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Suburban High School Teachers' Teaching Styles, Teaching Experiences, and Acceptance of Edmodo

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Tshimpo C. Mukenge

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Nicolae Nistor, Committee Chairperson, Education Faculty
Dr. Christopher Godat, Committee Member, Education Faculty
Dr. Beate Baltes, University Reviewer, Education Faculty

The Office of the Provost

Walden University
2019

Abstract

Suburban High School Teachers' Teaching Styles, Teaching Experiences, and Acceptance of Edmodo

by

Tshimpo C. Mukenge

MA, Interdenominational Theological Center, 2008

MS, Fort Valley State University, 1994

BA, Fort Valley State University, 1992

Project Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

August 2019

Abstract

Southern U.S. teachers at suburban high schools can use Edmodo; however, teachers prefer traditional teacher-centered teaching methods. This quantitative correlative study explored teachers' technology acceptance in relation to teaching styles and experiences. Framing acceptance by Davis's technology acceptance model (TAM), research questions addressed the direct and moderating relationships between teaching style and the TAM variables related to using Edmodo and the direct and moderating relationships between teaching experiences and TAM variables. From 240 teachers at the high school, 45 completed an online survey (response rate of 18.75%). Descriptive statistics, ANOVA, and regression analyzed data. TAM could be verified for the entire sample; however, no significant direct relationship between teaching style and the TAM variables was found. Teaching style moderated the relationships within the TAM; these were stronger for teachers with a teacher-centered teaching style. No significant direct relationship existed between teaching experiences and TAM variables; a moderating effect on the relationships existed within the TAM. Among experienced teachers, ease of use was the strongest acceptance predictor, whereas perceived use was the strongest predictor among less experienced teachers. Results indicated teachers might develop a more student-centered teaching style, thus concentrating on technology's ease of use, rather than its potential utility. A policy recommendation could ensure teachers efficiently used technology to support student-centered learning. The application of the recommended policies might lead to teachers' more effective use of instructional technology, which might affect student learning and motivation.

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Dedication

I dedicate this study to my beloved oldest sister, Ndaya Chantal Mukenge, who passed away during my doctoral journey. Ndaya was a great encourager and mentor. Her absence was missed every time I made a formatting error and could not call her for instructions on how to fix it. Love you, Ndaya.

To my relatives in the Congo, who have to cross more challenging issues to get their education.

To my sons, may your educational journey take you beyond where I have gone and beyond your dreams.

Acknowledgments

God gave me the strength, understanding, and patience to move past the challenges that I faced to complete this degree, and I am grateful.

My sincere thanks to my family for their unending support and love. Jewett, my wife, and our three sons have traveled this challenging and long journey with me. They made me aspire to be better. I am thankful for my mother's prayers that have covered all of my life; for having parents with doctorates, who assisted me to get mine; and for my sisters' and brother's encouragement and help.

Thanks also go to Dr. Nicolae Nistor who guided me through the process.

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Section 1: The Problem

Leaders of Zion County Public Schools (ZCPS, 2012a; pseudonym) strive to remain on the forefront of giving access and using technology in education. As explained in the academic achievement plan by ZCPS (2014), the district has three instructional priorities, and technology integration is one. The district's technology plan and strategic plan have shown the importance of these priorities, and all three documents contain descriptions of implementation efforts.

The county's 2012 to 2015 technology plan indicates the importance of integrating technology into the county's 3,210 classrooms and shows how district leaders plan to use technology to improve students' academic achievement (ZCPS, 2012a). More than 50,000 kindergarten through 12th-grade students sit in 21st-century classrooms of ZCPS (2012a; Georgia Department of Education [DOE], 2012). To support and facilitate learning, ZCPS (2012) issued laptops to all teachers and equipped schools and classrooms with the following:

- Interactive whiteboard or mobile handheld school pad unit.
- Ceiling-mounted digital projector integrated with TV Tuner, DVD/VHS combo.
- Mounted universal sound system.
- Student Response Clickers (at least one kit per grade level, with many schools purchasing additional units).
- Document cameras (at least 5-10 per school).
- Networked printer.

- At least one computer lab with 28 workstations.
- One multipurpose instructional lab and several career, technical, and agricultural education computer labs in each high school.
- Networked desktop computers (two or more, depending on the school and/or classroom; i.e., Read 180, remediation, and foreign languages classes).
- A minimum of one mobile wireless laptop cart.
- Digital content (software for interactive whiteboard, RM Easiteach, RM Math Frameworks, Thinkfinity, Turning Technologies, and locally developed lessons).

ZCPS (2014) led the charge of integrating technology as guided by the strategic goal to increase student achievement by several government mandates. The No Child Left Behind (NCLB) Act (2002) and the National Educational Technology Plan are among the government mandates for the educational integration of technology. In addition to mandating policies for implementing technology, some of the mandates come with funding.

Former President George W. Bush created the NCLB Act (2002) to mandate funding of educational technologies. Due to the act, significant advances occurred for leaders to integrate technology into classrooms to facilitate improvements in student achievement (Kotrlik & Redmann, 2009). More than $3 billion was awarded to school districts across the country from 2002 to 2008 through the U.S. DOE's (2010) Enhancing Education Through Technology program (Bakia, Means, Gallagher, Chen, & Jones, 2009).

President Barack Obama created the 2010 National Educational Technology Plan, entitled *Transforming American Education: Learning Powered by Technology*, to urge stronger efforts to leverage technology to advance student achievement in U.S. schools. Contributors to the plan recognized the stronghold that technology had on students' lives outside of school and wanted to harness that power within schools. The plan not only directed all levels of government to put forth more efforts to integrate technology into classrooms, but it also presented strategies for using technology in the administration and management of schools.

Inan and Lowther (2010) classified technology's integration into classrooms into the following three categories: use as a learning tool, use for instructional delivery, and use for instructional preparation. Teachers reported they used computers for generating instructional purposes, communicating, recording and viewing grades, taking attendance, and conducting assessments (Gray, Thomas, & Lewis, 2010). They also used technology to organize and deliver instructional material; create lesson plans; and communicate with parents, students, coworkers, and supervisors. Students used technology to develop presentations, write assignments, complete drill and practice assignments, and conduct research (Inan & Lowther, 2010).

Because the nature of technology has evolved, school system leaders have struggled to stay current with constant new developments and innovations. Schools, both in the United States and globally, have not adjusted teaching methods to coincide with the capabilities of emerging technologies (Allen, 2008; Ash, 2010; Ertmer & Ottenbreit-Leftwich, 2010; Siemens & Tittenberger, 2009). At times, creators have released new

technologies, which leasers have then integrated into education before undertaking a process to determine how to best use the technology for teaching and learning (Li & Choi, 2014).

The emerging technologies used in today's classrooms include iPads (Blow & McConnell, 2012; Montrieux, Vanderlinde, Schellens, & De Marez, 2015), 2D and 3D technology (Pellas, 2014), interactive whiteboards (Han & Okatan, 2016; Project Tomorrow, 2010), laptops (Inan & Lowther, 2010; Robinson, 2016), mobile devices (Huffling et al., 2014; Project Tomorrow, 2012), tablets (Gokcearslan, 2017), intelligent adaptive learning (Project Tomorrow & Dreambox, 2012), and learning management systems (LMSs; Peña, Mundy, Kupczynski, & Ruiz, 2018). Leaders of schools have used these tools to influence teaching and learning. E-learning tools, such as LMSs, have opened doors for teachers to use more flexible, student-centered strategies (Ritzhaupt, Dawson, & Cavanaugh, 2012).

Leaders of ZCPS have required teachers use Edmodo, one of the latest e-learning tools. Edmodo is a widely used, online learning environment that offers teachers a real-time platform for interacting with their students and their work (Batsila, Tsihouridis, & Vavougios, 2014). Through Edmodo, teachers can assign tasks, post content, create assessments and polls, share schedules, and initiate discussions (Edmodo, n.d.; Evans & Kilinc, 2013; Garner & Stokes, 2015). The system provides teachers with assessment data, and teachers can recognize student achievement by rewarding students with custom badges. Students can work collaboratively with their peers and easily communicate with classmates through an asynchronous discussion board that allows students to post when

convenient (Borup, 2016). Teachers, students, administrators, and parents can access Edmodo's free and paid educational applications with personal computers and various mobile devices. Only teachers can provide students with codes to join their groups, which assist in keeping students safe when interacting with the platform (Batsila et al., 2014; Garner & Stokes, 2015).

For today's students to operate in the 21st century effectively, they must have 21st-century skills. The integration of technology has become an increasing priority in ZCPS and the United States. This sense of urgency for full integration mirrors decades-old global trends for school leadership integrating or infusing technology into education (Li & Choi, 2014). The use of technology in education is essential to assist students in gaining knowledge and skills while improving their academic achievements (Moeller & Reitzes, 2011).

The Local Problem

Although the capabilities of technology in classrooms have changed in ZCPS, teaching methods have not, and technology use continues as teacher centered. Insufficient evidence exists concerning the widespread implementation of technology by U.S. teachers (Blackwell, Lauricella, & Wartella, 2014). This finding that technology integration is not widely used in schools is consistent with the conclusions of many researchers (Ash, 2010; Ertmer & Ottenbreit-Leftwich, 2010; Keengwe, Onchwari, & Wachira, 2008). Even with mobile technology and computers at hand, actual classroom use of technology is infrequent and limited to creating teaching tools, such as grade

books, lessons plans, and presentations (Blackwell et al., 2014; Gray et al., 2010; Liu & Cavanaugh, 2012).

Rationale

Evidence of the Problem at the Local Level

The problem that I investigated in this study was the continued use of traditional teacher-centered teaching methods by teachers at ZCPS, despite the availability of new educational technologies. Because ZCPS acknowledged that although teachers had access to technology, they continued to rely on teacher-centered strategies, I conducted this study. The ZCPS (2012) technology plan stated, "Technology observation data results reveal that most teachers still use technology to employ teacher-led instructional strategies" (p. 11). As part of the county's reaccreditation process, AdvancEd (2013) rated ZCPS student-centered technology use and the digital learning environment at 1.62 on a 4-point scale. Observation teams used the effective learning environment observation tool (ELEOT) to determine how teachers and students used technology in the classroom (AdvancEd, 2013). AdvancEd (2013) reported that instruction was mainly teacher-centered, especially in secondary classrooms, and students' use of technology lacked rigor and creative, independent inquiry.

With no significant increases, the results of AdvancEd (2018) engagement report for ZCPS indicated that the problem continued. The same student-centric classroom observation tool, ELEOT, was used in both reports (AdvancEd, 2013, 2018). The digital learning environment rating increased to 1.86, and the active learning environment rating increased from 2.57 (AdvancEd, 2013) to 2.91 (AdvancEd, 2018).

Evidence of the Problem From the Professional Literature

Because today's technology is more powerful, faster, and mobile, teachers face a change in the ways that they teach all the following subjects: language arts (Edwards-Groves, 2012; Jianjun & Yixin, 2010), social studies (Combs, 2010), science (Bybee, 2011), mathematics (Anthony & Clark, 2011; Su, Marinas, & Furner, 2011), and career and technical education (Morgan, Parr, & Fuhrman, 2011). The instructional practices that should be in place are those that support students as active learners (Montrieux et al., 2015). The International Society for Technology in Education (2008) created standards to call for a technology-enriched learning environment that provided student-centered, technology-driven instruction. Teachers can create this type of environment by using technology to involve students actively in opportunities to explore and solve real-world issues (International Society for Technology in Education, 2008). Lectures are the usual strategy of the traditional teacher-centered approach, whereas student-centered approaches make students active participants in the learning process (McCaskey & Crowder, 2015; Peters, 2010).

Teachers using student-centered approaches relinquish some control of their classrooms and act as coaches or facilitators (An & Reigeluth, 2012; Drexler, 2010; McCaskey & Crowder, 2015). Researchers have found that when students can use technology in a student-centered environment, they become motivated (Trust, 2017), they increase their grade point averages, and their knowledge of subject content is enhanced (Kopcha, 2010). Teachers can use emerging technologies to support a personalized and student-centered method of instruction to promote meaningful learning experiences for

students to construct deep and connected knowledge, which they can apply to real situations (Ertmer & Ottenbreit-Leftwich, 2010). Reinhart, Thomas, and Toriskie (2011) argued that educators could make more meaningful influences on learning by moving technological instructional tools to the forefront of their classrooms.

Nationally, technology has not been as influential on education as possible because school leaders have not effectively used technologies in classrooms (Ash, 2010; Ertmer & Ottenbreit-Leftwich, 2010). Blackwell et al. (2014); Friedrich and Hron (2011); and Ottenbreit-Leftwich, Glazewski, Newby, and Ertmer (2010) found that teachers' use of technology tended to be teacher centered, despite research findings that implicated student-centered learning as most effective. Instead of placing technology in students' hands, teachers often use technology to support their teacher-centered teaching methods. As a consequence, their students are passive, merely taking notes and listening (Friedrich & Hron, 2011).

Therefore, I began with the understanding that researchers recommended the student-centered use of technology, but secondary teachers of ZCPS mostly used teacher-centered teaching methods. I began my research with the assumption that teachers might cause the insufficient use of technology by not accepting Edmodo. A relationship might exist between teaching styles and teachers' acceptances and uses of educational technology. The link between teaching style and acceptance has not been sufficiently examined in the previous research; therefore, I decided to conduct my study. Little was known about the influence of teachers' teaching styles on their acceptances of LMS (Peng-Chun, Hsin-Ke, & Shu-Mei, 2014). I used the technology acceptance model

(TAM) in this study to investigate teachers' acceptance and use of the LMS, Edmodo. Technology use refers to another form of technology acceptance (the other form is the use intention), and both correlate. According to theory of reasoned action and all prominent acceptance models, this reason was why researchers should address technology use as an aspect of technology acceptance.

In this study, I excluded the behavioral intention component of TAM because teachers actively used Edmodo; therefore, I focused on use behavior. In the investigation, I sought to uncover the potential differences in the perceptions between teacher-centered and student-centered teachers as they related to their perceptions of the usefulness and ease of use of Edmodo.

The problem of ZCPS was related to teachers not accepting Edmodo. Researchers had not addressed teachers' teaching styles, acceptances, and uses of Edmodo. The purpose of this study was to determine teachers' teaching styles (teacher-centered *vs.* student-centered), and their acceptance and use of Edmodo in ZCPS. I explain the relationship between teaching experiences, teaching styles, and acceptances and uses of Edmodo.

Definitions of Terms

To assist readers in better understanding the ideas discussed in this study, I provide the following conceptual definitions of terms:

Blended learning: Blended learning refers to a formal education strategy where students learn part-time in the traditional face-to-face method and part-time online (Powell et al., 2015).

E-learning: E-learning refers to learning conducted through electronic media, especially on the Internet ("E-learning," n.d.).

Emerging technologies: Emerging technologies refer to "tools, concepts, innovations, and advancements utilized in diverse educational settings (including distance, face-to-face, and hybrid forms of education) to serve varied education-related purposes (e.g., instructional, social, and organizational goals)" (Veletsianos, 2010, pp. 12-13).

Lecture: Lecture refers to a method of teaching where students listen and take notes as the instructor gives an oral presentation of information or principles (Kaur, 2011). Lecture can also refer to a traditional model of teaching didactic information dissemination (McKnight, O'Malley, Ruzic, Horsley, Franey, & Bassett, 2016).).

Perceived ease of use (*PEU*): PEU refers to the degree to which the prospective user expects Edmodo to remain free of effort to use (Davis, Bagozzi, & Warshaw, 1989).

Perceived usefulness (*PU)*: PU refers to the probability that using Edmodo will enhance a teacher's job performance (Davis et al., 1989).

Teaching style: Teaching style refers to the noticeable constant characteristics displayed by a teacher, regardless of the teaching contents or situations (Conti, 1989).

Technology acceptance: Technology acceptance refers to users' reactions to a technology, as well as users' choices about how and when they will use technology (Davis, 1989).

Technology integration: Technology integration refers to the routine, seamless incorporation of technology resources (software, hardware, infrastructure, etc.) and

technology-based practices (collaboration, remote access, communication, etc.) in educational institutions (Schmitt, 2002).

Significance of the Study

I provided insight into the acceptance and use of educational technology, thereby adding to research that investigated the connections between teaching styles and teachers' technology acceptance levels (Lu & Lin, 2012; Peng-Chun et al., 2014). TAM is useful in explaining teachers' adoption of technology (Bozdogan & Özen, 2014; Holden & Rada, 2011; Kelly, 2014; Sumak, Heričko, & Pusnik, 2011; Ursavaş, 2013). As LMSs become more popular, teachers should use these in the most effective ways. Teachers' acceptance and behavior may be positively influenced by teaching styles, which may result in a more intensive use of educational technology and, consequently, higher academic performance (Ritzhaupt et al., 2012). The results of this investigation provides teachers, administrators, and curriculum specialists with data that could be used to assess LMS use in schools, design and conduct professional development programs for the efficient use of LMS, create LMS use policies, and develop more appropriate curricula. The opportunity to conduct effective professional development programs for teachers will improve teachers' preparations and abilities to use LMS, such as Edmodo, to its fullest.

This study could benefit all the following involved in the educational process: educators, administrators, curriculum designers, stakeholders, policy makers, and society at large. I provided a better understanding of the technology acceptation of LMS and the benefits of implementing such technologies in student-centered instructional practices. Positive social changes could result from research that might find that using LMSs, such

as Edmodo, could better help prepare students for work in the field of science while bridging the gap of student achievement between U.S. science students and those outside the United States (Liu & Cavanaugh, 2012). The increased implementation of policies and instructional practices that positively engage and motivate students in teaching and learning processes would increase the level of academic successes students can achieve. Therefore, high school students would be prepared for college and the workforce.

Research Questions and Hypotheses

Against the background of the stated problem and related literature review, I attempted to answer the following research questions (RQs) and hypotheses:

RQ1: What is the relationship between teaching style, as measured by Principles of Adult Learning Scale (PALS), and suburban high school teachers' acceptance of Edmodo as modeled by the technology acceptance model (TAM)?

The first four hypotheses tested the direct relationships between teaching style and the TAM variables.

