3b).

Self-Efficacy

“A lot of these kids are gaining access to [technology]…social media being a major part of that” (SL3b). SL3b does not “necessarily want to be an expert [in social media], but strives to be knowledgeable enough that if it becomes an issue or necessary in the school, I’m able to do it” (SL3b). SL3b believes, “It’s the same with technology. You just try to keep current. I want to make sure kids are using it for the right reasons and that it doesn’t become a negative tool” (SL3b).

Cross-Case Comparison

Technology Enhanced Teaching and Learning

Two TETL themes appeared between all three districts through this study: resources and student-centered strategies.

The first common TETL theme is resources. Each participant described an abundance of district resources:

- Quite a bit of technology (SL1)
- We almost have a surplus, at this point (SL1c)
- A wealth of resources (SL2a)
- Provides a lot resources (SL2b)
- A ridiculous amount of online resources (DL3)
- A plethora of resources (SL3a)

All three districts are one-to-one with student devices regarding students and devices. For instance, District 1 provides iPads for PreK through second grade (SL1a),

and all students have Dell 3310 Laptops (DL1). District 2 provides Chromebooks (DL1) for all students “except PreK and Head Start, have iPads as well” (SL2b). District 3 elementary students have Dell Chromebooks and their high school has Dell laptops (DL3).

In addition to the one-to-one access for students and devices, the standard classroom in District 1 includes an interactive Promethean ActivBoard and various equipment, including document cameras, video cameras, Swivls, and classroom amplification systems. The district also has a check-out system for equipment such as STEM tools (DL1). All District 2 classrooms include a Promethean ActivPanel and a teacher’s Windows computer. In addition, many classrooms have document cameras. There is also a checkout system for various equipment, including STEM materials. The teachers order equipment and resources via the district webpage, and the items are delivered to their school (DL2). In District 3, the teachers have two laptops but will have a Surface in the future. Older Promethean ActivBoards are in some classrooms along with document cameras, wireless projectors, interactive projectors, and a few Promethean ActivPanels (DL3). Highlights of software provided include the following:

- Microsoft 365 (DL1, SL1a, SL1b, DL3, SL3b)
- Google Suite (DL2, DL2b, SL2c)
- On Course (SL2a, DL3, SL3a, SL3b)
- NearPod (DL2, SL2a, SL2c, DL3, SL3a, SL3b)
- Classkick (SL1a)
- Canvas (DL1, SL1a, SL1b)

The second common TETL theme is student-centered strategies. All three districts provided examples of students actively engaged in using technology as a tool. When SL1b's went one-to-one utilizing student cell phones, one way they were actively used was with Quizlet because this allows students to participate in interactive quiz activities. Another example provided was when students used a Microsoft Form to fill out with research collected on the web (SL1b). DL2 and their team aligned NearPod tools with key highly effective teaching strategies, according to Hattie. Students are now actively using tech as a tool for feedback, to jigsaw information and in assessment (DL2). SL2a provided several active learning examples at their school using Nearpod and BreakoutEdu. "The kids really like…the opportunities to watch more interactive videos, manipulate things on the computer, and simulate different things that they can't do in the classroom" (SL2a). SL2c modeled the active learning experience for teachers with a Goosechase scavenger hunt. A similar version was also utilized school wide with students at the beginning of school (SL2a). SL3a expressed a key way technology is incorporated at their school is to bring up the engagement (SL3a). SL3b mentioned the polls and assessments in Nearpod providing engagement. At the high school, a zSpace lab provides an active learning VR experience for students learning about engines (SL3a).

Another example of student-centered strategies in the districts is using technology tools to collaborate with others. During professional development and coaching, DL1's team focuses on the technology having a meaningful connection to help teachers and students "work collaboratively…[and] help provide skills to think outside the box" (DL1). Both SL1c and SL2a included independent learning and collaborative learning when describing their schools' effective TETL. SL3a also mentioned teachers

incorporating Nearpod's collaborative board. Another example of collaboration was provided by SL3b. They have a "digital communication class for seventh graders" that creates the morning announcements using "video editing and camera technology as well as green screens" (SL3b). SL3b also mentioned the discussion activities integrated at their school through the use of Nearpod. SL1c described the full-blown student discussions possible through the integration of technology and the benefit. "A lot of times students who will not speak up in class will comment digitally" (SL1c).

Student-centered lessons discovered throughout the districts also included authentic connections linking the students to the world beyond the instructional setting. The core reason behind district 1 standardizing with Microsoft 365 versus the Google suite was the local workforce. Digital citizenship was also highlighted as important throughout the districts interviewed. SL1b expressed that "[technology] is very important because it's a great thing, but also it could land you in jail…It's important for us to have a digital citizenship" (SL1b). SL3a has digital citizenship built into the multimedia course. "The first nine weeks is just getting them getting really well versed in those online learning tools" used at the school (SL3a). "Then they move onto how to be safe online and how to cite sources" (SL3a). SL3b mentioned a course they offer called Cyber Society in which students learn about digital citizenship. DL2 described a virtual space experience provided by a group of third-grade teachers. The kids were able to go to space through the integration of ClassVR in the lesson (DL2). Students at SL2a's school are creating apps through Project Lead the Way (SL2a). A real-world connection SL2b mentioned was numerous coding activities incorporated in their computer lab (SL2b). The STEM class at SL2c's school also works on coding (SL2c). STEM courses are offered at each school in district 3 and they include coding and

robotics. The chemistry and science courses incorporate a program providing digital experiments. In addition, the high school drone class includes FAA certification (DL3).

Goal-directed student-centered experiences were also revealed in which the students use technology to set goals, plan activities, monitor progress, and evaluate results. As part of being a Leader in Me school, "[students] have data notebooks in Microsoft teams…all of the students have to track their own data and that helps us for them to set their goals and track their progress within those goals" (SL3a). Students at SL3b's school use SeeSaw to build a digital portfolio that "allows us to use it for assignments and data tracking, and the students will track their own data" (SL3b).

Leadership

All three districts in this study revealed the following common TETL leadership themes: team, vision, professional development, and future leaders. The TETL leadership team in each district begins with the superintendent (DL1, DL2, SL2a, SL2b, DL3, SL3b). Descriptions of the district superintendents in connection with TETL included the following:

- promotes the importance of technology (SL2a)
- forward-thinking (SL2b)
- regularly shares edtech findings (DL2)
- advocate for technology (DL3)
- makes sure [technology] budget is well funded, within reason (DL3)
- one of the big reasons we're so successful (SL3b)

An example of a superintendent's direct involvement in TETL was described by DL1. At the beginning of the pandemic, the superintendent for District 1, put DL1 in charge of a technology committee of 50 stakeholders charged with evaluating "all the learning tools

and major systems" of the district. The superintendent also served on the committee (DL1).

The study district leader was identified as key to the success of promoting and fostering TETL in the schools (SL1b, SL1c, SL2a, SL2b, SL2c, SL3a, SL3b). A common theme about the TETL district leaders was providing support through numerous professional development opportunities and assistance (SL1b, SL2a, SL2b, SL2c, SL3b). Highlights of participants' perceptions of the study's TETL district leader are as follows:

- key person…[who] pushed this district into the 21st century (SL1c)
- second to none (SL2b)
- always at the forefront of what's out there (SL3b)
- fabulous (SL2c)

Another common characteristic of the district TETL leader noticed was all of them had previous classroom experience. The district TETL leader in all three districts also had direct communication and collaboration with the curriculum department for the district, as well as, each of them is in charge of both educational technology and IT (DL1, DL2, DL3).

The IT department is also a piece of the leadership team. In District 1, the IT side includes a tech help desk, tech support network, and tech support equipment (DL1). The IT department in District 2 has working knowledge of the educational technology side as it relates to the classroom. This helps those directly involved in troubleshooting the importance of particular requests such as those involving an observation day (DL2). District 2 includes an IT administrator, a person in charge of data, and a desktop person (DL3).