H_{01}: There is no significant difference in the perceived usefulness (PU) of Edmodo between teachers with student-centered teaching styles and those teachers with teacher-centered teaching styles.

H_1: There is a significant difference in the perceived usefulness (PU) of Edmodo between teachers with student-centered teaching styles and those teachers with teacher-centered teaching styles.

H_{02}: There is no significant difference in the perceived ease of use (PEU) of Edmodo between teachers with student-centered teaching styles and those teachers with teacher-centered teaching styles.

H_2: There is a significant difference in the perceived ease of use (PEU) of Edmodo between teachers with student-centered teaching styles and those teachers with teacher-centered teaching styles.

H_{03}: There is no significant difference in the perceived attitude (A) towards Edmodo between teachers with student-centered teaching styles and those teachers with teacher-centered teaching styles.

H_3: There is a significant difference in the perceived attitude (A) towards Edmodo between teachers with student-centered teaching styles and those teachers with teacher-centered teaching styles.

H_{04}: There is no significant difference in the perceived actual use (AU) of Edmodo between teachers with student-centered teaching styles and those teachers with teacher-centered teaching styles.

H_4: There is a significant difference in the perceived actual use (AU) of Edmodo between teachers with student-centered teaching styles and those teachers with teacher-centered teaching styles.

The next set of hypotheses address the moderating effect of teaching style on the relationships between the TAM variables:

H_{05}: Perceived ease of use (PEU) does not moderate the relationship between teachers' teaching style and perceived usefulness (PU).

H_5: Perceived ease of use (PEU) does moderate the relationship between teachers' teaching style and perceived usefulness (PU).

H_{06}: Perceived usefulness (PU) does not moderate the relationship between teachers' teaching style and perceived attitude (A).

H_6: Perceived usefulness (PU) does moderate the relationship between teachers' teaching style and perceived attitude (A).

H_{07}: Perceived ease of use (PEU) does not moderate the relationship between teachers' teaching style and perceived attitude (A).

H_7: Perceived ease of use (PEU) does moderate the relationship between teachers' teaching style and perceived attitude (A).

H_{08}: Attitude (A) does not moderate the relationship between teachers' teaching style and actual use (AU).

H_8: Attitude (A) does moderate the relationship between teachers' teaching style and actual use (AU).

RQ2: What is the relationship between teaching experience and Edmodo acceptance as modeled by technology acceptance model (TAM)?

The following hypotheses relate to the direct relationships between teaching experience and the TAM variables:

H_{09}: There is no significant difference in the perceived usefulness (PU) of Edmodo between experienced teachers and less experienced teachers.

H_9: There is a significant difference in the perceived usefulness (PU) of Edmodo between experienced teachers and less experienced teachers.

H_{010}: There is no significant difference in the perceived usefulness (PEU) of Edmodo between experienced teachers and less experienced teachers.

H_{10}: There is a significant difference in the perceived usefulness (PEU) of Edmodo between experienced teachers and less experienced teachers.

H_{011}: There is no significant difference in the perceived attitude (A) towards Edmodo between experienced teachers and less experienced teachers.

H_{11}: There is a significant difference in the perceived attitude (A) towards Edmodo between experienced teachers and less experienced teachers.

H_{012}: There is no significant difference in the perceived actual use (AU) of Edmodo between experienced teachers and less experienced teachers.

H_{12}: There is a significant difference in the perceived actual use (AU) of Edmodo between experienced teachers and less experienced teachers.

Next, hypotheses related to the moderating effect of teaching experience on the relationships between the TAM variables were tested:

H_{013}: Perceived ease of use (PEU) does not moderate the relationship between teachers' experience and perceived usefulness (PU).

H_{13}: Perceived ease of use (PEU) does moderate the relationship between teachers' experience and perceived usefulness (PU).

H_{14}: Perceived usefulness (PU) does not moderate the relationship between teachers' experience and attitude (A).

H_{014}: Perceived usefulness (PU) does moderate the relationship between teachers' experience and attitude (A).

H_{015}: Perceived ease of use (PEU) does not moderate the relationship between teachers' experience and attitude (A).

H_{15}: Perceived ease of use (PEU) does moderate the relationship between teachers' experience and A.

H_{016}: Attitude (A) does not moderate the relationship between teachers' experience and actual use (AU).

H_{16}: Attitude (A) does moderate the relationship between teachers' experience and actual use (AU).

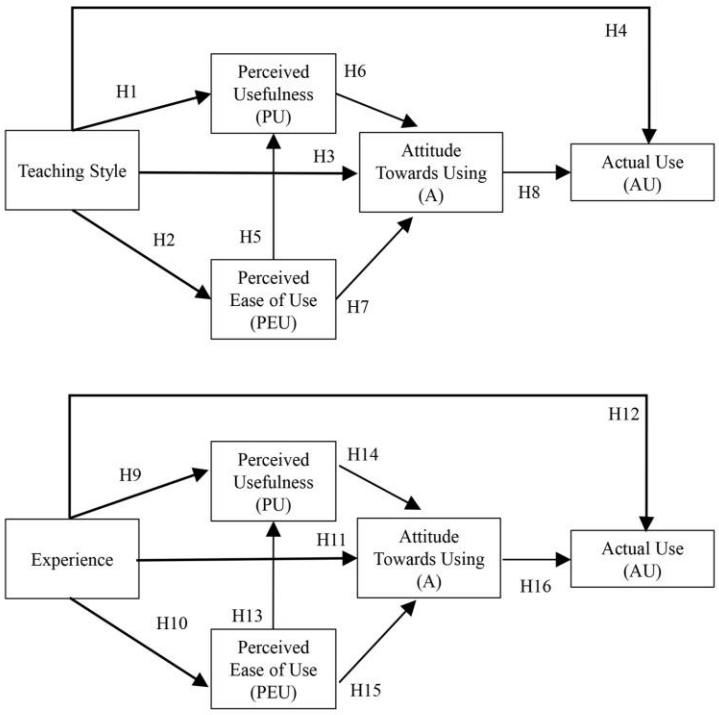

Figure 1. Research model. The top section of the figure illustrates the relationships between teaching styles and the TAM variables. The bottom section illustrates the relationships between teaching experience and the TAM variables.

Review of Literature

In this quantitative study, I investigated the relationship between teachers' teaching styles (student centered/teacher centered) and their acceptances and uses of the LMS, Edmodo. In addition, I explored whether and how teachers used Edmodo and whether they used student-centered methods in their instructional practices. In the following review of the literature, I explain the key concepts and theories that support this study. I include an overview of two teaching styles and technology's place in a student-centered classroom. This section also includes a description of the theoretical model that I used to determine the teachers' acceptance of Edmodo. I close the section by explaining how the presented literature aides in the advancement of the study.

Conceptual Framework

Regarding the use of technology in the classroom, teachers should accept, adopt, and use the technologies available. The first step for seeing the benefits of instructional technologies is to actually use the technology. Because I sought to understand how the LMS, Edmodo, was received and used by teachers, I needed to employ a theoretical framework to explain the acceptance, adoption, and use of technology. Therefore, I used the TAM to explain teachers' use of technology in the context of teaching style.

Developed by Davis (1986), researchers have applied the TAM as a theoretical model to explain and predict a potential user's behavioral intentions to use a given technology (Holden & Rada, 2011; Huntington & Worrell, 2013; Sumak et al., 2011). Researchers of the model have proposed several factors can influence users' decisions of how and when they will use new technology (Holden & Rada, 2011). Researchers have

used the TAM to describe and predict how a user arrives to accept and use a given technology. In research, researchers have used the TAM to explain how a certain population has adapted to a particular technology (Huntington & Worrell, 2013). Researchers have used the TAM model to measure a user's acceptance of an information technology by defining perceived usefulness and perceived ease of use, which is then applied to calculate the user's attitude to the technology and to determine their acceptance levels (J. Zhao, Fang, & Jin, 2018).

Technology acceptance and adoption research can be divided into two categories. One category focuses on the acceptance and use of technology at the organizational level. The other describes an individual's technology acceptance (Sumak et al., 2011; Venkatesh, Morris, Davis, & Davis, 2003). TAM, which derived from the theory of reasoned action, specifies casual relationships between external variables and actual usage behaviors by describing users' PEU and PU characteristics of a given technology (Bozdogan & Özen, 2014; De Smet, Bourgonjon, De Wever, Schellens, & Valcke, 2012; Holden & Rada, 2011; Vajda & Abbitt, 2011). According to Davis (1986), the key indicators of acceptance of new technology include users' perceptions of PEU and PU (Huntington & Worrell, 2013; Vajda & Abbitt, 2011). Without the acceptance of a given technology, there is no actual usage of said technology (Vajda & Abbitt, 2011). TAM has developed into one of the most commonly used technology acceptance theories (Sumak et al., 2011).

Underwood and Stiller (2014) defined TAM as a method used to articulate the acceptance, use, and impact of technology clearly. Davis (1989) defined PU as "the

degree to which a person believes that using a particular system would enhance his or her job performance" (p. 320); conversely, PEU is "the degree to which a person believes that using a particular system would be free of effort" (p. 320).

Researchers have commonly used TAM to test the acceptance of various technologies. Depending on the technology studied, TAM can include various variables that may influence the PU and PEU of said technology (Davis, 1989). Researchers have implemented TAM and revised it across various disciplines to illustrate and explain the adoption and use of different types of technologies. Researchers have defined the model as being receptive to change and having high validity (Davis, 1989; Huntington & Worrell, 2013).

Researchers have used TAM to explain many different technologies using multiple variables. In the education field, researchers have used TAM to predict and explain teachers' and students' acceptance and use of all types of technologies; moreover, researchers have used TAM globally to explain the acceptance and use of various technologies. In England, Underwood and Stiller (2014) used a TAM model to explain 50 teachers' actual use of a learning platform and identify barriers to use. In a mixed-methods study, Gokcearslan (2017) used TAM to discover the relationship between 414 Turkish high school students' levels of acceptance and levels of self-directed learning with tablets. By employing TAM, Huntington and Worrell (2013) found that U.S. teachers' belief profiles and teacher efficacy were variables that contributed to high school teachers' acceptances of computer-based information communication technologies

(ICTs) and digital media. When Holden and Rada (2011) applied TAM, they found self-efficacy and perceived usability had a positive correlation.

Researchers of the TAM have theorized that a person's behavioral intention to use technology can be determined by their PU, PEU, and A toward usage of the technology (Shroff, Deneen, & Ng, 2011; Vajda & Abbitt, 2011). Together, these components predict a user's AU. Researchers have used the TAM model to explain the use and acceptance of new and currently used technologies. Researchers have appraised new technologies by measuring teachers' behavioral intention to use, and researchers have used the AU to appraise currently used technologies (Holden & Rada, 2011).

Researchers have based student-centered methods on a constructivist theoretical framework (Ahmed, 2013; Andersen & Andersen, 2017; Means & Olson, 1995). Fundamental to understanding this framework was Piaget's (1964) theory of the nature of learning (McCaskey & Crowder, 2015). For Piaget (1964), students learn by interpreting their experiences, knowledge, and skills in classrooms.

Review of the Broader Problem

To conduct the literature review, I used various databases to search for articles to inform and support the concepts that established the study. I retrieved most resources from the Walden University online library using the ERIC, ProQuest, EBSCOhost, Sage, Education Research Complete, Academic Search Complete, Computers and Applied Science, Research Starter-Education, Learning Research Complete, Education Source, and Teacher Reference Center databases. I also used Google Scholar. I used the following keywords: *teaching style, teacher-centered, student-centered, learner-centered,*

technology acceptance model, *technology integration*, *teacher technology use*, *learning management systems*, *lecture*, and *Edmodo*. The searches resulted in many articles, primarily from peer-reviewed educational journals from the past 5 years. I made an effort to rely on research conducted on the secondary education level in U.S. schools. I found this effort difficult due to the overwhelming amount of research completed around the world in higher education on the concepts addressed in this study.

Teaching Style

Conti (1989) defined *teaching style* as the noticeable characteristics that teachers displayed, which were constant from day-to-day, regardless of what was taught. Grasha (1994) described *teaching style* as "a pattern of needs, beliefs, and behaviors that faculty displayed in their classroom" (p. 142). Teaching style is a multidimensional concept that affects the ways that teachers deliver course materials, manage classes, relate with students, supervise students as they complete assignments, and more (Grasha, 1994). According to McCaskey and Crowder (2015), researchers have identified teacher-centered and student- or learner-centered as the two principal and central teaching styles. The teacher-centered approach refers to the traditional, didactic, sequential, skills-based, shallow, and directive pedagogical method by which teachers have educated students at all levels (Butcher et al., 2014; Singh & Garg, 2015). Teachers disseminate knowledge and information through direct instructional lectures or whole class discussions to passive student listeners (Andersen & Andersen, 2017; McCaskey & Crowder, 2015; Peters, 2010; Singh & Garg, 2015). In addition to the teachers being the primary source of information, they are evaluators, thereby giving them authority over all aspects of how

and what is taught (Singh & Garg, 2015). Teachers are guided by the curriculum and standards (Singh & Garg, 2015), rather than by the need to engage students in the process of learning. Dole, Bloom, and Doss (2017) explained that the teacher-centered pedagogy was no longer acceptable for today's classrooms.

In contrast, the student-centered method is competency based, task centered, and personalized (Lee, Myers, & Reigeluth, 2016). McCombs and Whisler (1997) defined *learner centered* as follows:

> The perspective that couples a focus on individual learners (their heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs) with a focus on learning (the best available knowledge about learning and how it occurs and about teaching practices that are most effective in promoting the highest levels of motivation, learning, and achievement for all learners). This dual focus then informs and drives educational decision making. (p. 9)

In a constructivist classroom, instruction is student centered, and students are engaged in practical applications of information within a specific context (Matusevich, 1995). Key to student-centered approaches are students using real tools of the discipline to participate actively in authentic disciplinary problem-solving (Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). Students' interests, differences, experiences, talents, capacities, background, perspectives, and needs are considered and used as a guide for their learning (Ahmed, 2013; Singh & Garg, 2015).

Students are engaged in active learning as the teacher facilitates the lesson (McCaskey & Crowder, 2015). The students are involved in deciding what, when, and

how they are taught, thereby putting the responsibility of learning in the hands of students and developing "learner autonomy and independence" (Singh & Garg, 2015, p. 369). Students gain a deeper understanding of the subject matter and become more successful in critical thinking and problem solving (Simpson & Park, 2013; Stefaniak & Tracey, 2015).

When learning is centered on students, they are active and engaged in activities. The contextual and practical involvement of students is key to teaching students "how to think, solve problems, evaluate evidence, analyze arguments, generate hypotheses" (Singh & Garg, 2015, p. 370), and other learning skills needed to master the material. Student-centered activities include creating questions, debates, and cooperative learning. Students are motivated because they actively take part in their learning (Singh & Garg, 2015; Stefaniak & Tracey, 2015). Eronen and Kärnä (2018) found that student-centered learning occurred when the teacher's role was minimized, and students guided their own learning in environments where easy-to-use technology provided students with various learning materials.

Principles of Adult Learning Scale

I applied the Principles of Adult Learning Scale (PALS) to measure the degree to which high school teachers held student-centered instructional practices. Conti (1979) developed PALS to measure the extent to which college instructors employed student-centered adult learning principles. Conti (1979) used PALS to determine an instructor's teaching method by measuring behaviors in the seven factors that composed a teacher's teaching mode. These factors included learner-centered activities, personalizing

instruction, relating to experience, assessing student needs, climate building, participation in the learning process, and flexibility for personal development.

Researchers have used the principles of adult learning to explain ways that learners gain new skills, knowledge, and values through learning activities and reflecting on their experiences (Heystek & Terhoven, 2015). According to Nayak and Parkar's (2015) description of Knowles's explanation of the principles of adult learning, adult learners (a) are independent and self-directed, (b) have a variety of experiences, (c) must know the personal benefit of what learned, (d) know the relevance of what they are learning, (e) are practical, and (f) have various learning styles. Whether the course is in-person or online, effective two-way communications is key to this pedagogy (Gravani & Karagiorgi, 2014).

Kovačević and Akbarov (2016) applied PALS to test the assumption that the International University of Sarajevo's professors remained using the traditional teacher-centered teaching style. Kovačević and Akbarov had 52 respondents. Kovačević and Akbarov found that most professors used a teacher-centered teaching style and found no significant difference between teaching styles across gender and faculty types.

I justified using the same approaches prescribed for teaching adults on high school teachers because researchers recommended using the same student-centered methods for youths (see Ertmer & Ottenbreit-Leftwich, 2010; McCaskey & Crowder, 2015; Reinhart et al., 2011; Shaw, Conti, & Shaw, 2013). Hawken (2016) explained that principles of adult learning were the pedagogy used for high school seniors in Australia, and the relevant activities motivated students. Shaw et al. (2013) found that adult learning

methods applied to at-risk urban youth were empowering and recommended that student-centered approaches be used for all youth. Some of the framework supporting the principles of adult learners are the ideas that adult learners are capable of being self-directed learners who want to be cocreators of their knowledge, whose experiences aid in forming new knowledge as they think critically and reflect on new information (McDougall & Holden, 2017). Active learning and collaborative learning are among the suggested instructional practices under the principles of the adult learning theory (Pierce, 2017).

I aimed to demonstrate that teachers using student-centered approaches and technology in secondary schools would ensure that vision, mission, and instructional practices of ZCPS remained aligned (Moeller & Reitzes, 2011). ZCPS created vision and mission statements to urge that 21st technologies be used to prepare students for college and the workforce. By teachers accepting and using technologies (e.g., Edmodo) and student-centered instructional practices, they ensure students face full preparation for the future.

Student-Centered Use of Technology

Technology has an insufficient impact on students' learning in Kindergarten to 12th grade classrooms because technology integration is usually teacher-centered (Wang & Hsu, 2017). Teachers who employ teacher-centered approaches commonly use technology to support teacher-centered methods. In these cases, technology is used to prepare lessons, create PowerPoints, present information, communicate through email, and maintain a gradebook (R. J. Chen, 2010). Y. Zhao (2007) found that teachers

believed they could use technology to teach with various learning styles and present information in a visually appealing manner. According to one social studies teacher who participated in Y. Zhao's (2007) study,

> A lot of my lectures are on PowerPoint because they can hear me, they can see it, and they have to write it down. So we get into the visual, the auditory learner, and they kind of study from that. (p. 323)

Students in a teacher-centered classroom are usually passive listeners tasked with taking notes and remembering the information being presented. They then complete many assignments individually (Y. Zhao, 2007). Today's youth use social media, gaming, and texting platforms outside of school; therefore, they should have access to technology in school (Simpson & Park, 2013).

Several authors have contended that using technology for teacher-centered activities depicts a low-level of technology use compared to having students use technology at high levels in a student-centered classroom (An & Reigeluth, 2012; Ertmer & Ottenbreit-Leftwich, 2010). Instead of memorizing and recalling facts during testing periods, students in student-centered classrooms can analyze and process information to gain a more practical use of the knowledge they acquire in class (Peters, 2010). Researchers have reported improved metacognition, sense of empowerment, and ownership concerning students' learning among learners in student-centered instructional environments (Peters, 2010). Today's students want to use technology to deliver academic, real-world, and relevant knowledge (Simpson & Park, 2013).

According to Richardson, Sales, and Sentocnik (2015), technology allows teachers' pedagogy to remain more student-centered and individualized. Levin and Schrum (2013) found that teachers changed the ways that they taught the curriculum, and they changed their teaching practices when they successfully integrated technology. Through successfully integration, teachers used technology regularly to find appropriate online resources and to engage students in activities where they independently used a variety of technologies. Levin and Schrum observed teachers talking less when using technology and students doing more talking and group work.

Through focus groups, interviews, and classroom observations of seven exemplary U.S. schools, McKnight et al. (2016) sought to understand how technology enables teaching and learning. To document the technology-rich instructional strategies teachers used, McKnight et al. surveyed teachers' understanding, usage, and comfort with technology. McKnight et al. revealed that teachers used technology to have more time for instructional planning and delivery because technology made daily routines quicker and easier. Technology gave teachers access to a wider range of updated and in-depth learning resources. Teachers used technology in meeting students' learning needs by improving teachers' abilities to tailor or personalize instruction. Teachers used technology to improve communications among themselves, students, and all other stakeholders. These improvements from technology integration transformed the role of teachers and activated the cognitive learning processes of students (McKnight et al., 2016).

Researchers have found that teachers can use technology to create more student-centered classrooms (An & Reigeluth, 2012; Evans & Kilinc, 2013; Project Tomorrow, 2010; Stobaugh & Tassell, 2011; S. Watson & Watson, 2011). Kopcha (2010) found that when teachers placed technology in students' hands of students in a student-centered environment, students became motivated, their grade-point averages increased, and their knowledge of subject content was enhanced. S. Watson and Watson (2011) defined the following as some elements that digital technology made possible in a student-centered classroom: "Providing interactive content, giving immediate feedback, diagnosing student needs, providing effective remediation, assessing learning, and storing examples of student work (e.g., portfolios)" (pp. 39-40). Teachers can use student-centered technology to address the individual and diverse needs of students when managing classes (An & Reigeluth, 2012; S. Watson & Watson, 2011).

Teachers using student-centered approaches are usually highly active technology users (Tondeur et al., 2017). They tend to use technology more frequently and more student-centered ways (Tondeur et al., 2017). In addition, Tondeur et al. (2017) observed student-centered teachers using technology to help students acquire higher order thinking and problem-solving skills; additionally, Tondeur et al. (2017) observed student-centered teachers using technology as an information tool.

The advancements in digital and learning technologies make the management and facilitation of student-centered learning environments more possible (Amarteifio, 2018). The functions of education technology required for teacher-centered learning differs compared to those needed for student-centered learning (Aslan & Reigeluth, 2016). To

facilitate student-centered learning, functions of the education technology must provide a higher the level of personalization, customization, and self-regulation for learning (Aslan & Reigeluth, 2016).

Learning Management Systems

One technology that makes student-centered instruction possible is the web-based software called the LMS (Evans & Kilinc, 2013). Various terms exist for LMS, such as course management systems or classroom management systems (Evans & Kilinc, 2013), virtual learning environments, learning platforms, and personalized learning platforms (Underwood & Stiller, 2014). Examples of systems include the Moodle, eLearning, and eCampus (Evans & Kilinc, 2013). W. R. Watson, Watson, and Reigeluth (2015) described LMS as an educational software that managed and delivered course content. With grade books, discussion boards, uploads, emails, announcements, assessments, and multimedia features and components, teachers use LMS to organize courses, communicate with students, grade assignments, disseminate information, and assess student comprehension (Gautreau, 2011). With its various features, teachers can use LMS to support both online and face-to-face courses (Marks, Maytha, & Rietsema, 2016). LMSs are opened through web browsers and hold educational materials that are processed, stored, and disseminated (De Smet, Valcke, Schellens, De Wever, & Vanderlinde, 2016).

Gibeault (2018) noted that LMS supported self-paced learning, developed critical thinking skills, and provided greater access to materials. Not only do these features make student-centered instruction feasible, so also does the anytime, anyplace accessibility of

LMS. The functionalities of LMS support the constructivist approaches of flexible and active learning (Horvat, Dobrota, Krsmanovic, & Cudanov, 2015). However, Glowa and Goodell (2016) posited not all LMS were designed for student-centered learning; some were designed to support teacher-centered and course-centered processes. Dalsgaard (2016) and Jeljeli, Alnaji, and Khazam (2018) researched Facebook as an LMS.

Liu and Cavanaugh (2012) found that students of a Midwestern state virtual Kindergarten-12th grade schools showed academic gains after the school used an LMS to manage and deliver course materials and instructions. The hierarchical linear modeling technique was used to interpret data collected after students completed biology courses and took the corresponding end of course test. The results showed that the amount of time students spent on the LMS positively and significantly affected students' final grades. Results also showed that students were motivated by the LMS's interface to stay engaged in the academic activities posted on the LMS, and teachers' and students' communications improved.

The LMS at the center of this study was Edmodo. Batsila et al. (2014) investigated teachers' opinions about methods and frequency of Edmodo use by 41 secondary education teachers. They found that Edmodo was used three times a week by 48.8% (± 7.90%) of teachers, while 19.5% (± 6.27%) of the teachers responded that they used it twice a week. Approximately 66% of the teachers believed that Edmodo supported their work in the classroom "quite a lot" or "greatly." Teachers also rated Edmodo positively when asked about its ability to mark in real time, link to other websites, and interact online. When asked about Edmodo's motivating effect, 31.7% (±

7.36%) of the teachers answered, “quite a lot” and 29.3% (± 7.19%) answered “greatly.” Overall, most teachers liked and would recommend that other teachers should use Edmodo.

By providing students with opportunities of inquiry, teachers can use Edmodo to support student-centered learning (Evans & Kilinc, 2013). Evans and Kilinc (2013) discussed how social studies teachers could use Edmodo to facilitate engaging lessons in their classrooms. Sanders (2012) examined the impact of Edmodo on student engagement and responsible learning. An analysis of the data collected from 42 high school chemistry students in a suburban neighborhood in Southeastern United States revealed that Edmodo had a positive impact on student engagement and responsible learning. Sanders concluded that the features in Edmodo offered teachers the tools needed to have a more student-centered pedagogy.

Conclusions of the Literature Review

In addressing the problem of teachers’ use of teacher-center pedagogy despite the availability of technology in classrooms, I established the connection between teachers’ technology use and their acceptances of the technology in question. Several researchers have shown that teachers do not effectively or fully use technologies that they do not know how to use, they do not see the benefit of, or is too difficult for them to use. Therefore, this review of literature provided evidence that employing technologies that added to student-centered instructional practices were the recommended ways to instruct students. Evidence indicated the importance of having teachers accept the usefulness of that technology. I explained the key concepts and theories related to teachers’ teaching

styles, their instructional uses of technology, LMS, and technology acceptance levels explained to illuminate this study's purpose. I introduced PALS as the method by which teaching style was determined. Furthermore, to foster higher levels of student academic success, teachers must leverage all possible instructional technologies and practices. Using Edmodo to foster a more student-centered pedagogy was a step in the right direction. Edmodo offered students 24-hour access to an online format that could motivate their learning.

The preceding literature review showed a gap in the literature related to TAM, PALS, and Edmodo. Researchers defined TAM as useful in explaining the acceptance and use of LMS; however, little was known about the acceptance of the LMS, Edmodo. When TAM was used in educational research, researchers usually used it to explain acceptance of technology on a university campus. There was limited research on the use of TAM at the high school level in the United States. In addition, researchers defined PALS as appropriate for determining the teaching style of college instructors; however, little was known about the use of PALS in determining the teaching style of high school teachers. I only found one study, Shaw et al. (2013), where the researchers used PALS at the high school level.

Implications

This study has several implications for schools, teachers, and students in the areas of technology implementation and teacher practice. Leadership should use the information from this study to improve technology implementation processes and plans. Technology implementation plans that focus on familiarizing teachers with available

technologies, such as LMS, ensure teachers buy in and use the technology. Student successes can be anticipated when teachers correctly and effectively use Edmodo or any other technology. Simpson and Park (2013) declared teachers should buy into using the technology because "educators uncomfortable with technology deny their students access and therefore, limit the students in their individually desired form of learning" (p. 2432).

By assessing their own teaching styles, teachers can identify how actions manifest in their instructional practices, which can inform them of modifications and improvements that they need to make (Ahmed, 2013). As teachers make improvements in their teaching methods and become more student-centered, students will become more participatory in the learning process and learn better. Engaged learners are more likely to reach academic success, thereby making them better prepared for lives after high school. Positive social change can happen when students can fulfill the school district's mission and vision of preparing students to meet the challenges of college or a global society.

As another contribution, school system leaders can redesign current classroom practices using the findings of this study. Gaining an enhanced understanding of how students learn should assist leaders in creating more effective classroom practices (McCombs & Whisler, 1997). The implementation of more effective classroom practices should yield more student achievement.

I investigated whether high school teachers accepted and used the LMS, Edmodo, for student-centered instruction. Additional research is needed that includes student achievement, in particular how student achievement is affected by the integration of Edmodo through student-centered instruction. This study also benefits the school district

leaders to obtain students' perceptions about the effects of the student-centered instructional use of technologies, such as Edmodo.

Being able to see measurable academic benefits to using technologies, such as Edmodo, hinged on teachers effectively using available technologies. Getting teachers familiar with using Edmodo and using student-centered instructional methods was shown as significant for achieving student success. Key to teachers' adoption and use of any technology is the availability of professional development (Butcher et al., 2014; Levin & Schrum, 2013). However, addressing policy might be more important than professional development, as several researchers repeated the need to review policies (Amarteifio, 2018; De Smet et al., 2016; Glowa & Goodell, 2016; Levin & Schrum, 2013; McKnight et al., 2016; Tondeur et al., 2017; Underwood & Stiller, 2014).

Summary

Researchers have found that the best practices for using educational technologies entail those that promote student-centered learning (Ottenbreit-Leftwich et al., 2010). Wang and Hsu (2017), who researched technology integration in K-12 science classrooms, suggested that student outcomes would improve with instructional use of student-centered practices and by using technology to foster problem solving to develop cognitive skills. The problem that I addressed in this study was that despite the research and the availability of computers and other technologies, many teachers relied on traditional teaching practices (see Ottenbreit-Leftwich et al., 2010).

In this study, I described how high school teachers in ZCPS used the LMS, Edmodo, in the learning process. I investigated the relationship between teachers'

teaching styles (teacher-centered *vs.* student-centered) and teachers' acceptance of Edmodo. I also investigated the patterns and frequency of teachers' use of LMS to support student-centered learning.

Framed in four sections, I discuss the rationale, intent, and scope for the investigation. In Section 1, I defined the problem, and then provided the study's rationale, significance, research questions, review of literature, and implications. In Section 2, I reveal the methodology of the study, which includes a description of the quantitative research, the setting, the data collection, and data analysis. In Section 3, I explain the project, along with its rationale and review of the literature. In Section 4, I discuss findings from the project, reflections on the importance of the work, and the study's influence on social change.

Section 2: The Methodology

Introduction

In this study, I focused on an LMS called Edmodo. I gathered quantitative data from teachers using a survey that combined statements from PALS and TAM. I used PALS to establish a teacher's teaching style and TAM to determine their perceptions of their acceptance and the usefulness of Edmodo.

Research Design and Approach

I employed a correlative design to investigate the relationship between high school teachers' teaching style (teacher centered *vs.* student centered) and teachers' acceptance and use of Edmodo. I revealed whether a relationship existed between the teaching styles of suburban high school teachers and teachers' perceptions of the usefulness Edmodo, as measured by the TAM components. Because I sought to measure the relationship between teachers' teaching styles and their use of Edmodo, I used the correlative design. Creswell (2012) defined the design as used when the investigator described or measured the relationships among two or more variable.

Setting and Sample

ZCPS was a suburban school district in north central Georgia. With more than 50,000 students, it was among the largest school districts in the United States (ZCPS, 2012a; Georgia DOE, 2012). The district had two K-2 schools, 33 elementary schools, one K-8 school, 14 middle schools, 10 high schools, an adult education program, and two charter schools (ZCPS, 2012a).

I sent four principals a letter requesting to conduct a study in their high schools. I used several criteria to determine whether to consider a high school for the study. I aimed to first consider the high schools, one from each of the three clusters, with the largest student capacities. Next, the schools needed to have solid leadership. One of the schools with the largest student capacities had not replaced the recently promoted principal; therefore, I did not contact that school. Three principals agreed to participate in the study. The three high schools participating in the study had the largest or second largest student capacities in their cluster.

I invited all 240 ZCPS high school classroom teachers from three high schools to complete the questionnaire. I used two research eligibility criteria for participation. Eligible participants included teachers and worked at one of the three high schools where principals granted permission. To ensure that teachers fit the criteria, I sent invitation letters with a link to the online survey to the principals to forward to their teachers. I asked principals to forward a reminder letter to teachers 2 weeks later. Due to low participation numbers, I extended the survey collection time. I sent principals extension letter, which they again forwarded to teachers. I collected data from October 30, 2017 to December 18, 2017.

From all teachers in the survey, 45 teachers completed the online survey, which represented a response rate 18.75% of the total number of teachers invited to participate in the study. A power analysis using G*Power 3.1 revealed the between-groups comparison effect size with an $n = 32$ would be needed to obtain statistical power at the .80 level. To determine the required sample for a linear multiple regression, an analysis

revealed that I needed a sample size of $N = 35$ to achieve a power of .95 in a test based on $\alpha = 0.05$.

As shown in Table 1, the participants identified as 26.7% male and 73.3% female. A total of 73.4% were 40 years old or older. Most teachers (77.8%) had over 5 years of teaching experiences, and 57.8% had over 5 years of teaching experiences with the county. Table 1 shows that the participants represented more than six departments.

Table 1

Demographic Characteristics of Participants

Characteristics	*n*	%
Gender		
Male	12	27
Female	33	73.3
Age (years)		
25-30	2	4.4
30-40	10	22.2
40-50	16	35.6
Older than 50	17	37.8
Years of teaching experience		
Less than 1	2	4.4
More than 1 and less than 3	7	15.6
More than 3 and less than 5	1	2.2
More than 5 and less than 10	7	15.6
More than 10	28	62.2
Department		
English/language arts	8	17.8
Math	7	15.6
Science	7	15.6
Social studies	4	8.9
Foreign languages	1	2.2
Career, technical, and agricultural education	7	15.6
Other	11	24.4
Total	45	100

Instrumentation and Materials

According to the research questions, teachers' teaching style was the independent variable. The technology acceptance variables, PU, PEU, A, and AU, were the dependent

variables. I measured the teaching styles variable using the PALS instrument, and I measured the technology acceptance variables by the TAM. Conti (2004) used PALS to measure teachers' inclinations toward student-centered or teacher-centered teaching styles. I prompted teachers to respond to 44 behavior statements. PALS statements addressed seven factors that reflected student-centered teaching ideas; Table 2 lists the factors and PALS questions that relate to each factor.

Conti (2004) defined the PALS as using a 6-point Likert scale. Teachers responded to the statements by selecting *always*, *almost always*, *often*, *seldom*, *almost never*, or *never*. I scored all questions according to Conti (1983). The values for the positive questions (1, 3, 5, 8, 10, 14, 15, 17, 18, 20, 22, 23, 24, 25, 28, 31, 32, 34, 35, 36, 39, 42, 43, and 44) included *always = 5*, *almost always = 4*, *often = 3*, *seldom = 2*, *almost never = 1*, and *never = 0*. The values for the negative questions (2, 4, 6, 7, 9, 11, 12, 13, 16, 19, 21, 26, 27, 29, 30, 33, 37, 38, 40, and 41) included *always = 0*, *almost always = 1*, *often = 2*, *seldom = 3*, *almost never = 4*, and *never = 5*.

Table 2

Principles of Adult Learning Scale Factors and Related Questions

Principles of Adult Learning Scale factors		Related questions
1.	Learner-centered activities	2, 4, 11, 12, 13, 16, 19, 21, 29, 30, 38, 40
2.	Personalizing instruction	3, 9, 17, 24, 32, 35, 37, 41, 42
3.	Relating to experience	14, 31, 34, 39, 43, 44
4.	Assessing student needs	5, 8, 23, 25
5.	Climate building	18, 20, 22, 28
6.	Participation in the learning process	1, 10, 15, 36
7.	Flexibility for personal development	6, 7, 26, 27, 33

In two field tests of adult educators, two juries determined construct validity of PALS (Conti, 1982); therefore, the positive PALS items on the survey were consistent

with the student-centered mode of instruction. Conti (1983) later used factor analysis to provide evidence further of content validity. I determined that Cronbach's alpha reliability coefficient of .92.