Another shared layer of the leadership team is that at least one person directly connected the district and the schools (D1, SL1a, SL1b, SL1c, D2, SL2a, SL2b, D3, D3b). This position looked different in each district because some districts have multiple direct connections between the district and the schools. This did not include the district The DL for each district was not included in this list. Below is a breakdown per district of the position(s) directly connected with the schools:

- District 1
    - Coordinator - The coordinator is in charge of the Technology Training Center. In addition to this role, the coordinator works with ten teachers in a rotation of schools yearly with a focus on increasing technology integration into the curriculum (DL1).
    - Technology Facilitators - The technology facilitators are assigned to specific schools to work with and support the teachers (DL1, SL1a, SL1b, SL1c).
    - Showcase Teachers - Showcase teachers are high-tech model classroom teachers. These teachers work with three schools a year (DL1).
    - Tech Contacts - Each school has tech contacts (DL1, SL1a, SL1c). The number of contacts depends on the size of the school. School 1c has seven (SL1c). The contacts help to troubleshoot (SL1a).
- District 2
    - Technology Facilitators - There are two district technology facilitators who work directly with the schools (DL2. SL1a, SL1b).

    - Instructional Coaches - Each elementary and middle school has a math/science and an ELA/social studies instructional coach (DL2. SL1a, SL1b).
    - National Educator - District 2 contracted a national educator to work with their instructional coaches as well as working with administration at the district and school levels (DL2. SL1a).
- District 3
    - Technology Facilitator - Each school in the district has a full-time teacher that also serves as an instructional coach/technology facilitator. This position is paid a stipend on top of their teaching salary. In the afternoon, technology facilitators report to the district office to assist the district leader (DL3, SL1b).

Below is a breakdown per school within the districts of the position(s) directly connecting schools to district leadership. Each school has people involved on campus within the scope of TETL. Tech Contacts are not included in the list below because they were previously discussed above. A description of these campus influences are included for each school below:

- School 1a
    - The school has three people in charge of the organization and maintenance of the technology. SL1a's role in promoting and fostering TETL has changed over the past 14 years as a leader of School 1a. Due to all the built-in support provided by the district, the need for SL1a's direct involvement has drastically decreased.

Previously, SL1a invested school funds for technology and professional development and even installing equipment. SL1a and their administration team primarily helps share discoveries found during observations with other staff. “Faculty can then go and ask further questions about it” (SL1a).

- School 1b
    - Tech team leaders are a group of teachers that directly assist with TETL. In addition to these four or five teachers, students serve on a “tech team” to assist with troubleshooting. One teacher directly works with special education, primarily the new teachers (SL1b). SL1b is described as a technology advocate (DL1). As a principal, SL1b finds their role is to delegate because “you can’t do it all on your own.” SL1b is available to support TETL and serves as needed on committees such as the one developed due to the pandemic (SL1b)
- School 1c
    - SL1c and the assistant principal help promote and foster TETL at the school by setting expectations. They include technology in their “Snap Through” observations using Bullseye software (SL1c). SL1c is described as a leader that promotes technology (DL1).
- School 2a

    - The assistant principal, school media specialist, and a technology-savvy teacher help with the school's TETL. SL2a provides opportunities to share, enter work orders, and connect teachers with other staff who can assist with a particular tool or project (SL2a).
- School 2b
    - The school has "six to eight teachers that assist with professional development and troubleshooting." Teachers sharing what they discovered they could do with technology is something that happens regularly during PLC time. When SL2b first became principal as School 2b, their TETL role was to provide a clear direction. SL2b explains her support role, "I always tell them if you dream it then it's my job to make it happen."
- School 2c
    - The computer literacy teacher and media specialist along with "a good handful of teachers that are very techie and love to learn and grow in those areas" help keep everyone up-to-date. SL2c's role is to "be a bridge that helps them collaborate" and provide opportunities for staff to present (SL2b).
- School 3a
    - TETL support is "spread throughout our whole staff." One example of this is that there is a virtual teacher in each hall. SL3a describes their TETL "role is to make sure I'm facilitating an

environment where we know what our resources are and to foster the love of exploration" (SL3a).

- School 3b
    - During SL2b's administration team visits, as needed, they try to coach. SL3b's TETL "role is supporting their [teachers] efforts to make things a reality" (SL3b).

The second common TETL leadership theme is the vision and goals developed from the leadership team. Each district TETL leader develops a TETL vision and goals for the district. DL1's role in the district "is to provide a framework and the goals of what they're going to accomplish during the year, and look at the data to make sure that they're going in the right direction" (DL1). When SL1c was asked about the people involved in the school TETL, the first person mentioned was DL1. According to SL1c, when it comes to school TETL the "key person is DL1 who pushed this district into the 21st century. [DL1] definitely has a vision of where she wants to go and where she sees us." DL2 is a visionary leader who works to empower others while clearly communicating expectations. DL2 described their leadership as "a visionary leadership trying to get everything working together, and working as a team member to provide vision, develop goals, support, and encouragement." SL2a mentioned when it comes to fostering and promoting effective TETL at their school that, it starts at the top with the district team. DL3 has worked hard to blend curriculum and technology in the district, supporting each other working toward one common goal in the district (DL3). SL3b stated, "[DL3] is one of the big reasons we're so successful" promoting and fostering effective TETL (SL3b).

The school leaders share and promote the district vision while personalizing it with their own school-level goals. SL1a discovered a way for teachers to "interact in real-time with the students' work," so the school adopted the software Classkick (SL1a). Prior to the district becoming one-to-one, SL1b had a goal for their students to be one-to-one through the use of their cell phones. After receiving permission from the district and school board, they became the first school in the district to accomplish one-to-one technology in this manner (SL1a). SL1c and their administration team are purposeful in guiding teacher effective integration of technology through *Snap Throughs* using the Bullseye program data (SL1c). SL2b discovered a need specific to their school when the size of their new library was not conducive to housing books for head start through eighth grade. To accomplish the goal of providing books for the school, SL2b and their team have begun "working to build a digital library, checking out Kindles to kids and helping all of our students have library cards for the public library" (SL2b). One of SL2c's goals is to model for the teachers what is expected in the classroom. When providing staff meetings or professional development, SL2c, with the assistance of their team, provides ways for teachers to "get engaged in their learning versus just sitting there listening to her talk" (SL2c). SL3a has found an avenue to help themselves and staff continue to grow in TETL through book studies (SL3a). To further expand the vision of being a *Leader in Me* school, SL3b flipped absentee responsibility to the students. If a student is going to be out, they "team up with a buddy in the class, so they can participate in a live stream in the classroom" (SL3b).

A third common TETL leadership theme is professional development. All three districts have various professional development opportunities on both the district and

school levels. A variety of professional development opportunities are offered by district leaders in each district (DL1, SL1a, SL1b, DL2, SL2a, SL2c, DL3). District 1 and 2 provide face-to-face and webinar professional development (DL1, DL2). District 1 includes a Technology Training Center offered by the district coordinator and technology facilitators for district educators. The district awards points for training which can be used to purchase classroom equipment (DL1). District 1 also requires training prior to equipment check out (DL1). Technology facilitators also work directly with teachers providing professional developments on school campuses (DL1, SL1a). Below are interview highlights concerning the training provided by the districts:

- Educators can enroll in all these different courses (SL1a).
- You can sign up for anything under the sun (SL1b).
- Numerous professional development opportunities are available including virtual and face-to-face (DL2).
- The district provides a wealth of…training (SL2a).
- A lot of our teachers attend their professional developments (SL2c).
- Curriculum and online professional development is conducted by technology facilitators (DL3).
- DL3 and their cohort, accountability, and supervisor of schools also provide district training (DL3).

At the school level, there are additional professional development opportunities as outlined below:

- Technology facilitators work with teachers during PLC time (DL1, SL1a) and provide professional developments on campus (SL1a, SL1c, SL2a).

- Instructional coaches and a group of teachers provide on-campus professional development (SL2b).
- Teachers that attend district professional development have opportunities to present to the staff (SL2c).
- Many in-house professional developments are available (SL3a).
- Several strong teachers that love to integrate technology are given the opportunity to present to the staff (SL3b).

The fourth common TETL leadership theme is preparing future leaders (DL1, SL1a, SL1b, DL2, SL2a, SL2b, D3, D3b). As part of the building leadership model in District 1, the coordinator works with ten teachers at select schools per year to "spread out the experts throughout all schools" (DL1). Additionally, a group of high-tech model classroom teachers, Showcase Teachers, are paid to work with three schools per year (DL1). SL1a and other school leaders keep an eye out for new or creative technology incorporations in the classroom and then share the information with other teachers, partnering them up with peers to learn. Teachers attending district training come back to their campus and share during team meetings and when they observe each other (SL1a). School 1b also has a group of teachers called Tech Team Leaders that help make everything happen related to TETL.