I used the TAM to gather data to explain teachers' acceptance, adoption, and use of Edmodo. The survey presented 19 statements that addressed four TAM constructs: PU, PEU, A, and AU. As indicated in Table 3, I adapted the PU and PEU items from Davis (1989), and I adapted the A and AU items from Fathema, Shannon, and Ross (2015). PEU was the degree to which the prospective user expected Edmodo to remain free of effort to use. PU referred to the probability that using Edmodo would enhance a user's job performance. A referred to a person's positive or negative thoughts about using Edmodo. AU referred to a person's actual use of the Edmodo (e.g., Davis et al., 1989).

Table 3

Technology Acceptance Model Survey Questions

Category	#	Statement
Perceived usefulness	1	Using EDMODO in my job would enable me to accomplish tasks more quickly.
	2	Using EDMODO would improve my job performance.
	3	Using EDMODO in my job would increase my productivity.
	4	Using EDMODO would enhance my effectiveness on the job.
	5	Using EDMODO would make it easier to do my job.
	6	I would find EDMODO useful in my job
Perceived ease of use	7	Learning to operate EDMODO would be easy for me.
	8	I would find it easy to get EDMODO to do what I want it to do.
	9	My interaction with EDMODO would be clear and understandable.
	10	I would find EDMODO to be flexible to interact with.
	11	It would be easy for me to become skillful at using EDMODO.
	12	I would find EDMODO easy to use.
Attitude toward using	13	I think it is worthwhile to use EDMODO
	14	I like using EDMODO
	15	In my opinion, it is very desirable to use EDMODO for academic and related purposes
	16	I have a generally favorable attitude toward using EDMODO
Actual use	17	Overall to what extent do you use EDMODO?
	18	To what extent did you use EDMODO last month?
	19	To what extent did you use EDMODO last week?

Note. Perceived usefulness and perceived ease of use adapted from Davis (1989); attitude toward using and actual use adapted from Fathema et al. (2015).

I used the TAM section of the survey to ask teachers to respond to PU, PEU, and A statements with answers ranging from *strongly agree* to *strongly disagree*. I scored these using a 7-point Likert scale. The scale ranged from *1* (*extremely unlikely*) to *7* (*extremely likely*). The AU statements also used a 7-point Likert scale, but these used two sets of responses related to the amount of time teachers used Edmodo.

Researchers have established validity and reliability on the TAM survey statements. Davis (1989) established the validity of the 12 items of the PU and PEU scales in a laboratory study where he evaluated two graphics systems, Chart-Master and Pen-draw. The Cronbach's alpha score was .98 for the PU items and .94 for the PEU items, thus establishing reliability. I adapted the A and AU items from Fathema et al.

(2015). The two constructs were part of the TAM components in a survey that two content experts pilot tested (Fathema et al., 2015). I established all internal consistency reliabilities with a Cronbach's alpha score of .963 for A and .875 for AU.

To ensure that no copyright issues existed concerning the use of preexisting instruments, I sent letters to request the use of the instruments. I sought permission for the use of TAM constructs from Davis (1989; see Appendix C), from Fathema et al. (2015), and from Conti (1989; see Appendix D) for the PALS. All three granted permission.

I created a spreadsheet of this study's raw data. I will store the spreadsheet on a USB drive that will be in a locked file cabinet in my home office for 5 years. During that time, these data may be made available to the university or the research site by request. I will delete all data from the USB drive, and I will reformat the drive after the 5-year period.

Data Collection and Analysis

The research procedure began when I submitted the Walden University's institutional review board (IRB) application, and it ended when I closed the online survey. After the provisional approval, I sought approval from the ZCPS research review board. Subsequently, letters were sent to four high school principals requesting permission to conduct research at their school. When I received permissions from the three ZCPS high school principals, I requested final IRB approval from Walden University, which I received.

I emailed the high school principals the teacher invitation letters, which they forwarded to all their teachers. The letters contained a link to the online survey. After 2 weeks, I asked principals to forward a reminder letter to the teachers. At the end of 3 weeks, I extended the survey time due to low participation numbers. I sent principals an extension letter, which they again forwarded to teachers.

Surveys opened to the informed consent form where teachers could grant their implied consents. An implied consent indicated when a teacher selected to agree to participate and took the survey. I made the online survey available to teachers for 7 weeks.

To collect the quantitative data, I asked participants to respond to a survey that combined items from two preexisting instruments. The consent form was the first of the study survey's four sections. I used the second section to gather demographic information. The third section contained Conti's (1989) PALS, and the fourth section had 19 TAM items. Although the TAM section was based on Davis (1989), I pulled the wording for the A and AU items from Fathema et al. (2015). I made revisions to both the PALS and TAM sections. In the PALS revision, I removed the mention of adult students, and the TAM revision reflected that Edmodo was the technology in question. The survey was entitled *The Teaching Style and Edmodo Acceptance Survey* (see Appendix B).

Data Analysis

The data analysis began after the online survey closed. First, I checked validity and reliability for each PALS factor and TAM construct. To assist in the explanation of

study findings, I analyzed demographical data. I calculated descriptive statistics to explain the demographics of the participants.

I followed Conti's (1989) summation procedures for the PALS section of the survey. I calculated the PALS scores by adding values of all 44 questions for each participant. Scores could range from 0 to 220. Scores over 146 represented a student-centered teaching style. For each factor, I added the values of the responses to calculate the factor score. Then, I compared the factor score to Conti's (1989) factor means and standard deviation table. Factors scores equal to or above Conti's (1989) means indicated a student-centered teaching style.

I performed a one-way ANOVA to test the relationship between teaching style and the TAM variables. I examined the moderating effects of teaching styles on the relationships between the acceptance variables using a regression analyses. I performed the regression analyses separately for the student-centered and the teacher-centered teaching style clusters. I repeated each test by replacing the teaching style variables with teachers' experiences. I completed statistical calculations using IBM SPSS Statistics Version 25.

Assumptions, Limitations, Scope and Delimitation

I based this study on several assumptions. For the first assumption, I assumed the ZCPS problem was related to teachers' acceptance of Edmodo. Then, I assumed that principals only sent the surveys to classroom teachers. I also assumed that all participants remained truthful and factual in their responses to the survey.

The number of participants limited my research. From a pool of 240, only 45 teachers returned the survey. A small number of participants made generalizations difficult and some tests invalid. I abandoned the goal of increasing the number of sites and participants when I was advised that doing so might take more time than I wanted to spend to obtain the number of required approvals and go through all the required procedures.

I kept the scope to teaching styles, experiences, and technology (Edmodo) acceptance of ZCPS high school teachers. I only collected data from three of the county's high schools. The purpose of this study was to determine teachers' teaching styles (teacher-centered vs. student-centered), and their acceptance and use of Edmodo in ZCPS. I also explained the relationship between teachers' teaching experiences, teaching styles, and their acceptance and use of Edmodo.

I delimited the study to classroom teachers. I determined the criteria by principals who I asked to send the surveys to only classroom teachers. I delimited the study by the number of completed and returned surveys.

Protection of Participants' Rights

I made all efforts to keep all participants from harm and to keep their identities confidential. Participants received an informed consent form (see Appendix A) to advise them of their rights, including their rights to withdraw from the study at any time. Although I was a high school teacher in the district at the time of this study, I did not have any authority over the participants in the study, and my school did not participate in

the study. After the study is completed, I will store the study artifacts and data on a USB drive in a locked file cabinet for 5 years.

Data Analysis Results

As shown in Table 4, the measured acceptance variables covered (nearly) the entire scale and took moderate to high mean values, except AU, which took moderate to low values (M = 3.01, SD = 1.92). PEU significantly predicted PU (β = 0.71, p < .000, adj. R^2 = 0.49) and A (β = 0.56, p < .000 for PEU, β = 0.37, p = .001 for PU, adj. R^2 = 0.69). Further, A predicted AU (β = 0.50, p = .001, adj. R^2 = 0.23). The complete results of the regression analysis are provided in Table 8.

Table 4

Descriptive Statistics of the Measured Variables

	Min.	Max.	*M*	*SD*
PU	1.00	7.00	5.40	1.41
PEU	1.00	7.00	5.90	1.28
A	1.00	7.00	5.78	1.22
AU	1.00	7.00	3.01	1.92

Note. PU, perceived usefulness; PEU, perceived ease of usefulness; A, attitude toward use; AU, actual usefulness.

Table 1

Main Component Analysis of the PALS Items

	Resulting factors and loadings					
Items	1	2	3	4	5	6
Q17	**0.850**	-0.045	-0.200	0.094	0.090	-0.027
Q43	**0.791**	0.165	0.264	-0.203	-0.006	0.077
Q42	**0.752**	0.144	-0.125	0.038	-0.260	0.093
Q20	0.315	**0.782**	-0.125	0.111	-0.059	-0.115
Q36	0.059	**0.767**	0.037	-0.16	0.210	0.100
Q21	0.066	**-0.840**	0.185	0.092	-0.023	-0.046
Q29	0.010	-0.196	**0.778**	0.179	-0.06	0.021
Q28	0.109	0.056	**-0.811**	-0.166	-0.036	0.143
Q33	-0.067	-0.035	0.139	**0.880**	0.077	-0.001
Q27	0.055	-0.12	0.211	**0.855**	-0.086	0.000
Q1	-0.058	0.067	-0.247	0.006	**0.868**	-0.014
Q11	0.082	-0.13	-0.259	0.005	**-0.784**	-0.207
Q8	-0.226	-0.016	-0.160	0.093	0.252	**0.748**
Q23	0.298	-0.059	0.256	0.098	0.059	**0.682**
Q26	-0.140	-0.161	0.264	0.247	0.115	**-0.650**

As recommended by Conti (1989), I calculated the indicators of teaching styles to building disbalanced student-centered ($n_1 = 2$) versus teacher-centered ($n_2 = 43$) style subgroups, which would disable the further planned statistical analysis. I observed the PALS questionnaire consisted of a relatively high number of items (44); instead, I conducted a main component analysis with Oblimin rotation to reduce the number of factors. I considered item loadings over 0.500 for the new factors, and I excluded items that loaded on two or more factors. Thus, I reduced the total number of items to 15, which explained 73% of the total variance. The resulting six factors, along with those loadings, are presented in Table 5. I extracted those values using the Anderson-Rubin procedure and saved these for further analysis.

Table 2

Teaching Style Factors by Teaching Style Clusters (One-Way ANOVA Results)

		N	*M*	*SD*	*F*	*p*
Factor 1	Student-centered	20	0.72	0.79	32.153	0.000
	Teacher-centered	25	0.58	0.74		
Factor 2	Student-centered	20	-0.01	1.36	0.002	0.963
	Teacher-centered	25	0.01	0.60		
Factor 3	Student-centered	20	-0.29	1.24	3.169	0.082
	Teacher-centered	25	0.23	0.70		
Factor 4	Student-centered	20	-0.07	1.33	0.190	0.665
	Teacher-centered	25	0.59	0.65		
Factor 5	Student-centered	20	0.08	1.30	0.247	0.622
	Teacher-centered	25	-0.67	0.69		
Factor 6	Student-centered	20	0.25	1.04	2.354	0.132
	Teacher-centered	25	-0.20	0.94		

I clustered the study participants according to the six PALS items by a two-step cluster analysis with log-likelihood distances. I made the number of resulting clusters 2 and saved a new variable, indicating to which cluster each participant belonged. The cluster separation quality was moderate. A one-way ANOVA (Table 6) showed that the clusters differed significantly by Factor 1, $F(43, 1) = 32.163$, $p < 0.000$, which comprised the items Q17 (“I use different techniques depending on the students being taught”), Q42 (“I use different materials with different students”), and Q43 (“I help students relate new learning to their prior experiences”). The Factor 1 values for Cluster 1 ($M = 0.72$, $SD = 0.79$) were higher than for Cluster 2 ($M = -0.58$, $SD = 0.74$); therefore, Cluster 1 was regarded as the *student-centered teaching style* cluster ($n_1 = 20$ participants) and Cluster 2 as the *teacher-centered teaching style* cluster ($n_2 = 25$ participants).

RQ1 (H_1-H_4): Direct Relationships Between Teaching Style and the Technology Acceptance Model Variables

To test the relationship between teaching style and the TAM variables, I performed a one-way ANOVA. No significant differences existed between clusters in terms of acceptance variables. Only PEU was marginally higher, $F(43, 1) = 3.389$, $p = 0.073$) in the student-centered teaching style cluster ($M = 6.28$, $SD = 0.92$) than in the teacher-centered teaching style cluster ($M = 5.59$, $SD = 1.46$). No relationship existed between teaching style and the PU, PEU, A or AU variables. For this reason, I accepted the null hypothesis. Therefore, I considered the relationship between the TAM variables.

To provide a more detailed explanation of AU, I performed a two-way contingency table analysis to examine the relationship further among the three AU items (overall use, last month, and last week) and teaching styles (student-centered and teacher-center). With seven possible answers to the AU items, initial findings were spread too thin. To condense the finding, I condensed responses to how many times a teacher used Edmodo overall, last month, and last week to four (0 to 1, 2 to 3, 4 to 5, and 6+). Although the relationship was not significant, 60% of the teacher-centered teachers used Edmodo three or less times, and 50% of the teachers with a student-centered teaching style used Edmodo six or more times the previous month (see Figure 2).

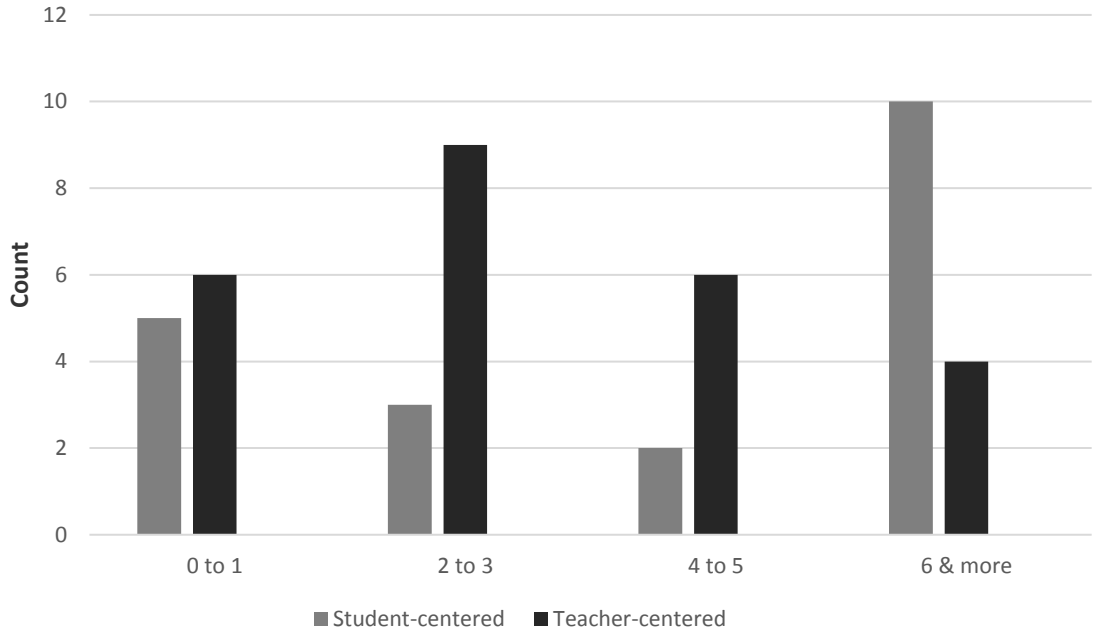

Figure 2. 1-month Edmodo use by teaching style.

RQ1 (H5-H8): Moderating Effects of Teaching Style on the Technology Acceptance Model Relationships

To examine the moderating effect of teaching style on the relationships between the acceptance variables, I performed the regression analyses corresponding to the TAM separately for the student-centered and the teacher-centered teaching style clusters. As shown in Table 7, in the teacher-centered teacher cluster, PEU was a stronger predictor of PU (β = 0.84, p < .000, adj. R^2 = 0.69) than in the student-centered cluster (β = 0.66, p = .001, adj. R^2 = 0.41). Further, PU was a stronger predictor of A in the teacher-centered cluster (β = 0.59, p = .001, adj. R^2 = 0.69) than in the student-centered teacher cluster (β = 0.40, p < .065, marginally significant, adj. R^2 = 0.56). Conversely, in the student-centered cluster, PEU was the stronger attitude predictor (β = 0.45, p < .041, adj. R^2 = 0.56), as compared with PU (β = 0.40, p < .065, adj. R^2 = 0.56). Additionally, A was a

stronger predictor of AU in the teacher-centered cluster (β = 0.58, p < .002, adj. R^2 = 0.31); however, in the student-centered cluster, its contribution to AU was not significant (β = 0.46, p < .042, adj. R^2 = 0.17).

Table 7

Moderating Effects of Teaching Style on the Technology Acceptance Model Relationships

TAM variables		Entire sample			Student-centered			Teacher-centered		
Predictors	Criteria	β	p	adj. R^2	β	p	adj. R^2	β	p	adj. R^2
PEU	PU	0.71	0.000	0.49	0.66	0.001	0.41	0.84	0.000	0.69
PU	A	0.37	0.001	0.75	0.40	0.065	0.56	0.59	0.001	0.84
PEU	A	0.56	0.000		0.45	0.041		0.37	0.023	
A	AU	0.53	0.000	0.27	0.46	0.042	0.17	0.58	0.002	0.31

RQ2: Relationship Between Teaching Experience and Edmodo Acceptance

Similar to RQ1, I subdivided the participant sample by clustering the participants according to their experiences with teaching to their experiences in the country. The cluster separation quality was good, indicating a larger cluster of experienced teachers (n_1 = 34; experiences with teaching M = 4.82, SD = 0.39; experiences in the country M = 4.09, SD = 1.16) and a smaller cluster of less experienced teachers (n_2 = 11; experiences with teaching M = 2.09, SD = 0.83, F[1, 43] = 225.195, p < .000; experiences in the country M = 2.09, SD = 1.14; F[1, 43] = 24.733, p < .000).

RQ2 (H9-H12): Direct Relationships Between Teaching Experience and Teaching Style

Using a *t*-test, I checked for mean value differences. There was no significant difference.

RQ2 (H13-H16): Moderating Effects of Teaching Experience on the Relationships Between Technology Acceptance Model Variables

Teaching experiences moderated the relationship as far as the attitude predictors were concerned. For highly experienced teachers, PEU ($\beta = 0.57$, $p < 0.000$, adj. $R^2 = 0.73$) was a stronger attitude predictor than PU ($\beta = 0.37$, $p < 0.005$). Conversely, for the less experienced teachers, PU ($\beta = 0.59$, $p < 0.126$, adj. $R^2 = 0.79$) was a stronger predictor of attitude than PEU ($\beta = 0.34$, $p < 0.347$). However, the latter predictors did not reach statistical significance, as shown in Table 8.

Table 8

Moderating Effects of Experience on the Technology Acceptance Model Relationships

TAM variables		Entire sample			Experience high			Experience low		
Predictors	Criteria	β	p	adj. R^2	β	p	adj. R^2	β	p	adj. R^2
PEU	PU	0.71	0.000	0.49	0.67	0.000	0.44	0.91	0.000	0.80
PU	A	0.37	0.001	0.75	0.37	0.005	0.73	0.59	0.126	0.79
PEU	A	0.56	0.000		0.57	0.000		0.34	0.347	
A	AU	0.53	0.001	0.27	0.54	0.001	0.27	0.48	0.14	0.15

Summary of Findings and Discussion

The main component analysis resulted in new factors for the PALS items. Although the results led to six factors, I condensed these to two because of the overlap between two sets of the new factors. The following two factors shaped the meaning of student-centered teaching style for the rest of the study: (a) personalized or adaptive learning and (b) collaborative learning. Student-centered teachers exhibited the personalized or adaptive learning factors by using strategies that relied on students' individual abilities and prior knowledge to encourage students to ask questions that

would lead to new understandings at their own paces. Teachers encouraged collaborative participation by fostering activities where students worked together to explore, evaluate, and problem solve the elements of the content. Student-centered teachers nurtured the flexibility for individualized development by using what they learned about individual students' needs and objectives to facilitate an adjustable learning environment.

The moderating effects of teaching style indicated that PU was the most important acceptance factor for teachers practicing a teacher-centered teaching style. These teachers might deem a technology useful (and, implicitly, easy to use) in general, therefore deciding to use it for teaching. In other words, for teacher-centered teachers, using technology seemed to derive from a generic cost-benefit analysis, which hardly considered individual student characteristics. In this sense, the technology acceptance of teacher-centered teachers was well described by the TAM; conversely, teachers practicing a student-centered teaching style might look at technology more from the student perspective. Thus, they might regard PEU and other technology affordances (not examined here) useful only for certain students and in specific situations. Thus, their decisions to use technology for teaching might be more complex, hence less accurately described by the TAM.

Although not significantly, TAM did show that teachers practicing a student-centered teaching style used Edmodo more often. Therefore, because of the purpose of Edmodo, their students most likely used Edmodo more than students of teacher-centered teachers. I would argue that student-centered teachers and their students would use any available technology more often.

I did not find a strong significant positive relationship between experience and TAM variables. The moderating effects of teachers' experiences were consistent with the moderating effects of teaching styles, such that teaching experiences within the U.S. culture might encompass a more teacher-centered teaching style. Therefore, this effect might result in teachers choosing easy-to-use educational technologies in classrooms.

The findings of this study indicated that ZCPS still had a problem that must be addressed. The finding that 95.5% of the participating teachers scored themselves as having teacher-centered teaching styles in the sense of Conti (1989) supported the AdvancEd report (2013, 2018), which I used as evidence of the county's problem. I found that no significant relationship between how teachers of different teaching styles use Edmodo in the classroom.

Conclusion

Teachers' traditional teacher-centered use of technology was a problem in the schools of this suburban county. Despite having access to new educational technologies, such as the LMS of Edmodo, teachers did not use those more effective student-centered instructional practices. By exploring the relationship between teaching styles and teachers' acceptance of Edmodo, the findings of this study might develop important positive social change.

The presented findings indicated that the use of educational technology in schools was best supported by fostering a student-centered teaching style, which was mainly defined by adaptive teaching, collaborative participation, and the flexibility for individualized development. These findings led to the following two possible project

options: a professional development training for student-centered teaching strategies or a policy recommendation that fostered the use of the student-centered teaching style by all teachers.

In the next section, I explain the project to provide teachers with information, activities, and resources to help them better implement technology use in their classrooms. In addition to discussing the purpose and rationale for the project, I provide a review of literature for some background and context. Additionally, I provide a detailed description of project and discuss the evaluation of the project.

Section 3: The Project

Introduction

Based on the findings provided in the previous section, the creation of a county-wide policy that would facilitate the teachers' use of e-learning tools in their classrooms would be most beneficial. First, I aimed to make clear the expectation of teachers to use student-centered instructional practices. Second, I developed the policy to leverage the capabilities of the e-learning solutions in the teachers' implementations of student-centered instructional practices. Last, I developed the policy to provide the expected frequency for using student-centered e-learning tools in classrooms.

In the next section, I explain the project aimed at providing teachers with information, activities, and resources to help them better implement technology use in their classrooms. In addition to discussing the purpose and rationale for the project, I provide a review of literature for background and context. Additionally, I provide a detailed description of project and discuss the evaluation of the project.

Rationale

As stated in Section 1, current researchers have recommended that teachers should implement student-centered instructional practices. Elmore and McLaughlin (1988) stated one of the reasons for reform was that a change occurred in professionals' understandings of effective practices. A need for policies existed that reflected the expectation of teachers' student-centered use of technology.

I found that more than 55% of teachers from the three participating high schools registered as teacher-centered, and there was no significant difference in how the two

groups of teachers used Edmodo. Leaders of ZCPS need a policy to address teachers' instructional uses of technology because they currently do not have one. The one technology-related policy in the *Employee Handbook* is too general and does not touch the instructional use of technology, nor the student-centered use of technology. The policy acknowledges that technology offers a diversity of instructional resources, and then informs employees that technology must be used to support their assigned job responsibilities, there should be no expectations of privacy, and they should refer to the Internet for the acceptable use policy, which is not in the handbook (ZCPS, 2017).

I rationalized selecting to write a policy recommendation based on the need for a solution to the problem. As a researcher, I witnessed the problems with the ineffective use of instructional technology and the continued use of the teacher-centered teaching style. At the time of this study, I was a teacher who had personally seen this problem; as suggested by Heineke, Ryan, and Tocci (2015), I believed it important that I should offer a policy to correct the problem.

Based on the county's 2017 academic achievement plan, evidence has indicated that ZCPS wants to improve teachers' instructional uses of technology. The plan identifies technology as an instructional tool and states that it should be used effectively for teaching and learning. The plan also establishes some expectations that include how teachers and students should use technology. The expectations and goals explained in the plan coincide with characteristics of effective uses of technology and the student-centered teaching style (ZCPS, 2017). Leaders of the county need rules and guideline that

establish the county's mandates for teachers' student-centered instructional uses of technology.

Review of the Literature

In the following review of the literature, I define policy, explain the importance of school policies, and explore ways to develop and write technology policies. I also provide more details on the characteristics of the student-center teaching style. I found the sources through the Walden University Library using the Academic Search Complete, eBook Collection (EBSCOhost), Education Commission of the States, Education Research Starters, Education Source, ERIC, ProQuest Central, Teacher Reference Center, SAGE Journals, and Taylor and Francis Online databases to search for peer-reviewed articles. I used the following search keywords used to address the policy component of this section: *educational policy*, *school policies*, *policy writing*, *policy reform*, *policy implementation*, *policy evaluations*, and *technology policy*. To address the student-centered instructional approaches components of this section, I used the following search terms: *student-centered strategies/methods*, *personalized learning*, *adaptive learning*, *collaboration*, *problem-based learning*, *project-based learning*, and *flipped-classroom*.

Policy

Haddad and Demsky (1995) defined *policy* as groups making decisions that could establish directives to offer guidance for future actions or the implementation of previous decisions (p. 18). Leaders create policies to guide the day-to-day management of an institution. Kyriakides, Creemers, Antoniou, Demetriou, and Charalambous (2015) defined a policy as a "principle of action adopted or proposed by an organization or

individual" (p. 113). Leaders of policies provide schools with guidelines that all stakeholder should follow to facilitate student learning. Leaders of policies explain what all stakeholders should do within and outside of classrooms. School policies connect the vision and the goals to in-house procedures (Kyriakides et al., 2015). Policies refer to the authoritative decisions that explain an organization's principals of education, the duties of the staff, the finances of the system, and the guidelines for operating it effectively and fairly (Elmore & McLaughlin, 1988). Furthermore, school policies set the circumstances of effective administration and practice (Elmore & McLaughlin, 1988).

Effective policy is built on the foundation of past policies, the school's mission, and the current issues that must be addressed. In clear language, school policy should provide definitions of terms and consensus of stakeholders (Brewer & Lakin 2018). Regarding school policies, one should consider three elements. Policies must clearly indicate the responsibilities of all stakeholders, the skillfulness and willingness of the stakeholders, and ways that their efforts will be supported by the schools' leadership team (Kyriakides et al., 2015).

When writing school technology policies, Calhoun (2012) defined the policy as written to address wanted human behaviors and not for technology use; whether the technology was software, hardware, or an application, it would change. Therefore, leaders should write policies to address the desired human behaviors; instead of writing a policy addressing a specific social networking application or cell phone use, leaders could write policies about appropriate communications between staff and students or about appropriate classroom behavior. Policies must clearly indicate the professional

behavioral standards for teachers and staff, regardless of what technologies exist today or tomorrow.

Student-Centered Characteristics and Methods

The technology plan and other documents for ZCPS encouraged the use of technology, such as the use of the LMS of Edmodo, which established a foundational support for blended learning. The use of in-class and online instructional practices could improve teaching and learning. Oliver and Stallings (2014) listed several authors who observed that blended learning was especially appropriate for student-centered and collaborative learning strategies.

As stated in Section I, researchers have suggested that teachers should use technology-enhanced, student-centered pedagogies, rather than traditional teacher-centered approaches. As explained in Section 2, I found that personal, adaptive learning and collaboration were major characteristics of the student-centered teaching styles. These student-centered characteristics and two examples of methods (project/problem-based learning and flipped classroom) that embody these characteristics are examined in the rest of this section.

Personalized and adaptive learning. Personalized learning refers to an innovative (Paz-Albo, 2017) and popular teaching approach supported by the Race to the Top federal education policy and the Gates Foundation (Bingham, Pane, Steiner, & Hamilton, 2018). Personalized learning refers to an instructional design principle that requires teachers to tailor students' learning by considering their strengths, needs, and interests (Easley, 2017; Patrick, Worthen, Frost, & Gentz, 2016). Tienken (2018) defined

personalized learning as "designing and implementing lessons that connect the student to the content by incorporating student interests, passions, and needs" (p. 106). Personalized learning refers to an instructional approach that considers the academic and personal interests of students and provides both meaningful and relevant real-world learning experiences (Patrick et al., 2016). The U.S. DOE (2017) stated the following:

> Personalized learning refers to instruction in which the pace of learning and the instructional approach are optimized for the needs of each learner. Learning objectives, instructional approaches, and instructional content (and its sequencing) may all vary based on learner needs. In addition, learning activities are meaningful and relevant to learners, driven by their interests, and often self-initiated. (p. 9)

Students are active in the learning process, helping to decide what, how, when, and where they learn (Easley, 2017). With flexibility and personalization, students are more responsible for their own learning.

Personalization allows for understanding established by students' connections to prior knowledge. The concepts taught are placed in the contexts of students' interests. The acquisition of new ideas is easier for students when teachers have placed the new ideas in the contexts of the music, video games, or sports within which they have interest. For example, Walkington and Hayata (2017) stated teachers could present a lesson on ratios in contexts that interest their students. Therefore, teachers could educate about ratios using batting averages, likes per hour, or damages per second to incorporate

students' interests in sports, social media, and video games (Walkington & Hayata, 2017).

The U.S. DOE (2017) created the technology plans to encourage using technology to support innovative methods, such as personalized learning, to increase student achievement. The use of technology to power personalized learning makes the shift to student-centered learning a reachable goal (Bulger, 2016). With the advancements of technology, personal learning can be adaptive.

Adaptive learning refers to personalized learning powered by adaptive computer-based systems that make curriculum and instructional practices decisions based on student data (Roberts-Mahoney, Means, & Garrison, 2016). Adaptive learning systems take students' assessment results, the unique characteristics of students, and students' current statuses to plot a learning trajectory by determining what happens next (Y. Chen, Li, Liu, & Ying, 2018). A student's next step may be to watch a video lecture, do a practice assignment, or be moved to the next skill. The recommendation function is the major element of an adaptive learning system (Y. Chen et al., 2018). The adaptive learning systems platform gives students control over instructional methods, subject matters, and time (Dishon, 2017).

The algorithms in adaptive software can modify lessons according to students' academic performances, interests, and needs (Easley, 2017). Leaders of Netflix and Amazon have used similar technology to recommend movies and purchases (Bulger, 2016). Such algorithms can take students' demographical data (age, gender, and grade level), interests, and test performances to create a profile for each student (Bulger, 2016).

Based on students' profiles, teachers can make decisions about ways to best instruct students. Personalized adaptive learning systems can recommend and set a learning path for students (Bulger, 2016).

Collaborative learning. Student collaboration is another feature of a student-centered learning environment. For Borup (2016) and Retnowati, Ayres, and Sweller (2017), collaborative learning happens when two on more students learn while working together. Learning occurs as students interact with others as they work toward a goal (Retnowati et al., 2017). Charoenwet and Christensen (2016) stated that through a constructivist approach in collaborative learning, students' knowledge was enhanced, they developed ways to achieve solutions to complex problems, and there was an opportunity for free exchange of ideas. Active social interactions, group goals, and individual accountability are the required features of collaborative learning. Collaborative learning activities require students to construct individual knowledge and insights as they interactively use their problem-solving skills to develop an understanding of main concepts (Retnowati et al., 2017). The use of technology accelerates the capabilities of the collaboration process (Charoenwet & Christensen, 2016).

For instructors using blended learning methods, collaboration occurs in the classroom and online. In-class collaboration may involve group work, and collaborative online activities may involve participation in a discussion board or a group project. Whether an assignment is given in the classroom or online, it must fulfill a specific goal. In blended courses, researchers have linked student satisfaction to opportunities for communication and interaction (Oliver & Stallings, 2014).

Student participation in a discussion board involves students posting responses to discussion questions, and then commenting on the posting of at least two classmates. This process is usually a required part of online learning (Borup, 2016). The asynchronous discussion board allows students to post based on convenience. Retnowati et al. (2017) found that collaborative learning had significant academic benefits over students who worked individually, and it provided students with better outcomes in math. Teachers have found that collaborative learning can be an impactful tool for enhancing students' overall success (Litts, Kafai, & Dieckmeyer, 2015). Students learn from peers of diverse backgrounds, and some students have found their voices as the groups tackled problem-solving, completed tasks, and/or created products. The instructional method was also found to be helpful for struggling students (Litts et al., 2015).

Project-based learning and problem-based learning. Tienken (2018) defined project-based learning and problem-based learning as effective methods for implementing personalized learning and collaboration in Grades K-12. Dole et al. (2017) identified project-based learning and problem-based learning as teaching methods that cultivated personalized learning. Project-based learning and problem-based learning are similar; researchers have often used PBL as the acronym for both methods (MacMath, Sivia, & Britton, 2017). These are both student-centered pedagogical models characterized by a learning collaboration of students to address a problem or project. Moving forward, I use the acronym PBL for problem-based learning and PjBL for project-based learning (see Dole et al., 2017). I begin with a definition for both terms and summaries of some PBL and PjBL studies.

PBL refers to an instructional technique that requires students to apply prior knowledge and develop skills for problems they must investigate and solve as a group. Students work together to solve usually ill-structured problems; they work in small collaborative groups to formulate questions, gather information through investigation, and then do the work needed to resolve the problem (Merritt, Lee, Rillero, & Kinach, 2017). Remijan (2017) cited a source that listed the following as PBL's crucial actively engaging steps: (a) meet the problem, (b) identify needs, (c) define the problem, (d) gather and share information, (e) generate solutions and determine the best solution, and (f) present the best solutions.

The PBL teaching strategy is student driven and is effective for a wide range of learners, from beginners to advanced students (McConnell, Parker, & Eberhardt, 2016). Through the inquiry and problem-solving process, high school students can gain a deeper understanding of science (McConnell et al., 2016), math (Widyatiningtyas, Kusumah, Sumarmo, & Sabandar, 2015), geography (Caesar et al., 2016), and more.

A teacher's role in a PBL classroom moves from being the expert who presents content information to that of a facilitator who asks questions and offers resources to students. Teachers facilitate learning by guiding students through a collaborative process of analyzing a problem to find a solution (McConnell et al., 2016). Teachers must master their roles in assimilating information, safeguarding effective time-management, and ensuring student participation (Caesar et al., 2016).

PjBL is similar to PBL because both student-centered instructional techniques involve student collaboration and focus on students achieving shared goals or projects

(Holmes & Hwang, 2016; Kokotsaki, Menzies, & Wiggins, 2016; Savery, 2015). During PjBL lessons, students focus on the final product; in PBL lessons, they focus on the learning process (Kokotsaki et al., 2016). In PjBL, students work collaboratively to investigate meaningful real-world problems constructively by asking questions, participating in problem-solving activities, designing authentic solutions, and presenting final products. In addition, students set goals and do some work autonomously (Holmes & Hwang, 2016; Kokotsaki et al., 2016).

A key concept behind PjBL is that through real-world practice, meaningful learning occurs as students ask authentic questions of real-world problems (Kokotsaki et al., 2016). Dell'Aringa and Fick (2015) provided the following illustration: Students participating in a PjBL science lesson acted as if they were scientists as they solved relevant, real-world problems. The more students took part in the PjBL process, the more comfortable they became acting like scientists, and they began to think and ask questions like scientists (Dell'Aringa & Fick, 2015). By solving real-world problems, students can construct knowledge. The PjBL process involves thorough asking and refining questions; designing and conducting investigations; gathering, analyzing, and interpreting information and data; drawing conclusions; and reporting findings (Kokotsaki et al., 2016).