DL2 purposefully "looks for and encourages teachers to present as they get more comfortable [DL2] continues to push them to larger audiences such as state conferences." Additionally, "teachers are encouraged to brand themselves, network, and become experts, not passive learners. We've pushed them to reach out to the national folks on social media. They're starting to see recognition from outside of [District 2] for what they

are doing" (DL2). SL2a feels "it is very important to give teachers opportunities to share. Teachers discover things, and they're excited in their PLC to share with other teachers (SL2b). SL2c provides opportunities for their staff to present when they come back from the professional developments.

DL3 regularly communicates with principals and teachers. An example of leadership opportunities she has given includes hiring one teacher per school as a technology facilitator. Another example is when she is exploring technology options. While "trying to find a projector that worked with the Chromebooks," DL3 asked the principal for a teacher to lead the exploration and discovery of what would work. If a teacher gets excited about a technology integration such as using See Saw, SL3a provides opportunities for them to present to other teachers that are interested. SL3b empowers leadership in teachers by supporting opportunities they desire, such as attending conferences like LACUE or doing site visits.

All three districts provided examples of these leadership opportunities already returning full circle. DL1 spotted the current coordinator as a teacher presenting at InTech and knew that would be the next technology facilitator. The transitioned from a regular classroom teacher to model teacher to technology facilitator to now coordinator. DL2 empowered SL2a to be a leader while a classroom teacher. SL2a said, "I wouldn't be here [as a principal] if it wasn't for [DL2] seeing me in the classroom. She tries to ensure that it is not just her and her team that give all the training. She saw potential in me to lead, so she had me leading" (SL2a). In District 3, SL3b transitioned from classroom to technology facilitator to now principal (SL3b).

Perception

TETL importance and use are two common perception themes revealed between all three districts through this study. TETL was described as essential (DL1, DL3), priority (SL1a), vital (SL2a), necessity (DL1, SL1c, SL3b), and important (DL3). DL2 described effective TETL as an expectation. TETL meets the needs of students and what they need for their future (DL1, SL1a, SL1b, SL1c, DL2, SL2a. SL2c, DL3, SL3a, SL3b). Technology should be used to enhance learning (DL1, SL1a, DL2, SL2a, SL2b, SL2c, SL3a) not just used for technology's sake (DL1, SL1b, DL2, SL2b, SL3a). Technology integration is directly connected to the curriculum (DL1, SL1a, SL1c, DL2, SL2a, SL2b, DL3, SL3a).

Skill

Common skill themes across the district include skill level range and avenues to remain current in technology. The TETL skills of the participants ranged from average to advanced as listed below:

- Advanced (DL1, DL2, SL2a)
- Above Average (SL1a, SL3a)
- Average to above average (DL3, SL3b)
- 7.5/10 (SL1c)
- Average (SL1b, SL2b, SL2c)

Additional information concerning the self-ratings includes DL1 feeling that they are "always emerging and learning new things" (DL1). DL2 mentioned they would fall under more of a knowledgeable level if only referencing IT skills (DL2). DL3 notes that "it's one of those, how deep are we talking? Are we talking SQL? There's none at all"

(DL3). SL3b would not define their skills as expert level but feels “comfortable and adequate in what is needed.”

All participants are purposeful in their need to remain current in the ever-changing world of technology. Below is a list of common avenues taken to stay current:

- Professional organizations such as ISTE, TCEA, and/or LACUE (DL1, SL1a, DL2, SL2b, DL3, SL3a, SL3b)
- Social networking (DL1, SL1b, DL2, SL2a, SL2c, DL3, SL3a, SL3b)
- Blogs, wikis, etc. (SL1b SL1c)
- National experts (DL1, DL2, SL2a, SL3a, SL3b)
- Listservs (DL1, DL3)
- District training and or communications (SL1a, SL1c, SL2c)
- Teacher observations, collaborations, and/or training (SL1a, SL2b, SL2c)
- Continue teaching (SL1b, DL2)
- Book studies and/or research (SL2b, SL3a)

Self-Efficacy

Self-efficacy themes have been revealed between all three districts through this study. The first theme is having the confidence just to try anything (SL1a, SL1b, SL1c, SL2c, DL3, SL3a). The second theme revealed between all three districts related to self-efficacy is to be open to listening to those that can support you (SL1b, SL2c, DL3, SL3a)

CHAPTER 5

DISCUSSION

The purpose of this qualitative study was to develop a school leadership model that promotes and fosters effective technology-enhanced teaching and learning (TETL) in PK-12 education. Technology-enhanced teaching and learning (TETL) is the integration of technology into teaching and learning practices to improve the quality of learning outcomes (Law et al., 2016). It is an essential strategy for improving educational quality, and school-level leadership directly affects TETL (Ghavifekr & Rosdy, 2015; Law et al., 2016). Despite research validating the benefit of TETL to aid and support students' learning, integration of technology differs vastly between classrooms, schools, and districts (Ghavifekr & Rosdy, 2015).

This qualitative study investigated highly effective TETL public school districts in Louisiana. The district TETL leaders and school-level leaders in these districts were interviewed to explore TETL, leadership, perception, skill, and self-efficacy to uncover characteristics needed to promote and foster TETL.

This chapter discusses key findings, recommendations for leadership, and implications for future research. The key findings are organized first by the research question constructs, followed by theoretical framework and emergent findings from the other study constructs.

Finding 1: Perception

How do school leaders' perceptions influence their leadership characteristics to foster effective TETL?

High Perception

Perception of TETL was found to be high among study participants at both the school and district levels. District leaders perceive effective TETL to be essential (DL1, DL3) and an expectation (DL2). School leaders characterized effective TETL as a priority (SL1a), vital (SL2a), and a necessity (SL1c, SL3b).

In this study, the sample was selected due to promoting and fostering effective TETL. The study's finding of school-level leadership with high levels of perception producing effective TETL aligns with the study results of Machado and Chung (2015) and Webb (2011). These studies found that a principal's positive TETL perception fosters the promotion of successful teacher integration in the classroom (Machado & Chung, 2015; Webb, 2011).

According to Law et al. (2016) and Liu et al. (2016), research needs to consider the school system's multi-level structure to avoid the risk of ignoring influence within its complex layers. This study provided additional insight by including district-level leadership perceptions. In addition to discovering high perceptions of TETL among the interviewed district-level leadership (D1, D2, D3), each superintendent was identified as a person not only interested in district-wide TETL but also influential in the district and school TETL success (DL1, DL2, SL2a, SL2b, DL3, SL3b). The study's district leaders were also identified as key to the success of promoting and fostering TETL in the schools (SL1b, SL1c, SL2a, SL2b, SL2c, SL3a, SL3b). The effective integration of technology in

the district classrooms is linked not only to the high perception of TETL by school-level leaders but also that of district-level leadership.

Perception of Use

Another finding related to perception was the use of technology in the classroom. Participants across all three districts felt TETL meets the current and future needs of students (DL1, SL1a, SL1b, SL1c, DL2, SL2a. SL2c, DL3, SL3a, SL3b) which directly aligns with Education 2030 promoting the need to build life skills aligned to our technology-driven world (UNESCO, 2015). Participants across all three districts also felt technology should be used to enhance learning (DL1, SL1a, DL2, SL2a, SL2b, SL2c, SL3a) and be directly connected to the curriculum (DL1, SL1a, SL1c, DL2, SL2a, SL2b, DL3, SL3a). Meeting the current and future needs of students, enhancing learning with technology, and focusing on curriculum are elements related to the perception of technology use. These are elements to consider while developing a shared vision for using technology to improve student success. This shared vision of use is part of the ISTE Standards for Leaders 3.2 Visionary Planner (ISTE 2018).

Finding 2: Skill

How do school leaders' skills influence their leadership characteristics to foster effective TETL?

Level of Skill

TETL skill among study participants ranged from average to advanced. Advanced skill levels were found in 67% of the district leaders, and all district leaders ranged between above average and advanced. Average skill levels were found in 50% of the school leaders with the remainder ranging between above average and advanced. While

self-reporting technology skill level, 36% of the participants mentioned the breadth of technology connected to TETL. Participant DL3 noted that "technology skills is one of those. How deep are we talking? Are we talking SQL? There's none at all." Due to some study participants including IT skills in their ranking, the data could be skewed, resulting in a self-reported lower ranking. School-level leaders' TETL skills directly link to teachers' technology use (Raman et al., 2014). In this study, finding a technology skill level of average to advanced among school leaders links to the teachers' technology use in an effective manner. This skill connection is part of the ISTE Standards for Leaders 3.1a Equity and Citizenship Advocate, "Ensure all students have skilled teachers who actively use technology to meet student learning needs" (ISTE 2018, para. 1).