When engaged in the PjBL process, students must confront, investigate, and question the problem before they can collaboratively create and present the end product (Kokotsaki et al., 2016). Teachable moments are revealed as students question the problems that they encounter as they work toward following the guidelines for

completing the specified end product (Kokotsaki et al., 2016; Savery, 2015). Depending on the class, the end product may involve building a rocket or designing a website (Savery, 2015). Other possible artifacts include presenting a report, video, photographs, or sketches (Kokotsaki et al., 2016). The end product serves as an artifact of students' new knowledge. Teaching occurs as needed as students work on the project and ask questions. As they work collaboratively to reach a common goal, the teacher provides feedback and guidance (Savery, 2015).

PjBL refers to an instructional technique used in various courses (Holmes & Hwang, 2016). Researchers have found that the hands-on, collaborative technique builds problem-solving and critical thinking skills as students reach a deeper understanding of various concepts. PjBL motivates and challenges students to retain and apply learned knowledge (Holmes & Hwang, 2016). This technique is used in all phases of education, from elementary to college (Kokotsaki et al., 2016).

Benefits exist for students whose teachers use both the PBL and the PjBL instructional techniques. Teachers can use these techniques to challenge students to work in groups to learn how to implement practical applications to newly learned knowledge. Students learn the skills to define problems, investigate issues, and develop solutions to real-world complications.

Flipped classroom learning. The flipped classroom model refers to a blended or hybrid, student-centered pedagogical approach where the typical in-class lecture occurs at home, and students complete homework at school (Clark, 2015; Gough, DeJong, Grundmeyer, & Baron, 2017). In this model, direct instruction is homework. Direct

instruction usually involves watching lecture videos that the teacher has recorded (Sams & Bergman, 2013; Gough et al., 2017) or videos from other sources (L. I. Chen, 2016). When watching videos at home or whenever, students can rewind, pause, and rewatch the lectures as needed (Sams & Bergman, 2013; Gough et al., 2017). Teachers usually post lecture videos online or create podcasts for students (Snyder, Paska, & Besozzi, 2014). In addition to watching lectures, teachers may require students take notes (Sams & Bergman, 2013), complete reading assignments (L. I. Chen, 2016), and participate in interactive lessons (Tucker, 2012). The at-home assignments prepare students for those in-class activities.

Moving direct instruction to the home allows for more time for in-class active learning activities and creates a student-centered environment (Gough et al., 2017). Therefore, classes are transformed into a "place to work through problems, advance concepts, and engage in collaborative learning" (Tucker, 2012, p. 82). In this emerging instructional model, the classroom becomes a space for application and collaboration with a focus on student understanding (L. I. Chen, 2016). By utilizing active learning activities, students are no longer passive, and they developing higher order thinking skills (Sams & Bergman, 2013; Gough et al., 2017). In a flipped classroom, teachers' interactions with students increase, and they can help struggling students; teachers can better able respond to discipline issues that may arise (Gough et al., 2017). The in-class active learning activities of a flipped classroom open opportunities for collaborative learning among the students (Sams & Bergman, 2013; Gough et al., 2017). The flip opens class-time to more opportunities for group discussions and for practicing skills (L. I.

Chen, 2016; Tomory & Watson, 2015). In the extra time to practice skills, teachers can provide students with immediate feedback (L. I. Chen, 2016).

Sams and Bergman (2013) offered a three-part agenda for an in-class session of a flipped classroom. The session begins with a warm-up activity. After 5 minutes, 10 minutes is spent answering students' questions about the previous night's video. During this time, teachers can address misconceptions and identify video lecture issues that need improving. Guided and independent practice and/or a lab activity occurs in the last 75 minutes. On a 90-minute block schedule, Sams and Bergman (2013) could sometimes fit in more than one activity. These activities may include a hands-on activity, a directed problem-solving activity, an inquiry activity, a test, or a lab. The flipped classroom's model removes the lecture from the agenda, thereby giving the teacher more to time to interact with and assist students.

Most researchers of flipped classrooms have focused on the college level. Limited research has focused on the Kindergarten through 12th grade level about the flipped classroom approach (Snyder et al., 2014). Gough et al. (2017) and Snyder et al. (2014) studied the flipped classroom approach at the high school level.

Besozzi, a social studies teacher in Albany, New York, started using the ScreenFlow software to create screencasts in 2009 to flip his ninth-grade class (Snyder et al., 2014). A screencast refers to the video recording of a computer screen and voiceover of a PowerPoint presentation. For the daily classes, the teacher posted two screencasts a week to YouTube for students to watch. Students used graphic organizers to take notes as they watched the screencasts. Snyder et al. (2014) explained Besozzi's longitudinal

action research where 194 of his 209 students completed a 17-question survey that asked students about the screencasts, features, and student-centered in-class activities. Students could also write in a comment. By the third year, 95% of students agreed the screencasts helped them learn, over 93% liked the pause and rewind features, and qualitative data supported quantitative data that over half the students like having more time for in-class student-centered activities. During the 3-year study, Besozzi recorded and posted a 30-minute downloadable podcast for exam review after student comments revealed that there were too many screencasts to watch to prepare for the state Regents exam and the final (as cited by Snyder et al., 2014).

Sucipto, Lilo, Efendi, Hanif, and Budiyanto (2017) examined how Edmodo, used in a flipped classroom, enhanced students' performance outcomes. One group of students got the conventional learning, and the other got the Edmodo flipped classroom. Sucipto et al. found that students of the Edmodo flipped group had better learning outcomes, and they performed better on tests compared to the conventional group.

Although research on the use of flipped classrooms in high schools was limited, it showed benefits of its implementation. By flipping classrooms, students can better gain content knowledge at their paces outside of classes and participate in more engaging, active, collaborative, student-centered, and personalized experiences in class. Flipped classrooms offer more time for group discussions, higher order thinking activities, practicing learned skills, and giving immediate feedback. Vaughan (2014) defined the flipped classroom approach as providing teachers with an effective way of encouraging an active and collaborative classroom.

Summary

Technology is key to today's student-centered pedagogical strategies. According to the U.S. DOE's (2017) technology plan, technology can quicken, magnify, and expand the influence of powerful principles of learning. The plan's authors argued that technology could improve and enhance learning by enabling personalized learning, organizing learning around practical strategies (e.g., PjBL), opening learning opportunities beyond the classroom, helping students explore their interests, and offering students transformative learning opportunities. Including the two approaches already explained, Table 9 lists 10 examples of student-centered use of technology.

The integration of e-learning tools, such as Edmodo, opens opportunities for learning in and outside of the classroom. Personalized learning does not depend on (Bulger, 2016) or require (Easley, 2017) technology, but it does make it easier. LMS helps the personalization process by teachers automating, tracking, and organizing classroom management tasks (Bulger, 2016). Edmodo makes collaboration possible outside of the classroom.

Table 9

Examples of Student-Centered Use of Technology

Student-centered approach	References
Collaborative concept mapping	Chang et al. (2017)
Collaborative writing	Alkhataba, Abdul-Hamid, & Ibrahim (2018) Greenhow & Askari (2017)
Digital storytelling	Kim (2014)
Digitized literature	Marlatt (2018)
ePortfolio	Soare (2014)
Flipped classroom	Snyder et al. (2014)
Gaming (concept mapping & teaching narrative)	Roscoe, Segedy, Sulcer, Jeong, & Biswas (2013)
Jigsaw and guided inquiry	Bialangi, Zubaidah, Amin, & Gofur (2016)
Multimodal writing process	Edwards-Groves (2012)
Project-based learning and problem-based learning	Dole et al. (2017)

Teachers can use Edmodo to assign students to groups, and then Edmodo facilitates peer-to-peer collaboration through discussions, inquiries, and reflections (Wendt & Rockinson-Szapkiw, 2014). Tambouris, Zotou, and Tarabanis (2014) noted that technology was needed to make some instructional strategies, such as PBL, available in a blended learning environment. Edmunds, Arshavsky, Glennie, Charles, and Rice (2017) observed students using technology for collaborative learning, researching, writing scripts, filming, and editing. Technology makes the flipped classroom possible in the research previously discussed. With technology, students can access instructional videos outside of class (Vaughan, 2014).

Informed by the review of the literature and the findings of my study, I developed a policy recommendation to address teachers' teaching styles and their instructional uses of technology. The implementation of a policy that mandates and sets the expectations for teachers student-centered instructional use of technology would ensure progress toward

solving the problem of teachers' outdated teacher-centered instructional uses of technology. The policy addressed teachers' teaching style and their uses of technology.

Project Description

I aimed to establish policies that would eradicate the teachers' instructional uses of technology problem in ZCPS. There was a need to move teachers closer to implementing the recommended student-centered use of technology into their instructional practices. The project involved developing a policy recommendation to address how ZCPS teachers should use technologies, such as Edmodo, in their classrooms. The recommended actions established a policy to mandate that teachers should use instructional techniques that foster personalized, adaptive learning and student collaboration. I addressed how and how much technologies should be used, policy implementation goals, and the evaluation of the policy for effectiveness.

The formal policy recommendation provided readers with a policy description, the scope, definitions of key terms, and recommendation. The recommendation detailed the mandates, provided examples of strategies for the student-centered use of technology, and explained the roles of key stakeholders (e.g., teachers, principals, and the information technology department; see Appendix A for the formal policy recommendation).

I made arrangements to present this recommendation to the ZCPS's Board of Education. The protocol for requesting to getting on the agenda involved me calling the board's executive assistant or me signing up on a list before a board meeting. I called to get on the agenda for the upcoming fall of 2018 session.

Potential Barriers

There was a need to change teachers' teaching styles and how they use technology. The only foreseen barriers to the rules and guidelines of this policy recommendation were those who resist change. Those who do not want change can be convinced of the need for change by referring them to the 2013 AdvancEd *External Review*. ZCPS's classroom use of technology was rated at 1.62 on a 4-point scale; the high school instruction was found to be mainly teacher-centered; and the students' uses of technology lacked rigor and creative, independent inquiry (AdvancEd, 2013).

Proposal for Implementation

To ensure a smooth implementation of the proposed instructional changes, communication and professional development is needed before teachers can follow the policy's mandates. This process can be completed by leaders mandating that the policy begin at the start of a semester. Teachers should receive notice of the upcoming changes as soon as possible. That notice should include resources, such as online videos and webinars that will make the transition easier. Mandatory professional development should occur during preplanning. In addition to modeling the student-centered use of LMS and other e-learning tools, the professional development should provide teachers with practical applications and a list of explained student-centered instructional approaches.

Project Evaluation Plan

I developed this policy recommendation as a project to address ZCPS's problem. I created the policy recommendation to establish rules and guidelines for teachers'

instructional uses of technology. To appraise the implementation of this policy recommendation, leaders needed a method of evaluation. Researchers have used a goal-based evaluation to determine the degree to which the implements of the policy reaches its goals (Youker, Zielinski, Hunter, & Bayer, 2016). Teachers can submit lesson plans and in-class observations to provide evidence of goals being met.

To evaluate the extent to which teachers have implemented the rules and guidelines of this policy recommendation, leaders can review lesson plans. Lesson plans, submitted weekly by most teachers in the county, will provide documentation of the instructional strategies and e-learning devices used by teachers. Lesson plans provide a snapshot of the quality of planned instruction and strategies (Oliva, Mathers, & Laine, 2009).

Additional data can be collected using a classroom observation instrument. The instrument will measure the observable teacher skills (Oliva et al., 2009) used to implement a student-centered use of technology in the classroom. An evaluator can conduct an in-class observation or complete a video observation. As a common method of assessing teaching, classroom observations can provide feedback that may be otherwise missed (Zaare, 2013); these can enlighten conclusions about teachers to provide a realistic context for understanding them (Martinez, Taut, & Schaaf, 2016). Classroom observations are the method by which leaders evaluate most U.S. teachers (Martinez et al., 2016).

Key Stakeholders

High school teachers are key to the effective implementation of the directives spelled out in this recommendation and evaluation. However, they cannot do it alone. Teachers need the support of the staff at the school and district level. In addition to being responsible for nurturing and sustaining the professional growth of teachers, principals face the task of effectively implementing policies (Derrington & Campbell, 2015). ZCPS (2017) identified key personnel needed to facilitate the implementation of my recommendation in their action plan. Digital learning specialists, content coordinators, lead teachers, and site facilitators must prepare teachers for the student-centered instructional use of technology.

Project Implications

I aimed to improve how teachers in the county used technology in classrooms by developing a policy that mandated the student-centered use of technology. Given the benefits of better classroom use of technology by teachers and increased use of the student-centered teaching style discussed in Section 1, there were rewarding implications of this study and project. I could raise the academic outcomes of students who were more motivated and engaged in the learning process. Such a policy might improve students' performances on standardize tests, the graduation rates, and students' higher education opportunities.

ZCPS (2017) created a strategic improvement plan report that indicated the need for these improvements and explained plans to address these issues. ZCPS (2017) explained that students were below the state and national averages on the SAT, Advanced

Placement (AP), ACT, and Career Pathway assessment scores. ZCPS (2017) highlighted the over six years of graduation rate increases. According to the Frick (2018), the graduation rate for Georgia in 2017 was 80.6%. The graduation rate for ZCPS (2017) was just below 70%. The effects of implementing this policy recommendation would add to these positive outcomes.

The positive outcomes of this policy recommendation might be a great benefit to the county. The current economic disposition of the county is not good, as evident by the ZCPS website indicating that 94% of the county's schools are Title 1 schools. Therefore, most students qualify to receive free or reduced-priced school breakfast and lunch. Improving the education of the students of the county could lead to better jobs, larger tax bases, and more money for schools.

Conclusion

I aimed to improve how teachers in the county used technology in classrooms by developing a policy that mandated teachers' teaching styles and their uses of technology. Teachers must rely less on the teacher-centered instructional strategies and implement more student-centered techniques. As teachers begin to implement more student-centered techniques, they must improve their uses of technology. Teachers must do more to leverage the full capabilities of today's technology. Learning management systems, such as Edmodo and other e-learning tools, can improve the implementation of more student-centered instructional practices. With this understanding, this policy recommendation was presented. By mandating teachers' uses of technology and their instructional uses of

techniques that fostered personalized learning, adaptive learning, and student collaboration, ZCPS would move closer to correcting the problem at hand.

Section 4: Reflections and Conclusions

Project Strengths and Limitations

As I considered the entire process involved in producing a quality project, I identified one key strength of my research. I addressed a popular problem in research—how to improve ways that teachers used technology in the classroom. The policy recommendation provided a solution. Too often, researchers could face struggles when identifying problem after problem and not being prepared to focus on the development of tangible solutions to problems. Research with no tangible solutions would equate to endless frustration and dissatisfaction. Due to contributing to the solution to the problem that my original question posed, my confidence developed in my research and the topic that I selected.

For every strength, I identified weakness or opportunity for improvement. My research was limited because I only addressed a solution at the high school level. Teachers must introduce student-centered strategies to students early in their academic careers. In reality, children face excess technology use in their lives; therefore, teachers must tap into their potential by including student-centered strategies in the elementary curriculum plan. The same students will enter middle school, thereby making incorporation of student-centered tactics anticipated by the students and other stakeholders. Including the younger student population in a research project similar to this one may result in more complete data and outcomes with a broader scope.

Recommendations for Alternative Approaches

The problem identified was that teachers' instructional practices and their uses of technology was teacher centered. According to most research, the use of teacher-centered approaches was outdated and did not resonate with today's students. To investigate the problem, I surveyed teachers to discover their teaching styles and their acceptances and uses of Edmodo. The information provided supportive input to develop a policy recommendation. An alternative way of addressing the problem could have been to study barriers to using student-centered teaching styles. A more obvious alternative to addressing the problem could have been to survey students to gather their perceptions of what teaching styles teachers used in classrooms.

An alternative research design could have been used. The use of a qualitative or a mixed-method research design could have offered a different perspective of the current teaching situation in the classroom. Asking open-ended questions or conducting interviews and classroom observation would have provided a voice to the teachers and an image of current classroom practices that the scaled questions used could not convey. Additionally, only three high schools were included in the study. This research could have been expanded to include additional high schools in the district.

To provide a different solution to the local problem, an alternative project could have also been developed. One possible alternative would have been to design a professional development policy to train teachers on ways to implement a student-centered technology teaching style and instructional practice. Instead of a policy recommendation, a curriculum plan could have been created, which would provide an

example of how teachers could implement the student-centered instructional use of technology.

Scholarship, Project Development, Evaluation, Leadership, and Change

My scholarly exposure to research dated back to when, as a teenager, I assisted my mother with her coding on a computer that she brought home from campus. I vaguely recall entering 0s and 1s into the data analysis software, not fully realizing that those numbers shaped a portion of my mother's life work. I never imagined that I would be in a position to process data on the path toward completing unique research that involved the use of instructional technology. Little did I know then, but the act of serving as a research assistant might have developed into a fuller appreciation for the use of research in the development of solutions to problems that I would encounter in my career.

Even though work toward two master's degrees involved generation of a thesis, the research involved in pursuing my Doctor of Education demanded more. The number of sources necessary to support doctoral work far exceeded those needed to formulate my thesis. When searching for previous work to justify the initiation of my exploration in the area of teachers' acceptances of the student-centered use of Edmodo in the classroom, I found there had been little work done that reflected my research emphasis. Because historical examples were lacking, I faced the task of putting pieces of research results together, much like one would assemble pieces of an intricate puzzle. There were a few similar studies; however, the differences were significant enough that these caused me to take additional steps to merge together what had been done before and what I tried to bring together in this study. Pieces were made to fit together, but it took close observation

and attention to details of the study to show how results worked together for the advancement of using technology in the classroom.

I encountered another challenge once I reached the data analysis segment of my research. Because the original analysis did not bring results that were reliable, I eliminated select questions from the survey used to gather data. With the selected questions eliminated, I had to look at new or different ways of interpreting the data. This called for use of SPSS methods unfamiliar to me; instead, I conducted a main component analysis with Oblimin rotation to reduce the number of factors. I extracted the values using the Anderson-Rubin procedure, which I saved for further analysis. In the future, I may need to collaborate with someone to select the correct test to analyze data more efficiently.

I drew from my ability to think critically as related to seeing both the advantages and challenges that might be revealed during the act of introducing a revised way of approaching the use of Edmodo in the classroom. It is human nature to defend an idea or concept that a person may feel strongly about, but advanced research showed me the importance of thinking objectively, as opposed to thinking subjectively about classroom approaches. The successful use of Edmodo depended on the teachers' abilities to take ownership of the advantages of implementing assistive technology in the classroom, while acknowledging push-back from a generation who viewed instructional technology as restrictive at best.

Project development involves seeing a project through from inception to the finished product. In video production, I had tangible projects that I needed to develop or

produce. Professional development was more familiar to me based on my experiences. Therefore, professional development was the genre that I initially intended to use concerning my project. However, being encouraged to do a policy recommendation rather than designing professional development took me out of my comfort zone. The process made me think more about policies and how these affected teachers and other stakeholders.

Evaluation of my research required critical thinking about the whole process of my project. I had to think deeper about what I was doing and what influence that I desired my research to have on all stakeholders involved. Making sure what I stated in my project was measurable was the basis of being able to develop a meaningful evaluation. Only outcomes that were measurable could be evaluated for effectiveness and the degree to which these were practically applicable. By reflecting on the need for my research to begin with, I moved forward in the process of evaluating the outcomes, potential impact, and usefulness of my research.

When I started this research project, I restricted any thoughts about leadership to my department. During this process, I started considering leadership on a larger scale as a possibility for me, whether that be as a principal or by serving in a countywide role. The doctoral process should influence what I did in the classroom. My experience changed how I did things in the classroom due to some classes I took during this process. I took on a lot of the technology aspects that I learned through the process. I implemented strategies to deal with diversity.

As society moves forward into a world that works more closely with technology, I believe it is the responsibility of educators to introduce classroom use of student-centered technology to student and immerse students in an environment where the use of said technology is the norm, not the exception to a historical rule. Although teachers are on the front lines of implementation, the administration must be collaborators from the perspective of supporting the use of student-centered technology. With proper backing, teachers are permitted to be free when modernizing classrooms and making the learning experience one that will be memorable and impactful for all stakeholders, from the students, parents, and to those in leadership positions.

When counties and regions develop additional ways that student-centered technology can be used, I witnessed that the level of interest in learning and the desire to apply the knowledge and skills acquired in the classroom to real work settings increases. An example of this is when students travel to regional expos that feature technological advances being piloted for use in area classrooms. Visiting expos also push teachers to bring another level of learning to the classroom that has lasting effects on students. I found it encouraging to talk with students who, after completing high school, were motivated to continue their educations at college levels, and they reported that the use of student-centered technology helped them make smoother transitions to college classroom communities.

Reflection on Importance of the Work

I studied the student-centered use of technology in the classroom—Edmodo, an LMS, similar to Google Classroom, and used by several different school districts around

the country. Because different technologies are entrenched in everyday lives, society should use technology effectively in education. Leadership should take technologies that students are familiar with and leverage it to improve and enhance their academic journeys.

Teachers must implement the effective use of technology in the classroom. As a teacher, being able to use strategies and methods that personalize learning and use collaborative learning approaches are fundamental to achieving student success. Using this framework can also motivate students and encourage their active participation in the learning process. Problem-based learning, project-based learning, and flipped classrooms are among the ways that teachers can implement student-centered instructional techniques.

Implications, Applications, and Directions for Future Research

Considering the benefits of student-centered techniques, there is more student engagement, the students are motivated to learn and participate, and they use higher-level thinking skills. Therefore, students will have better academic performance in school, students will graduate on time, and more will be prepared for college and/or the workforce after graduation. A benefit to the local school district community is that graduates will most likely obtain higher paying jobs, which have an economic impact on the community. When society has more students graduating at a higher academic level, more students can enter STEM fields. Increased involvement in STEM fields can be a substantial boost to society because STEM jobs are in demand and are a driving force

behind advancements in the global arena as far as the future is concerned. This impact is more of an overall society benefit.

In education, students are the lifeblood of the community. Designing a program with students in mind is essential. Based on my findings, future research should include looking at the problem from the student's point of view. Using a qualitative design to gather their perception of what teaching styles their instructors were using in the classroom can broaden the perspective of the research and can contribute additional details in the policy or curriculum plan developed. Student input will prove to be vital in an effort to gain buy-in and ownership of the problem and active participation in the creation of a solution.

I focused on teachers' acceptances and uses of Edmodo. LMSs, such as Edmodo, are an important component of the instructional use of technology in classrooms. Technologies used in the classrooms may change based on which technologies are updated with innovations of adaptive, personalized learning. Because technology is always changing, there is a need to think beyond one particular e-learning solutions and address LMS as a whole.

Conclusion

My interest in the integration of instructional technology dated back to the beginning of my teaching career. In my teaching of video production, at some points, I had no resources. At other times, the resources I had were outdated. I found myself piecing educational materials and lessons together. I made the independent decision to

use the LMS to put all the resources together in one place to facilitate ready access. Two years later, leaders of ZCPS mandated Edmodo.

If I struggled to identify quality resources for my students, it made me wonder what other problems might exist concerning integrating technology into classrooms. As I searched and read documents on the website of ZCPS, I discovered that leaders of the accrediting agency found that high school teachers' uses of technology relied on outdated teaching styles. Teachers' styles and instructional practices were teacher centered.

Educators have used technology to improve student achievement. Student-centered instructional practices are characterized by active student participation, collaboration between classmates, and problem-solving activities. These attributes lead to engaged and motivated students who can practically apply higher level thinking skills.

After surveying teachers from three high schools, I originally found that two teachers' PALS score revealed that they had a student-centered teaching style, and 43 teachers' teaching style were teacher centered. These skewed results were not reliable; therefore, after a factor deduction, I reanalyzed data using a two-step cluster analysis. Further analysis indicated no significant differences existed between the student-centered teaching style cluster (n_1 = 20 participants) and Cluster 2 as the teacher-centered teaching style cluster (n_2 = 25 participants) regarding acceptance variables of teaching style on the TAM variables. No significant relationship occurred between teaching styles and teachers' actual use (AU) of Edmodo, but these data showed 50% of the teachers with a student-centered teaching style used Edmodo six or more times the previous month.

I developed a policy recommendation as a possible solution to the problem at hand. I recommended that leadership should place a policy in the teacher handbook to address teachers' instructional uses of technology. The policy should mandate that teachers would use student-centered approaches at least twice a week, and they should use technology to facilitate those approaches. All stakeholders should have responsibility for implementing the mandates of this policy.

Leveraging student-centered instructional use of technology may increase student achievement and graduation rates. Researchers defined a key component of student-centered learning as technology. Through problem-based and project-based learning and flipped classrooms, students may achieve high motivation and engagement levels. With technology, teachers can provide personal and adaptive learning to facilitate student collaboration, the two main characteristics of student-centered learning.

References

AdvancEd. (2013, April 13). *External report:* [redacted]. Retrieved from http://www.[redacted].us/administration/accountability/index.asp

AdvancEd. (2018, March 18-21). *AdvancED engagement review report: AdvancEd Performance Accreditation, results for* [redacted]. Retrieved from https://www[redacted]/common/pages/UserFile.aspx?fileId[redacted]

Ahmed, A. K. (2013). Teacher-centered versus learner-centered teaching style. *Journal of Global Business Management, 9*(1), 22-34. Retrieved from http://www.jgbm.org/

Alkhataba, E. H. A., Abdul-Hamid, S., & Ibrahim, B. (2018). Technology-supported online writing: an overview of six major web 2.0 tools for collaborative-online writing. *Arab World English Journal 9*(1), 433-446. doi:10.24093/awej/vol9no1.30

Allen, L. (2008). The technology implications of *A Nation at Risk*. *Phi Delta Kappan, 89*(8), 608-610. doi:10.1177/003172170808900817

Amarteifio, G. (2018). *Does your school have what it takes? Implementation of a bring your own device technology program*. Retrieved from https://conservancy.umn.edu/bitstream/handle/11299/201087/Amarteifio_umn_0130E_18935.pdf?sequence=1

An, Y. J., & Reigeluth, C. (2012). Creating technology-enhanced, learner-centered classrooms: K-12 teachers' beliefs, perceptions, barriers, and support needs. *Journal of Digital Learning in Teacher Education, 28*(2), 54-62. doi:10.1080/21532974.2011.10784681

Andersen, I. G., & Andersen, S. C. (2017). Student-centered instruction and academic achievement: Linking mechanisms of educational inequality to schools' instructional strategy. *British Journal of Sociology of Education, 38*(4), 533-550. doi:10.1080/01425692.2015.1093409

Anthony, A. B., & Clark, L. M. (2011). Examining dilemmas of practice associated with the integration of technology into mathematics classrooms serving urban Students. *Urban Education, 46*(6), 1300-1331. doi:10.1177/0042085911416015

Ash, K. (2010). U.S. ed-tech plan urges rethinking in K-12 schools. *Education Week, 29*(24), 1-3. Retrieved from http://www.edweek.org/info/about/

Aslan, S., & Reigeluth, C. M. (2016). Investigating "The coolest school in America": How technology is used in a learner-centered school. *Educational Technology Research and Development, 64*(6), 1107-1133. doi:10.1007/s11423-016-9450-9

Bakia, M., Means, B., Gallagher, L., Chen, E., & Jones, K. (2009). *Evaluation of the enhancing education through technology program: Final report*. Washington, DC: U.S. Department of Education.

Batsila, M., Tsihouridis, C., & Vavougios, D. (2014). Entering the web-2 Edmodo world to support learning: Tracing teachers' opinion after using it in their classes. *International Journal of Emerging Technologies in Learning, 9*(1), 53-60. doi:10.3991/ijet.v9i1.3018

Bialangi, M. S., Zubaidah, S., Amin, M., & Gofur, A. (2016). Development of students' social attitudes in biology classroom through jigsaw and guided inquiry. *Development, 1*(10), 1-7. Retrieved from http://www.academicjournal.in/

Bingham, A. J., Pane, J. F., Steiner, E. D., & Hamilton, L. S. (2018). Ahead of the curve: Implementation challenges in personalized learning school models. *Educational Policy, 32*(3), 454-489. doi:10.1177/0895904816637688

Blackwell, C. K., Lauricella, A. R., & Wartella, E. (2014). Factors influencing digital technology use in early childhood education. *Computers & Education, 77*, 82-90. doi:10.1016/j.compedu.2014.04.013

Blow, D., & McConnell, S. (2012). Classroom technology rollouts. *Leadership, 42*(2), 32-33. Retrieved from http://www.acsa.org

Borup, J. (2016). Teacher perceptions of learner-learner engagement at a cyber high school. *The International Review of Research in Open and Distributed Learning, 17*(3), 231-250. doi:10.19173/irrodl.v17i3.2361

Bozdogan, D., & Özen, R. (2014). Use of ICT technologies and factors affecting pre-service ELT teacher's perceived ICT self-efficacy. *Turkish Online Journal of Educational Technology, 13*(2), 186-196. Retrieved from http://www.tojet.net/

Brewer, P., & Lakin, M. B. (2018). Credit for prior learning: Putting standards for policy into place. *PLA Inside Out: An International Journal on Theory, Research and Practice in Prior Learning Assessment, 6,* 1-15. Retrieved from https://www.plaio.org/

Bulger, M. (2016). Personalized learning: The conversations we're not having. *Data and Society*, *22*. Retrieved from https://datasociety.net/pubs/ecl/Personalized Learning_primer_2016.pdf

Butcher, K. R., Leary, H., Foster, J., & Devaul, H. (2014). Facilitating teachers' thinking about pedagogy and technology with an online curriculum planning tool. *Journal of Technology and Teacher Education, 22*(4), 423-447. Retrieved from http://www.aace.org

Bybee, R. W. (2011). Scientific and engineering practices in k-12 classrooms: Understanding "A framework for K-12 science education." *Science Scope, 35*(4), 6-11. Retrieved from https://www.nsta.org/middleschool/

Caesar, M. I. M., Jawawi, R., Matzin, R., Shahrill, M., Jaidin, J. H., & Mundia, L. (2016). The benefits of adopting a problem-based learning approach on students' learning developments in secondary geography lessons. *International Education Studies, 9*(2), 51-65. doi:10.5539/ies.v9n2p51

Calhoun, K. J. (2012). It's on the line: Tech policies that make sense. *Leadership, 42*(2), 12-14. Retrieved from http://www.acsa.org

Chang, C. C., Liu, G. Y., Chen, K. J., Huang, C. H., Lai, Y. M., & Yeh, T. K. (2017). The effects of a collaborative computer-based concept mapping strategy on geographic science performance in junior high school students. *Eurasia Journal of Mathematics, Science and Technology Education, 13*(8), 5049-5060. doi:10.12973/eurasia.2017.00981a

Charoenwet, S., & Christensen, A. (2016). The effect of Edmodo learning network on students' perception, self-regulated learning behaviors and learning performance. In N. Callaus, B Sanchez, A. Tremante, & F. Welsch (Eds.), *The 10th international multi-conference on society, cybernetics and informatics* (IMSCI) (pp. 297-300). Orlando, FL: International Institute of Informatics and Systemics.

Chen, L. l. (2016). Impacts of flipped classroom in high school health education. *Journal of Educational Technology Systems, 44*(4), 411-420. doi:10.1177/004723951 5626371

Chen, R. J. (2010). Investigating models for preservice teachers' use of technology to support student-centered learning. *Computers & Education, 55*(1), 32-42. doi:10.1016/j.compedu.2009.11.015

Chen, Y., Li, X., Liu, J., & Ying, Z. (2018). Recommendation system for adaptive learning. *Applied Psychological Measurement, 42*(1), 24-41. doi:10.1177/ 0146621617697959

Clark, K. R. (2015). The effects of the flipped model of instruction on student engagement and performance in the secondary mathematics classroom. *Journal of Educators Online, 12*(1), 91-115. doi:10.9743/jeo.2015.1.5

Combs, H. (2010). Instructional technology: Status in middle and high school social studies. *National Teacher Education Journal*, *3*(3), 23-31. Retrieved from https://ntejournal.com/

Conti, G. J. (1979). Principles of adult learning scale. In *Proceedings of the 20th annual adult education research conference* (pp. 164-169). Ann Arbor, MI: Adult Education.

Conti, G. J. (1982). The principles of adult learning scale. *Adult Literacy and Basic Education*, *6*, 135-147. Retrieved from https://www.learntechlib.org/j/ISSN-1934-2322/

Conti, G. J. (1983). *Analysis of scores on principles of adult learning scale for part-time faculty and recommendations for staff development activities* (Doctoral dissertation, Texas A&M University). Retrieved from https://eric.ed.gov/?id=ED235355

Conti, G. J. (1989). Assessing teaching style in continuing education. *New Directions for Adult and Continuing Education*, *43*, 3-16. Retrieved from https://onlinelibrary.wiley.com/journal/15360717

Conti, G. J. (2004). Identifying your teaching style. In M. W. Galbraith (Ed.), *Adult learning methods: A guide to effective instruction* (pp. 75-92). Malabar, FL: Krieger.

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Upper Saddle River, NJ: Pearson Education.

Dalsgaard, C. (2016). Students' educational use of Facebook groups. *Educational Media International, 53*(4), 261-273. doi:10.1080/09523987.2016.1254879

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340. doi:10.2307/249008

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1002. doi:10.1287/mnsc.35.8.982

Dell'Aringa, A. P., & Fick, S. (2015, June), Supporting students to ask scientific questions in a biology project-based learning unit. In *Studies in teaching 2015 research digest: Action research projects presented at annual research forum* (pp. 49-54). Winston-Salem, NC: Wake Forest University.

Derrington, M. L., & Campbell, J. W. (2015). Principal concerns and superintendent support during teacher evaluation changes. *Editorial Review Board, 12*(3), 11-22. doi:10.1007/s10833-015-9244-6

De Smet, C., Bourgonjon, J., De Wever, B., Schellens, T., & Valcke, M. (2012). Researching instructional use and the technology acceptation of learning management systems by secondary school teachers. *Computers & Education, 58*(2), 688-696. doi:10.1016/j.compedu.2011.09.013

De Smet, C., Valcke, M., Schellens, T., De Wever, B., & Vanderlinde, R. (2016). A qualitative study on learning and teaching with learning paths in a learning management system. *Journal of Social Science Education, 15*(1), 27-37. doi:10.4119/UNIBI/jsse-v15-i1-1460

Dishon, G. (2017). New data, old tensions: Big data, personalized learning, and the challenges of progressive education. *Theory and Research in Education, 15*(3), 272-289. doi:10.1177/1477878517735233

Dole, S., Bloom, L., & Doss, K. K. (2017). Engaged learning: Impact of PBL and PjBL with elementary and middle grade students. *Interdisciplinary Journal of Problem-Based Learning, 11*(2), 9-11. doi:10.7771/1541-5015.1685

Drexler, W. (2010). The networked student model for construction of personal learning environments: Balancing teacher control and student autonomy. *Australasian Journal of Educational Technology*, *26*(3), 369-385. doi:10.14742/ajet.1081

Easley, M. (2017). Personalized learning environments and effective school library programs. *Knowledge Quest, 45*(4), 16-23. Retrieved from http://knowledgequest.aasl.org/

Edmodo. (n.d.). *Connect with students and parents in your paperless classroom*. Retrieved May 10, 2016 from https://www.edmodo.com/

Edmunds, J., Arshavsky, N., Glennie, E., Charles, K., & Rice, O. (2017). The relationship between project-based learning and rigor in STEM-focused high schools. *Interdisciplinary Journal of Problem-Based Learning, 11*(1), 1-22. doi:10.7771/1541-5015.1618

Edwards-Groves, C. (2012). Interactive creative technologies: Changing learning practices and pedagogies in the writing classroom. *Australian Journal of Language & Literacy, 35*(1), 99-113. Retrieved from https://www.alea.edu.au/resources/australian-journal-of-language-and-literacy-ajll-2

E-learning. (n.d.) In *Oxford English Dictionary*. Retrieved from http://www.oed.com

Elmore, R. F., & McLaughlin, M. W. (1988). *Steady work. Policy, practice, and the reform of American education*. Santa Monica, CA: The RAND Corporation-Publications Department.