Remaining Current

District and school-level participants in this study were purposeful in their need to remain current in TETL. Social networking was used by 73% of participants as one of the ways they stay current with technology. Being a member and participating in ISTE, TCEA, and/or LACUE was an avenue of skill and knowledge growth by 64% of participants. Connecting with national experts was reported by 46% of participants. Other routes to remain current included blogs and wikis, listservs, district training, book studies, research, teacher observations, and continuing to teach. The focus on and avenues for skill growth directly connect with ISTE Leadership Standard 3.5 Connected Learner (ISTE, 2018, para. 5):

- 3.5.b Participate regularly in online professional learning networks to collaboratively learn with and mentor other professionals.

- 3.5.c Use technology to regularly engage in reflective practices that support personal and professional growth.
- 3.5.d Develop the skills needed to lead and navigate change, advance systems and promote a mindset of continuous improvement for how technology can improve learning.

The growth of one unit in TETL skills by school-level leaders could increase teachers' technology use by .04 (Raman et al., 2014). As these educators' TETL skills improve, so do their teaching methods and promotion of learning infused with 21st-century skills (Ghavifekr & Rosdy, 2015). 21st-century skills are a key focus of both Education 2030 and the TIM framework. Education 2030 aims to foster creativity and knowledge, ensuring foundational literacy and numeracy skills, promoting analytical higher-order thinking skills, and developing interpersonal skills (UNESCO, 2015). In the TIM framework, there are five interdependent characteristics of meaningful learning environments: active, collaborative, constructive, authentic, and goal-directed (FCIT, 2019).

Finding 3: Self-Efficacy

Confidence

Having the confidence to try anything was reported by 75% of participants to directly link to self-efficacy (SL1a, SL1b, SL1c, SL2c, DL3, SL3a). All participants mentioned avenues taken to remain current in technology as outlined in finding 2. The confidence to try while focusing on remaining current directly connect with ISTE Leadership Standard 3.5 Connected Learner (ISTE, 2018, para. 5):

> 3.5.d Develop the skills needed to lead and navigate change, advance systems and promote a mindset of continuous improvement for how technology can improve learning.

In addition to the above ISTE standard alignment, leaders should be aware of building others' confidence as mentioned in ISTE Standards for Leaders 3.3 Empowering Leaders (ISTE, 2018, para. 3): "3.3.b Build the confidence and competency of educators to put the ISTE Standards for Students and Educators into practice." Education 2030 promotes lifelong learning (UNESCO, 2015).

Communication

Data collected from all three districts revealed a relationship between self-efficacy and communication. DL3 expressed, "Good communication helps us address everything…Our principals aren't afraid to say what they want, nor are my teachers. Everyone is involved."

Limited self-efficacy in TETL restricts its integration in the classroom (Liu et al., 2016). One participant was self-aware of self-efficacy, somewhat hindering their approach to TETL. To combat this, SL2c tries to remain open and relies on those who are TETL knowledgeable. Educators should be open to listening to those that can help provide support (SL1b, SL2c, DL3, SL3a). Educators with high TETL skills have the self-efficacy needed to integrate the technology into the classroom (Hennessy et al., 2005).

Finding 4: Connection to Framework

According to SLT, the relationship between the leader and follower is critical, and a key factor determining success is the leader's ability to assess the followers' ability and

willingness to accomplish a specific task (Hersey, 1985). This framework has previously been used to determine the school-level leadership style needed according to the teachers' ability and willingness. The current study expanded the SLT focus from the teachers' ability and willingness to the leader's ability and willingness by looking at their perception, skill, and self-efficacy. Additionally, the study sample is districts with effective TETL; hence the teachers are effective in TETL and should have similar ability and willingness levels.

The study data of school-level leaders found perception of TETL to be high. Self-efficacy was also determined to be high among 88% of the school-level leaders, with one participant having average self-efficacy. Both perception and self-efficacy are used to determine willingness. Ability is determined by the school-level leaders' TETL skills. The study found skill to be variable between average to advanced. Average skill levels were found in 50% of the school leaders with the remainder ranging between above average and advanced. While self-reporting technology skill level, 36% of the participants mentioned the breadth of technology connected to TETL. Due to some study participants including IT skills in their ranking, the data could be skewed resulting in a self-reported lower ranking. The School-leader's description of their TETL role at the school was aligned with SLT leadership styles. The leadership styles represented by school-leader participants were support, coach, and support/delegate. All participants had elements of delegate leadership style due to the TETL team approach on the district and school levels. Table 5.1 outlines the leadership styles along with the levels of perception, skill, and self-efficacy related to TETL.

Table 5.1

School-Level Leadership

	Leadership Style	Perception	Skill	Self-efficacy
SL1a	Support	High	Above Average	High
SL1b	Support	High	Average	High
SL1c	Coach	High	Above Average	High
SL2a	Support-Delegate	High	Advanced	High
SL2b	Support-Delegate	High	Average	High
SL2c	Support	High	Average	Average
SL3a	Support	High	Above Average	High
SL3b	Support	High	Average to Above Average	High

The above school-level leadership data were analyzed in two ways. One way was directly applying the existing SLT follower ability and willingness characteristics to the school-level leader's ability and willingness as outlined below:

- Delegate leadership is an option when followers exhibit high ability and willingness of the relevant skill.
- Support leadership works best with followers who have moderate to high ability and variable willingness.
- Coach leadership is applied when followers lack ability but have a high willingness.
- Direct leadership is an option when the followers lack ability and willingness.

The data did not align with the currently defined leadership styles. The second way the data were analyzed was by looking for ability and willingness patterns aligned

with the self-described leadership styles of support, coach, and support-delegate. No consistent patterns were found.

All school-level participants credited district leadership as key to their school's TETL success. Each school also included on-campus TETL leaders as well as personnel directly linking the school and the district. Research should consider the school system's multi-level structure to avoid the risk of ignoring influence within its complex layers (Law et al., 2016) (Liu et al., 2016). Insight from this study suggests the school system's multi-level structure strongly affects leadership style, leadership characteristics, and effective integration of TETL.

Finding 5: Emerging Considerations

Resources

This research found an abundance of equipment and tools in all three districts. For instance, the standard equipment in most classrooms in each district includes an interactive front of classroom display, one-to-one student devices, and a variety of software programs. Including an interactive display aligns with Yang et al. (2015) study, finding students regularly engaged through an IWB exhibited significantly better learning effectiveness. The IWB group participants also had more positive attitudes towards their learning environment.

In addition to the provided classroom equipment and resources, each district had avenues for borrowing or ordering additional resources. Districts 1 and 2 provide a check-out system for equipment and tools, and district 3 shares equipment and tools between schools. District 1 awards points for professional development training in which teachers can purchase equipment and tools for their classrooms. School leaders in each

district also shared the ability to communicate with the district TETL leader additional resource needs within their schools, which were typically able to be met. Providing resources directly connects with ISTE Standards for Leaders 3.1 Equity and Citizenship Advocate and 3.4 (ISTE, 2018, para. 1 and 4):

- 3.1.b Ensure all students have access to the technology and connectivity necessary to participate in authentic and engaging learning opportunities.
- 3.4.b Ensure that resources for supporting the effective use of technology for learning are sufficient and scalable to meet future demand.

The availability of equipment and tools also aligns with Education 2030 promoting the urgent need for children building life skills aligned to our technology-driven world (UNESCO, 2015). This finding connects also with the Education for All Act of 2016 in the United States by providing the needed resources to promote sustainable, quality basic education, which includes digital literacy (Education for All Act of 2016, 2016).

Student-Centered Strategies

Providing the resources needed for effective TETL links directly to the ability to provide the student-centered strategies found throughout the districts. Technology provides the opportunity to shift instruction from the traditional classroom with teacher-led lessons to student-centered lessons focused on the active learning environment, which integrates the 21st-century skills of collaboration, creativity, critical thinking, and communication (Berlinguer, 2012; Daley et al., 2001; Law et al., 2016). This building of life skills requires pedagogical sound teaching and learning methods supported by technology (UNESCO, 2015).

Implementations of this study are the need for school leadership to understand TETL methods and strategies. Numerous student-centered strategies were documented by both district and school-level leaders. Highlights of the student-centered strategies are aligned below with the TIM framework provided by FCIT (2019):

- Active - Students are actively engaged in using technology as a tool rather than passively receiving information from the technology.
    - Examples of students being actively engaged in using technology include a virtual scavenger hunt, visiting space, jigsawing information, and providing and receiving feedback.
- Collaborative - Students use technology tools to collaborate with others rather than working individually at all times.
    - Examples of students using technology to collaborate include collaboration using NearPod, discussion boards, and team virtual activities.
- Authentic - Students use technology tools to link learning activities to the world beyond the instructional setting rather than working on decontextualized assignments.
    - Examples of students using technology to link to the world beyond the instructional setting include VR, digital citizenship, and STEM.
- Goal Setting - Goal-directed student-centered experiences were also revealed in which the students use technology to set goals, plan activities, monitor progress, and evaluate results.

- Examples of students having goal-setting experiences were students using Microsoft Teams or Seesaw to track their own data and set their goals.

The ISTE Standards for Leaders (2018) which align with the student-centered strategies mentioned include the following:

- 3.1.a Ensure all students have skilled teachers who actively use technology to meet student learning needs.
- 3.1.b Ensure all students have access to the technology and connectivity necessary to participate in authentic and engaging learning opportunities.
- 3.1.c Model digital citizenship by critically evaluating online resources, engaging in civil discourse online and using digital tools to contribute to positive social change.
- 3.1.d Cultivate responsible online behavior, including the safe, ethical, and legal use of technology.
- 3.3.e Develop learning assessments that provide a personalized, actionable view of student progress in real-time.

Team

Each district included both a district and school team promoting and fostering effective TETL. Within the teams, there is at least one person directly linked between the district and the school. A breakdown of these roles in each district and school is included in Chapter 4. Providing these teams ensured each teacher multiple avenues of support. Leaders who provide mentoring teachers with strong TETL skills promote higher levels of TETL on their campuses (Webb, 2011). Providing a team to promote and foster TETL aligns with ISTE Standards for Leaders 3.4 System Designer (ISTE, 2018, para. 4): 3.4.a

- Lead teams to collaboratively establish robust infrastructure and systems needed to implement the strategic plan.

Vision

Leadership in each district, along with TETL team members, develop the TETL vision. Clear communication and buy-in are evident throughout each district. They speak the same language. In addition to the district vision, each school-level leader has additional TETL vision and goals specific to their school. An example of school-specific goals is the purposeful data collection and guidance by the administration at SL1c's school through *Snap Throughs* using the Bullseye program (SL1c). Development and promotion of a TETL vision align with ISTE Standards for Leaders 3.2 Visionary Planner (ISTE, 2018, para. 2):

- 3.2.a Engage education stakeholders in developing and adopting a shared vision for using technology to improve student success, informed by the learning sciences.
- 3.2.b Build on the shared vision by collaboratively creating a strategic plan that articulates how technology will be used to enhance learning.

Professional Development

Professional development is a focus in all three districts. This focus along with the study sample being effective in TETL aligns with Campbell et al. (2015) findings of the positive impact of professional development supporting TETL. Professional development opportunities in each district and school varied including both face-to-face and virtual options. TETL professional development aligns with ISTE Standards for Leaders 3.2 Visionary Planner and 3.5 Connected Learner (ISTE, 2018, para. 2):

- 3.2.e Share lessons learned, best practices, challenges, and the impact of learning with technology with other education leaders who want to learn from this work.
- 3.5.b Participate regularly in online professional learning networks to collaboratively learn with and mentor other professionals.
- 3.5.a Set goals to remain current on emerging technologies for learning, innovations in pedagogy, and advancements in the learning sciences.

Future Leaders

Each district empowers teachers to become future leaders. Interviews included current leaders that were in their current position due to the TETL district leader's intentional encouragement and preparation from the time they were in the classroom. District 1 incorporates a building leadership model in the structure of their TETL team, vision, and goals. DL2 is a visionary leader who works to empower others by encouraging presentations, networking, and branding. Promotion and development of future leaders align with ISTE Standards for Leaders 3.3 Empowering Leadership (ISTE, 2018, para. 3):

- 3.3.a Empower educators to exercise professional agency, build teacher leadership skills, and pursue personalized professional learning.
- 3.3.b Build the confidence and competency of educators to put the ISTE Standards for Students and Educators into practice.

Description of the School Leadership Model

The conclusions of this study identify a multi-level approach to TETL leadership which includes both a district and a school leadership team. The district and school

leadership teams need at least one person to create a direct link between the school and the district. The multi-level team approach is included in the school-level leadership model developed from the study's findings. The school-level leadership model encompasses the following key elements: vision, curriculum focus, student-centered, foster growth, empower future leaders, and support.

Figure 5.1

TETL School Leadership Model

Vision

A shared vision developed by stakeholders and adopted district-wide is needed for effective TETL. Goals aligned with the vision should include using technology to enhance learning, meeting students' current and future needs, and connecting directly to the curriculum.

Curriculum Focus

Curriculum content is immersed throughout each element of effective TETL. Vision development should include the curriculum department. The district leadership team should also include someone from the curriculum department. Student-centered teaching strategies are to be modeled using curriculum content along with technology as a tool to enhance learning.

Student-Centered

Student-centered teaching strategies focusing on students being active participants in learning versus passive receivers of information are essential to effective TETL. Integration of student-centered strategies can be aided by incorporating a framework such as TIM to help communicate and model the vision of 21st-century learning.

Foster Growth

Promoting and modeling growth in TETL is a crucial element of effective TETL leaders. Fostering of TETL growth includes a variety of professional learning opportunities and formats, avenues to share and collaborate with others, networking through social media, and involvement in professional organizations such as ISTE, TCEA, and LACUE.

Empower Future Leaders

Leaders empower future leaders by building confidence through recognizing leadership characteristics and encouraging leadership roles such as leading professional development.

Support

Resources including equipment, software, and tools are one support element needed to promote and foster effective TETL. Additional supports include troubleshooting assistance, IT team, and methods and strategies coaching.

Implications for Future Research

While this research identified an effective school leadership model, there may be value in identifying characteristics of ineffective TETL. The TETL School Leadership model could be used to discover which elements are missing from an ineffective TETL district. These insights would provide a list of what not to do in addition to discovering how missing parts of the TETL School Leadership model affect a district's integration. Additional future research could include expanding the sample of this current study. The findings are generalizable but need consideration of independent school district structures that may differ from the current study sample.

Conclusion

This research aimed to identify key elements needed to develop a school-level leadership model promoting and fostering effective TETL. This goal was accomplished by employing a qualitative multi-case study investigating highly effective TETL public school districts in Louisiana.

A multi-level approach in research was taken to avoid the risk of ignoring influence within its complex layers (Law et al., 2016; Liu et al., 2016). District and school-level leaders within each case provided information concerning their perception, skill, self-efficacy, TETL, and leadership as it relates to their success promoting and fostering effective TETL. The study revealed high perceptions of TETL and its use to enhance learning, meet students' current and future needs, and connect directly to the curriculum.

The skill levels of participants ranged from average to advanced. Each participant was purposeful to remain current in TETL skills and knowledge which included social networking and professional organizations. Self-efficacy findings were participants having the confidence to try anything and open communication. Additional findings revealed from participants TETL and leadership knowledge were the need for a clear TETL vision as well as a team approach at both the district and school levels. The team approach provided multiple avenues of support as well as professional development opportunities. Numerous resources including equipment and software were found to be available for teachers and leadership with a focus on integrating student-centered strategies. A conscience effort was made by participants to empower teachers to become future leaders.

The TETL School Leadership model was developed from this study's findings. This model provides a multi-level team approach to integrate the needed elements to foster and promote effective TETL. The key elements of this model are vision, curriculum focus, student-centered, foster growth, empower future leaders, and support.

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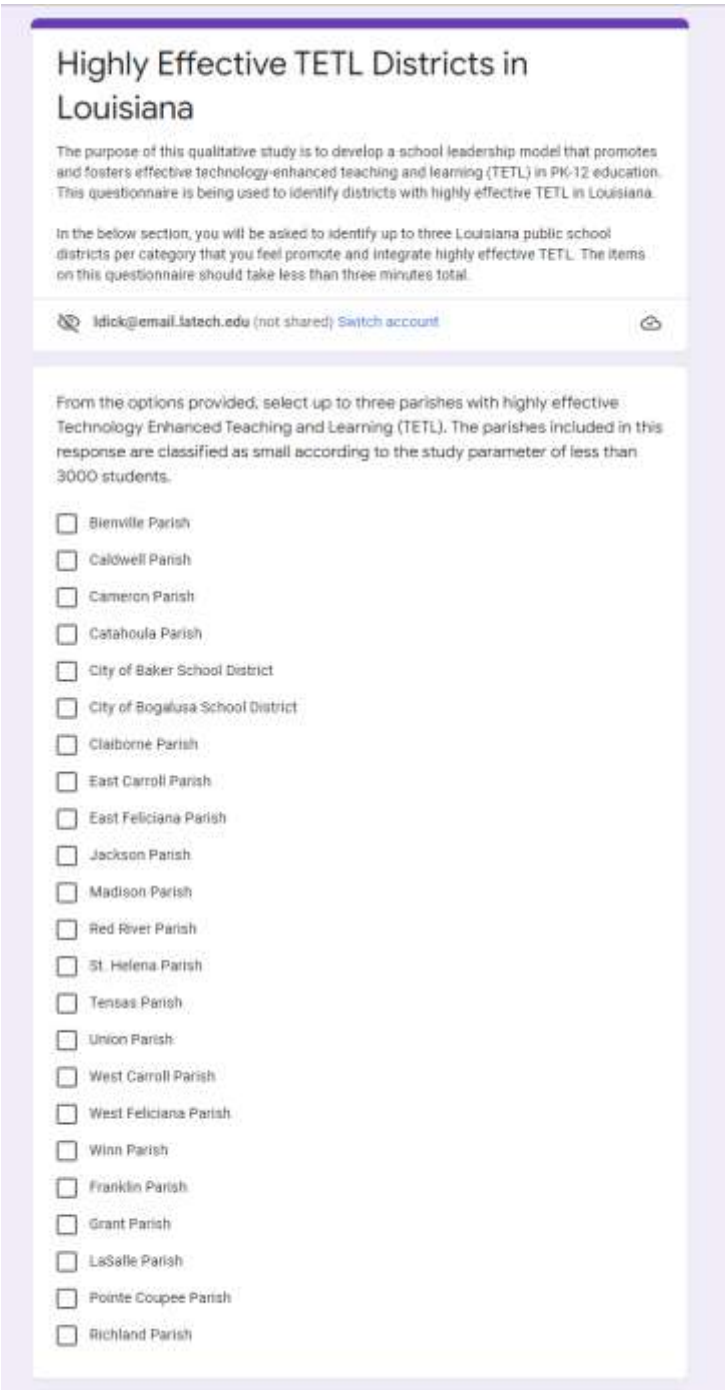
Yin, R. K. (2018). *Case study research and application* (6th ed.). Sage Publications.

APPENDIX A

CASE SELECTION FORM

Case Selection Form



Highly Effective TETL Districts in Louisiana

The purpose of this qualitative study is to develop a school leadership model that promotes and fosters effective technology-enhanced teaching and learning (TETL) in PK-12 education. This questionnaire is being used to identify districts with highly effective TETL in Louisiana.

In the below section, you will be asked to identify up to three Louisiana public school districts per category that you feel promote and integrate highly effective TETL. The items on this questionnaire should take less than three minutes total.

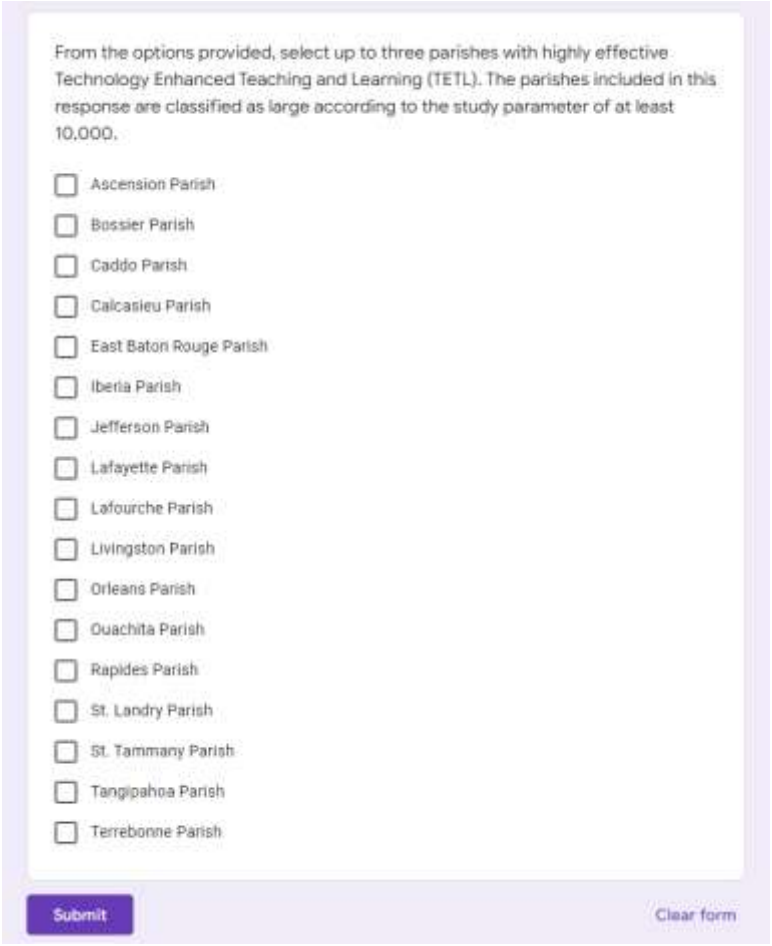
ldick@email.latech.edu (not shared) Switch account

From the options provided, select up to three parishes with highly effective Technology Enhanced Teaching and Learning (TETL). The parishes included in this response are classified as small according to the study parameter of less than 3000 students.

- [ ] Bienville Parish
- [ ] Caldwell Parish
- [ ] Cameron Parish
- [ ] Catahoula Parish
- [ ] City of Baker School District
- [ ] City of Bogalusa School District
- [ ] Claiborne Parish
- [ ] East Carroll Parish
- [ ] East Feliciana Parish
- [ ] Jackson Parish
- [ ] Madison Parish
- [ ] Red River Parish
- [ ] St. Helena Parish
- [ ] Tensas Parish
- [ ] Union Parish
- [ ] West Carroll Parish
- [ ] West Feliciana Parish
- [ ] Winn Parish
- [ ] Franklin Parish
- [ ] Grant Parish
- [ ] LaSalle Parish
- [ ] Pointe Coupee Parish
- [ ] Richland Parish

From the options provided, select up to three parishes with highly effective Technology Enhanced Teaching and Learning (TETL). The parishes included in this response are classified as medium according to the study parameter of 3001 - 9999 students.

- [ ] Acadia Parish
- [ ] Allen Parish
- [ ] Assumption Parish
- [ ] Avoyelles Parish
- [ ] Beauregard Parish
- [ ] Central Community School District
- [ ] City of Monroe School District
- [ ] Concordia Parish
- [ ] DeSoto Parish
- [ ] Evangeline Parish
- [ ] Iberville Parish
- [ ] Jefferson Davis Parish
- [ ] Lincoln Parish
- [ ] Morehouse Parish
- [ ] Natchitoches Parish
- [ ] Plaquemines Parish
- [ ] Sabine Parish
- [ ] St. Bernard Parish
- [ ] St. Charles Parish
- [ ] St. James Parish
- [ ] St. John the Baptist Parish
- [ ] St. Martin Parish
- [ ] St. Mary Parish
- [ ] Zachary Community School District
- [ ] Washington
- [ ] Webster
- [ ] West Baton Rouge
- [ ] Vernon
- [ ] Vermillion


From the options provided, select up to three parishes with highly effective Technology Enhanced Teaching and Learning (TETL). The parishes included in this response are classified as large according to the study parameter of at least 10,000.
Ascension Parish
Bossier Parish
Caddo Parish
Calcasieu Parish
East Baton Rouge Parish
Iberia Parish
Jefferson Parish
Lafayette Parish
Lafourche Parish
Livingston Parish
Orleans Parish
Ouachita Parish
Rapides Parish
St. Landry Parish
St. Tammany Parish
Tangipahoa Parish
Terrebonne Parish
Submit
Clear form

APPENDIX B

INITIAL LACUE EMAIL

Initial LACUE Email

Dear LACUE Board of Directors,

My name is Lisa Flanders-Dick, and I am a doctoral student in Educational Leadership at Louisiana Tech University. I am reaching out to you as a LACUE Board member to request your assistance with my dissertation study. By completing a brief three-item questionnaire, you will assist me in the identification of the study's population. All responses are anonymous.

The purpose of this qualitative study is to develop a school leadership model that promotes and fosters effective Technology-Enhanced Teaching and Learning (TETL) in PK-12 education. For reference, I have included below a description of effective TETL.

I appreciate your assistance with the questionnaire which can be accessed by following this link: **https://bit.ly/TETL-La** If you have any questions or would like a copy of my results once the study is complete, please do not hesitate to reach out.

Respectfully,

Lisa Flanders-Dick

Characteristics of Technology Enhanced Teaching and Learning (TETL)

Effective TETL in this study is being defined according to the Technology Integration Matrix (TIM) framework developed by the Florida Center for Instructional Technology. The TIM Framework identifies five interdependent characteristics of meaningful learning environments: active, collaborative, constructive, authentic, and goal-directed. Though there are various levels of technology integration for each of these

characteristics, the below list will give you a general idea of these characteristics in connection with TETL.

- Active - Students are actively engaged in using technology as a tool rather than passively receiving information from the technology.
- Collaborative - Students use technology tools to collaborate with others rather than working individually at all times.
- Constructive - Students use technology tools to connect new information to their prior knowledge rather than to passively receive information.
- Authentic - Students use technology tools to link learning activities to the world beyond the instructional setting rather than working on decontextualized assignments.
- Goal-Directed - Students use technology tools to set goals, plan activities, monitor progress, and evaluate results rather than simply completing assignments without reflection.

APPENDIX C

REMINDER 1 LACUE EMAIL

Reminder 1 LACUE Email

Good morning, _____,

I just wanted to send everyone a reminder about the three-question survey (see below) which should take less than three minutes to complete. If you have already completed it, thank you so much for your help identifying my dissertation study's population.

Sincerely,
Lisa Flanders-Dick

APPENDIX D

REMINDER 2 LACUE EMAIL

Reminder 2 LACUE Email

Good afternoon, _____,

If you haven't completed the three-question survey (see below) to aid in assisting me with the identification of the study's population, would you PLEASE participate? There is currently a tie between two districts in one of the categories.

If you have already completed the survey, thank you so much for your help with my dissertation.

Sincerely,
Lisa Flanders-Dick

APPENDIX E

CASE STUDY PROTOCOL

Case Study Protocol

Section A. Overview of the Case Study

Purpose: The purpose of this qualitative study was to develop a school leadership model that promotes and fosters effective technology-enhanced teaching and learning (TETL) in PK-12 education.

Research Questions:

RQ1: How do school leaders' perceptions influence their leadership characteristics to foster effective TETL?

RQ2: How do school leaders' skills influence their leadership characteristics to foster effective TETL?

RQ3: How do school leaders' self-efficacy influence their leadership characteristics to foster effective TETL?

Constructs: perception, skill, self-efficacy, TETL, and leadership

Theoretical Framework: Situational Leadership Theory (SLT) by Hersey and Blanchard

Seminal Work: Law, N., Niederhauser, D. S., Christensen, R., & Shear, L. (2016). A multi-level system of quality technology-enhanced learning and teaching indicators. *Journal of Educational Technology & Society*, *19*(3), 72-83. www.jstor.org/stable/jeductechsoci.19.3.72

Section B. Data Collection Procedures

Contact Persons: LACUE Board, District TETL leaders of identified cases, School leaders identified by district leaders

Data Collection Plan:

1. Send questionnaire to LACUE Board members for them to select up to three districts per category (small, medium, large).
2. Select one district per size as the study case from top number of votes cast by LACUE board members.
3. Send email to each district selected TETL leader identifying them as a top district promoting and fostering TETL in Louisiana and asking them to participate in the study.
4. After agreeing to participate, district leaders receive IRB consent form, schedule interview, and interview questions.
5. Interviews are recorded and transcribed via Zoom and back-up app Record.
6. School leaders in each district are identified during the interview.
7. Send email to each school leader asking them to participate in the study.
8. After agreeing to participate, school leaders receive IRB consent form, schedule

interview, and interview questions.
9. Interviews are recorded and transcribed via Zoom and back-up app Record.
10. Transcripts are coded by study constructs: perception, skill, self-efficacy, TETL, and leadership

Preparation Prior to Fieldwork:
Divide districts into categories of small, medium, and large.

- Small - student population was less than 3,000
- Medium - 3,001 to 9,999 student population
- Large - student population of 10,000 and over

Create questionnaire
Collect LACUE board members email addresses
Create initial LACUE board member email, district TETL leader email, and school leader email.
Create structured interview protocol for district leaders
Create structured interview protocol for school leaders

Section C. Protocol Questions

A structured interview approach was taken during this study. This approach increased the ability to compare responses between the various school districts (Merriam, 2009). Patton (1990) suggested six types of questions that were used to help generate quality interview responses. These question types are as follows: experience/behavior, opinion/value, feeling, knowledge, sensory, and background/demographics. The sequencing of the questions began with more comfortable, straightforward questions that encourage descriptive responses to elicit greater detail

Question Protocol District TETL Leader District Technology Interview Google document
Question Protocol School Leader School Leader Interview document

Section D. Case Study Report Outline

- Constructs (perception, skill, self-efficacy, TETL, and leadership) are first reported per case per participant.
- Cross-Case Analysis was then reported per construct.
- Findings were reported per research question construct (perception, skill, self-efficacy), theoretical framework, and then emerging findings according to TETL and leadership constructs.
- Findings were then used to create key elements of the school leadership model.
- The TETL School Leadership model provides a multi-level team approach to integrate the needed elements to foster and promote effective TETL. The key elements of this model are vision, curriculum focus, student-centered, foster growth, empower future leaders, and support.

APPENDIX F

DISTRICT TETL LEADER INTERVIEW PROTOCOL

District TETL Leader Interview Protocol

District TETL Leader Interview: Perception, Skill, and Self-Efficacy of TETL

1. What technology is available to teachers and students in your district?
2. In what ways do you expect your schools/teachers to integrate technology?
3. Which of these technologies do you use and how do you use them?

- ☐ Word Processors (Word, Google Docs, etc.)
- ☐ Spreadsheets (Excel, Google Sheets, etc.)
- ☐ Presentation Software (PowerPoint, Google Slides, etc.)
- ☐ Web Design (Google Sites, WordPress, Weebly, etc.)
- ☐ Creative Software (Canva, Photoshop, Garageband, Audacity, etc.)
- ☐ Web 2.0 Tools (Blogs, Wikis, etc.)
- ☐ Social Networking (Facebook, Twitter, Instagram, etc.)
- ☐ Video Conferencing (Zoom, Google Meet, etc.)
- ☐ Learning Management Systems (Moodle, Blackboard, Canvas, etc.)
- ☐ Database (Access, MySQL, etc.)
- ☐ Others:

4. How do you feel about TETL in education?
5. Describe TETL in your district?
6. List three top schools in your district that promote and foster effective TETL/
7. Who are the key people involved in promoting and fostering effective TETL in your district? In the above-mentioned schools?
8. What are their roles in TETL?
9. Describe your role with TETL in your district?
10. Has your role in TETL changed during your time here? If so, how has it changed?
11. What steps do you take to remain current in educational technology?
12. How would you describe your technology skill level?
13. How does your self-efficacy influence your approach to TETL?

14. What are your next TETL goals in your district? What action steps are you taking to make this happen?

APPENDIX G

SCHOOL LEADER INTERVIEW PROTOCOL

School Leader Interview Protocol

School Leader Interview: Perception, Skill, and Self-Efficacy of TETL

1. What technology is available to teachers and students in your school?
2. In what ways do you expect your teachers to integrate technology?
3. Which of these technologies do you use and how do you use them?

- ☐ Word Processors (Word, Google Docs, etc.)
- ☐ Spreadsheets (Excel, Google Sheets, etc.)
- ☐ Presentation Software (PowerPoint, Google Slides, etc.)
- ☐ Web Design (Google Sites, WordPress, Weebly, etc.)
- ☐ Creative Software (Canva, Photoshop, Garageband, Audacity, etc.)
- ☐ Web 2.0 Tools (Blogs, Wikis, etc.)
- ☐ Social Networking (Facebook, Twitter, Instagram, etc.)
- ☐ Video Conferencing (Zoom, Google Meet, etc.)
- ☐ Learning Management Systems (Moodle, Blackboard, Canvas, etc.)
- ☐ Database (Access, MySQL, etc.)
- ☐ Others:

4. How do you feel about TETL in education?
5. Describe TETL in your district?
6. Who are the key people involved in promoting and fostering effective TETL in your school?
7. What are their roles in TETL?
8. Describe your role with TETL in your school?
9. Has your role in TETL changed during your time here? If so, how has it changed?
10. What steps do you take to remain current in educational technology?
11. How would you describe your technology skill level?
12. How does your self-efficacy influence your approach to TETL?

13. What are your next TETL goals in your school? What action steps are you taking to make this happen?

APPENDIX H

INITIAL DISTRICT TETL LEADER EMAIL

Initial District TETL Leader Email

Dear ____,

Congratulations! Your district was selected by a group of educational technology experts as a top Louisiana public school district that promotes and fosters effective Technology-Enhanced Teaching and Learning (TETL) in PK-12 education. My name is Lisa Flanders-Dick, and I am a doctoral student in Educational Leadership at Louisiana Tech University. I am reaching out to you as the Supervisor of Data and Technology of West Feliciana Parish to request your assistance with my dissertation study by participating in a brief interview and selecting three district schools you feel exemplify the promoting and fostering of effective TETL.

The purpose of this qualitative study is to develop a school leadership model that promotes and fosters effective Technology-Enhanced Teaching and Learning (TETL) in PK-12 education. For reference, I have included at the end of this email a description of effective TETL.

It would be a pleasure to work with you and your district. Would you please respond to this email with times you are available on Monday, Wednesday, or Friday for an interview via Zoom this week? If these days do not work with your schedule, please do not hesitate to send other options. Thank you in advance for your consideration; I greatly appreciate your help.

Respectfully,

Lisa Flanders-Dick
Professional-in-Residence/Hub Coordinator
Louisiana Tech University
College of Education
318.257.2561 (office) | 318.268.6187 (cell)

Characteristics of Technology Enhanced Teaching and Learning (TETL)

Effective TETL in this study is being defined according to the Technology Integration Matrix (TIM) framework developed by the Florida Center for Instructional Technology. The TIM Framework identifies five interdependent characteristics of meaningful learning environments: active, collaborative, constructive, authentic, and goal-directed. Though there are various levels of technology integration for each of these characteristics, the below list will give you a general idea of these characteristics in connection with TETL.

- Active - Students are actively engaged in using technology as a tool rather than passively receiving information from the technology.
- Collaborative - Students use technology tools to collaborate with others rather than working individually at all times.
- Constructive - Students use technology tools to connect new information to their prior knowledge rather than to passively receive information.
- Authentic - Students use technology tools to link learning activities to the world beyond the instructional setting rather than working on decontextualized assignments.
- Goal-Directed - Students use technology tools to set goals, plan activities, monitor progress, and evaluate results rather than simply completing assignments without reflection.

APPENDIX I

FOLLOW-UP DISTRICT TETL LEADER EMAIL

Follow-up District TETL Leader Email - Study Participation and Information

Good morning, ____!

Thank you SO much for agreeing to participate in the study! I have you down for [Date] at [time]. I will also need the attached consent form completed prior to our interview.

I am looking forward to our meeting! You can access the interview questions on this District Technology Interview Google document. I have also attached the Zoom meeting information below:

Join Zoom Meeting: [link]

Meeting ID: *** *** ***
Passcode: ****

Thank you again for your help!

Sincerely,
Lisa

APPENDIX J

INITIAL SCHOOL-LEVEL LEADER EMAIL

Initial School-level Leader Email

Dear ___,

Congratulations! Your district was selected by a group of educational technology experts as a top Louisiana public school district that promotes and fosters effective Technology-Enhanced Teaching and Learning (TETL) in PK-12 education. My name is Lisa Flanders-Dick, and I am a doctoral student in Educational Leadership at Louisiana Tech University. I am reaching out to you as the principal of [school] to request your assistance with my dissertation study by participating in a brief interview of fewer than 30 minutes. The interview questions can be viewed on this School Leader Interview document.

The purpose of this qualitative study is to develop a school leadership model that promotes and fosters effective Technology-Enhanced Teaching and Learning (TETL) in PK-12 education. For reference, I have included below a description of effective TETL as defined in the study.

It would be a pleasure to virtually meet with you. Would you please respond to this email with times you are available on Monday - Wednesday for an interview via Zoom next week? If these days do not work with your schedule, please do not hesitate to send other options. Thank you in advance for your consideration; I greatly appreciate your help.

Respectfully,

Lisa Flanders-Dick
Professional-in-Residence/Hub Coordinator
Louisiana Tech University
College of Education
318.257.2561 (office) | 318.268.6187 (cell)

Characteristics of Technology Enhanced Teaching and Learning (TETL)

Effective TETL in this study is being defined according to the Technology Integration Matrix (TIM) framework developed by the Florida Center for Instructional Technology. The TIM Framework identifies five interdependent characteristics of meaningful learning environments: active, collaborative, constructive, authentic, and goal-directed. Though there are various levels of technology integration for each of these characteristics, the below list will give you a general idea of these characteristics in connection with TETL.

__Active - Students are actively engaged in using technology as a tool rather than passively receiving information from the technology.

__Collaborative - Students use technology tools to collaborate with others rather than working individually at all times.

__Constructive - Students use technology tools to connect new information to their prior knowledge rather than to passively receive information.

__Authentic - Students use technology tools to link learning activities to the world beyond the instructional setting rather than working on decontextualized assignments.

__Goal-Directed - Students use technology tools to set goals, plan activities, monitor progress, and evaluate results rather than simply completing assignments without reflection.

APPENDIX K

FOLLOW-UP SCHOOL-LEVEL LEADER EMAIL

Follow-up School-level Leader Email - Study Participation and Information

Good morning, ____!

Thank you SO much for agreeing to participate in the study! I have you down for [date] at [time]. I will also need the attached consent form completed prior to our interview.

I am looking forward to our meeting! You may access the questions from this School Leader Interview document. I have also included the Zoom meeting information below:

Join Zoom Meeting: [link]

Meeting ID: *** *** ***
Passcode: ****

Thank you again for your help!

Sincerely,
Lisa

APPENDIX L

HUMAN USE APPROVAL LETTER

LOUISIANA TECH
UNIVERSITY

OFFICE OF SPONSORED PROJECTS

MEMORANDUM

TO: Ms. Lisa Flanders-Dick and Dr. Richard Shrubb

FROM: Dr. Richard Kordal, Director of Intellectual Properties
rkordal@latech.edu

SUBJECT: **HUMAN USE COMMITTEE REVIEW**

DATE: November 17, 2021

TITLE: **"A Qualitative Study Identifying Educational Leadership Styles Promoting Technology-Enhanced Teaching and Learning."**

NUMBER: **HUC 21-098**

In order to facilitate your project, an EXPEDITED REVIEW has been done for your proposed study entitled: **"A Qualitative Study Identifying Educational Leadership Styles Promoting Technology-Enhanced Teaching and Learning"**

The proposed study's revised procedures were found to provide reasonable and adequate safeguards against possible risks involving human subjects. The information to be collected may be personal in nature or implication. Therefore, diligent care needs to be taken to protect the privacy of the participants and to assure that the data are kept confidential. Informed consent is a critical part of the research process. The subjects must be informed that their participation is voluntary. It is important that consent materials be presented in a language understandable to every participant. If you have participants in your study whose first language is not English, be sure that informed consent materials are adequately explained or translated. Since your reviewed project appears to do no damage to the participants, the Human Use Committee grants approval of the involvement of human subjects as outlined.

Projects should be renewed annually. ***This approval was finalized on November 17, 2021 and this project will need to receive a continuation review by the IRB if the project continues beyond November 17, 2022.*** **ANY CHANGES** to your protocol procedures, including minor changes, should be reported immediately to the IRB for approval before implementation. Projects involving NIH funds require annual education

training to be documented. For more information regarding this, contact the Office of Sponsored Projects.

You are requested to maintain written records of your procedures, data collected, and subjects involved. These records will need to be available upon request during the conduct of the study and retained by the university for three years after the conclusion of the study. If changes occur in recruiting of subjects, informed consent process or in your research protocol, or if unanticipated problems should arise it is the Researchers responsibility to notify the Office of Sponsored Projects or IRB in writing. The project should be discontinued until modifications can be reviewed and approved.

Thank you.