Eronen, L., & Kärnä, E. (2018). Students acquiring expertise through student-centered learning in mathematics lessons. *Scandinavian Journal of Educational Research, 62*(5), 682-700. doi:10.1080/00313831.2017.1306797

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education, 42*(3), 255-284. doi:10.1080/15391523.2010.10782551

Evans, R., & Kilinc, E. (2013). Creating 21st century learners: Edmodo in the social studies classroom. In R. McBride & M. Searson (Eds.), *Proceedings of Society for Information Technology, & Teacher Education International Conference 2013* (pp. 4965-4970). Chesapeake, VA: Association for the Advancement of Computing in Education.

Fathema, N., Shannon, D., & Ross, M. (2015). Expanding the technology acceptance model (TAM) to examine faculty use of learning management systems (LMSs) in higher education institutions. *Journal of Online Learning & Teaching, 11*(2) 210-232. Retrieved from http://jolt.merlot.org/

Frick, M. (2018, September 9). *Georgia's graduation rate rises to all-time high*. Retrieved from Georgia Department of Education website: https://www.gadoe.org/External-Affairs-and-Policy/communications/Pages/PressReleaseDetails.aspx?PressView=default&pid=644

Friedrich, H. F., & Hron, A. (2011). Factors affecting teachers' student-centered classroom computer use. *Educational Media International, 48*(4), 273-285. doi:10.1080/09523987.2011.632276

Garner, J., & Stokes, R. R. (2015). We've cast a pebble! *English in Texas, 45*(2), 27-32. Retrieved from http://www.tctela.org/english-in-texas

Gautreau, C. (2011). Motivational factors affecting the integration of a learning management system by faculty. *Journal of Educators Online, 8*(1), 20-28. Retrieved from http://www.thejeo.com

Georgia Department of Education. (2012, August). *2011-12 Annual District Technology Inventory Survey - (631)*. Retrieved from http://www.gadoe.org/_layouts/TechInventoryDashboard/AdminID_11/DistrictReport_37523.pdf

Gibeault, M. J. (2018). Organization of materials and accessing the library in blackboard: A learner-centered usability study. *Journal of Academic Librarianship, 44*(2), 190-195. doi:10.1016/j.acalib.2018.02.008

Glowa, L., & Goodell, J. (2016). *Student-centered learning: Functional requirements for integrated systems to optimize learning*. Vienna, VA: International Association for K-12 Online Learning.

Gokcearslan, S. (2017). Perspectives of students on acceptance of tablets and self-directed learning with technology. *Contemporary Educational Technology, 8*(1), 40-55. Retrieved from http://www.cedtech.net

Gough, E., DeJong, D., Grundmeyer, T., & Baron, M. (2017). K-12 teacher perceptions regarding the flipped classroom model for teaching and learning. *Journal of Educational Technology Systems, 45*(3), 390-423. doi:10.1177/004723 9516658444

Grasha, A. F. (1994). A matter of style: The teacher as expert, formal authority, personal model, facilitator, and delegator. *College Teaching, 42*(4), 142-149. doi:10.1080/ 87567555.1994.9926845

Gravani, M. N., & Karagiorgi, Y. (2014). Underpinning principles of adult learning in face-to-face (f2f) meetings employed by distance-teaching universities. *Journal of Adult and Continuing Education, 20*(1), 53-67. doi:10.7227/JACE.20.1.4

Gray, L., Thomas, N., & Lewis, L. (2010). *Teachers' use of educational technology in US public schools* (NCES 2010-040). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Greenhow, C., & Askari, E. (2017). Learning and teaching with social network sites: A decade of research in K-12 related education. *Education and Information Technologies, 22*(2), 623-645. doi:10.1007/s10639-015-9446-9

Haddad, W. D., & Demsky, T. (1995). *Education policy-planning process: An applied framework. Fundamentals of educational planning 51*. Paris, France: United Nations Educational, Scientific and Cultural Organization.

Han, T., & Okatan, S. (2016). High school students' attitudes and experiences in EFL classrooms equipped with interactive whiteboards. *GiST Education and Learning Research Journal,* (13), 148-165. doi:10.26817/16925777.317

Hawken, S. (2016, June). Applied learning in the senior years of high school–a systemic approach in the state of Victoria, Australia. In *The future of education Pixel conference proceedings* (6th ed, pp. 365-370). Florence, Italy: Libreriauniversitaria.it Edizioni.

Heineke, A. J., Ryan, A. M., & Tocci, C. (2015). Teaching, learning, and leading: Preparing teachers as educational policy actors. *Journal of Teacher Education, 66*(4), 382-394. doi:10.1177/0022487115592031

Heystek, J., & Terhoven, R. (2015). Motivation as critical factor for teacher development in contextually challenging underperforming schools in South Africa. *Professional Development in Education, 41*(4), 624-639. doi:10.1080/19415257.2014.940628

Holden, H., & Rada, R. (2011). Understanding the influence of perceived usability and technology self-efficacy on teachers' technology acceptance. *Journal of Research on Technology in Education, 43*(4), 343-367. doi:10.1080/15391523.2011.10782576

Holmes, V. L., & Hwang, Y. (2016). Exploring the effects of project-based learning in secondary mathematics education. *Journal of Educational Research, 109*(5), 449-463. doi:10.1080/00220671.2014.979911

Horvat, A., Dobrota, M., Krsmanovic, M., & Cudanov, M. (2015). Student perception of Moodle learning management system: A satisfaction and significance analysis. *Interactive Learning Environments, 23*(4), 515-527. doi:10.1080/10494820. 2013.788033

Huffling, L., Tomasek, T., Matthews, C., Benavides, A., Carlone, H., & Hegedus, T. (2014). Using mobile devices in field science. *Science Teacher, 81*(6), 35-40. doi:10.2505/4/tst14_081_06_35

Huntington, H., & Worrell, T. (2013). Information communication technologies in the classroom: Expanding TAM to examine instructor acceptance and use. *Journal of Educational Multimedia and Hypermedia*, *22*(2), 147-164. Retrieved from http://www.aace.org

Inan, F. A., & Lowther, D. L. (2010). Factors affecting technology integration in K-12 classrooms: A path model. *Educational Technology Research, & Development, 58*(2), 137-154. doi:10.1007/s11423-009-9132-y

International Society for Technology in Education. (2019). *ISTE standards for educators*. Retrieved from https://www.iste.org/standards/for-educators

Jeljeli, R., Alnaji, L., & Khazam, K. (2018). A comparison between Moodle, Facebook, and paper-based assessment tools. *International Journal of Emerging Technologies in Learning, 13*(5), 86-99. doi:10.3991/ijet.v13i05.8091

Jianjun, W., & Yixin, Z. (2010). Examining potentialities of handheld technology in students' academic attainments. *Educational Media International*, *47*(1), 57-67. doi:10.1080/09523981003654977

Kaur, G. (2011). Study and analysis of lecture model of teaching. *International Journal of Educational Planning and Administration, 1*(1), 9-13. Retrieved from https://www.ripublication.com/ijepa/

Keengwe, J., Onchwari, G., & Wachira, P. (2008). Computer technology integration and student learning: Barriers and promise. *Journal of Science Education and Technology, 17*(6), 560-565. doi:10.1007/s10956-008-9123-5

Kelly, H. (2014). A path analysis of educator perceptions of open educational resources using the technology acceptance model. *International Review of Research in Open, & Distance Learning*, *15*(2), 26-42. doi:10.19173/irrodl.v15i2.1715

Kim, S. (2014). Developing autonomous learning for oral proficiency using digital storytelling. *Language Learning & Technology, 18*(2), 20-35. Retrieved from https://www.lltjournal.org//

Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools, 19*(3), 267-277. doi:10.1177/1365480216659733

Kopcha, T. J. (2010). A systems-based approach to technology integration using mentoring and communities of practice. *Educational Technology Research and Development*, *58*(2), 175-190. doi:10.14742/ajet.1081

Kotrlik, J. W., & Redmann, D. H. (2009). Technology adoption for use in instruction by secondary technology education teachers. *Technology*, *21*(1). doi:10.21061/jte.v21i1.a.3

Kovačević, E., & Akbarov, A. (2016). The elusiveness of learner-centered teaching. *Interdisciplinary Description of Complex Systems*, *14*(2), 212-222. doi:0.7906/indecs.14.2.10

Kyriakides, L., Creemers, B. P., Antoniou, P., Demetriou, D., & Charalambous, C. Y. (2015). The impact of school policy and stakeholders' actions on student learning: A longitudinal study. *Learning & Instruction, 36,* 113-124. doi:10.1016/j.learninstruc.2015.01.004

Lee, D., Myers, R. D., & Reigeluth, C. M. (2016). The learner-centered paradigm of education. In *Instructional-design theories and models* (Vol. IV, pp. 21-48). New York, NY: Routledge.

Levin, B. B., & Schrum, L. (2013). Using systems thinking to leverage technology for school improvement: Lessons learned from award-winning secondary schools/districts. *Journal of Research on Technology in Education, 46*(1), 29-51. doi:10.1080/15391523.2013.10782612

Li, S., & Choi, T. (2014). Does social capital matter? A quantitative approach to examining technology infusion in schools. *Journal of Computer Assisted Learning*, *30*(1), 1-16. doi:10.1111/jcal.12010

Litts, B. K., Kafai, Y. B., & Dieckmeyer, E. (2015). Collaborative electronic textile designs by high school youth: Challenges and opportunities in connecting crafts, circuits, and code. In *The 2014 ACM SIGCHI fablearn conference on creativity and fabrication in education* (pp. 381-386). Stanford, CA: Association for Computing Machinery.

Liu, F., & Cavanaugh, C. (2012). Factors influencing student academic performance in online high school algebra. *Open Learning, 27*(2), 149-167. doi:10.1080/02680513.2012.678613

Lu, H. K., & Lin, P. C. (2012, April). Toward an extended behavioral intention model for e-learning: Using learning and teaching styles as individual differences. In *The 2012 2nd international conference on consumer electronics, communications and networks* (pp. 3673-3676). doi:10.1109/CECNet.2012.6202261

MacMath, S., Sivia, A., & Britton, V. (2017). Teacher perceptions of project based learning in the secondary classroom. *Alberta Journal of Educational Research, 63*(2), 175-192. Retrieved from http://ajer.journalhosting.ucalgary.ca/

Marlatt, R. (2018). Literary analysis using Minecraft: An Asian American youth crafts her literacy identity. *Journal of Adolescent & Adult Literacy, 62*(1), 55-66. doi:10.1002/jaal.747

Marks, A., Maytha, A. A., & Rietsema, K. (2016). Learning management systems: A shift toward learning and academic analytics. *International Journal of Emerging Technologies in Learning, 11*(4), 77-82. doi:10.3991/ijet.v11i04.5419

Martinez, F., Taut, S., & Schaaf, K. (2016). Classroom observation for evaluating and improving teaching: An international perspective. *Studies in Educational Evaluation, 49*, 15-29. doi:10.1016/j.stueduc.2016.03.002

Matusevich, M. N. (1995). *School reform: What role can technology play in a constructivist setting?* Retrieved from https://www.scribd.com/document/76926797/School-Reform

McCaskey, S. J., & Crowder, C. L. (2015). Reflection on one's own teaching style and learning strategy can affect the CTE classroom. *CTE Journal, 3*(1), 2-12. Retrieved from https://www.thectejournal.com/

McCombs, B. L., & Whisler, J. S. (1997). *The learner-centered classroom and school: Strategies for increasing student motivation and achievement*. San Francisco, CA: Jossey-Bass.

McConnell, T., Parker, J., & Eberhardt, J. (2016). *Problem-based learning in the life science classroom, K-12*. Arlington, VA: National Science Teachers Association.

McDougall, J., & Holden, H. (2017). The silence about oral presentation skills in distance and online education: New perspectives from an Australian university preparatory programme. *Open Learning, 32*(2), 163-176. doi:10.1080/02680513.2017.1316187

McKnight, K., O'Malley, K., Ruzic, R., Horsley, M. K., Franey, J. J., & Bassett, K. (2016). Teaching in a digital age: How educators use technology to improve student learning. *Journal of Research on Technology in Education, 48*(3), 194-211. doi:10.1080/15391523.2016.1175856

Means, B., & Olson, K. (1995,). *Technology's role in education reform, findings from a national study of innovating schools*. Menlo Park, CA: SRI International.

Merritt, J., Lee, M. Y., Rillero, P., & Kinach, B. M. (2017). Problem-based learning in K–8 mathematics and science education: A literature review. *Interdisciplinary Journal of Problem-Based Learning, 11*(2), 3.

Moeller, B., & Reitzes, T. (2011). *Integrating technology with student-centered learning*. Quincy, MA: Education Development Center, Nellie Mae Education Foundation.

Montrieux, H., Vanderlinde, R., Schellens, T., & De Marez, L. (2015). Teaching and learning with mobile technology: A qualitative explorative study about the introduction of tablet devices in secondary education. *PloS One, 10*(12). doi:10.1371/journal.pone.0144008

Morgan, A., Parr, B., & Fuhrman, N. (2011). Enhancing collaboration among math and career and technical education teachers: Is technology the answer? *Journal of Career and Technical Education, 26*(2), 77-89. doi:10.21061/jcte.v26i2.527

Nayak, A., & Parkar, S. R. (2015). How students learn: Principles of adult learning. In P. Bhuiyan, A. Supe, & N. Rege (Eds.) *The art of teaching medical students* (pp. 52-61) London, England : Elsevier.

No Child Left Behind Act of 2001, P.L. 107-110, 20 U.S.C. § 6319 (2002).

Oliva, M., Mathers, C., & Laine, S. (2009). Effective evaluation. *Principal Leadership, 9*(7), 16-21. Retrieved from https://principalsmonth.org/

Oliver, K., & Stallings, D. (2014). Preparing teachers for emerging blended learning environments. *Journal of Technology and Teacher Education, 22*(1), 57-81. Retrieved from https://www.aace.org/pubs/jtate/

Ottenbreit-Leftwich, A. T., Glazewski, K. D., Newby, T. J., & Ertmer, P. A. (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers, & Education*, *55*(3), 1321-1335. doi:10.1016/j.compedu.2010.06.002

Patrick, S., Worthen, M., Frost, D., & Gentz, S. (2016). *Promising state policies for personalized learning*. Vienna, VA: International Association for K-12 Online Learning.

Paz-Albo, J. (2017). Is personalized learning the future of school? *Childhood Education, 93*(4), 295-299. doi:10.1080/00094056.2017.1343581

Pellas, N. (2014). The development of a virtual learning platform for teaching concurrent programming languages in the secondary education: The use of Open Sim and Scratch4OS. *Journal of e-Learning and Knowledge Society, 10*(1). Retrieved from https://www.learntechlib.org/p/148264/

Peña, R. H., Mundy, M.-A., Kupczynski, L., & Ruiz, A. (2018). Low SES high school per pupil allocation and its effect on achievement. *Journal of Instructional Pedagogies, 21,* 1-14. Retrieved from http://www.aabri.com

Peng-Chun, L., Hsin-Ke, L., & Shu-Mei, F. (2014). Exploring the impact of perceived teaching style on behavioral intention toward Moodle reading system. *International Journal of Emerging Technologies in Learning*, *9*(3), 64-67. doi:10.3991/ijet.v9i3.3500

Peters, E. E. (2010). Shifting to a student-centered science classroom: An exploration of teacher and student changes in perceptions and practices. *Journal of Science Teacher Education*, *21*(3), 329-349. doi:10.1007/s10972-009-9178-z

Piaget, J. (1964). Part I: Cognitive development in children: Piaget development and learning. *Journal of Research in Science Teaching*, *2*(3), 176-186. doi:10.1002/tea.3660020306

Pierce, C. A. (2017). Research-based integrated reading and writing course development. *Journal of Developmental Education, 40*(2), 23-25. Retrieved from http://ncde.appstate.edu/publications

Powell, A., Watson, J., Staley, P., Patrick, S., Horn, M., Fetzer, L., . . . Verma, S. (2015). *Blending learning: The evolution of online and face-to-face education from 2008-2015. Promising practices in blended and online learning series*. Vienna, VA: International Association for K-12 Online Learning.

Project Tomorrow. (2010). *Unleashing the future: Educators "speak up" about the use of emerging technologies for learning*. Irvine, CA: Author.

Project Tomorrow. (2012). *Personalizing the classroom experience: Teachers, librarians and administrators connect the dots with digital learning*. Irvine, CA: Author.

Project Tomorrow, & Dreambox, L. (2012). *Leveraging intelligent adaptive learning to personalize education: A special white paper based upon the speak up 2011 national findings.* Retrieved from https://files.eric.ed.gov/fulltext/ED536064.pdf

Reinhart, J. M., Thomas, E., & Toriskie, J. M. (2011). K-12 teachers: Technology use and the second level digital divide. *Journal of Instructional Psychology, 38*(3), 181-193. Retrieved from http://www.projectinnovation.biz/jip_2006.html

Remijan, K. W. (2017). Project-based learning and design-focused projects to motivate secondary mathematics students. *Interdisciplinary Journal of Problem-Based Learning, 11*(1), 1-10. doi:10.7771/1541-5015.1520

Retnowati, E., Ayres, P., & Sweller, J. (2017). Can collaborative learning improve the effectiveness of worked examples in learning mathematics? *Journal of Educational Psychology, 109*(5), 666-370. doi:10.1037/edu0000167

Richardson, J. W., Sales, G., & Sentocnik, S. (2015). Plans for embedding ICTs into teaching and learning through a large-scale secondary education reform in the country of Georgia. FIRE: *Forum for International Research in Education, 2*(1), 19-32. doi:10.18275/fire201502011047

Ritzhaupt, A. D., Dawson, K., & Cavanaugh, C. (2012). An investigation of factors influencing student use of technology in k-12 classrooms using path analysis. *Journal of Educational Computing Research, 46*(2), 229-254. doi:10.2190/EC.46.3.b

Robinson, K. (2016). The effect of technology integration on high school students' literacy achievement. *Teaching English with Technology, 16*(3), 3-16. Retrieved from http://www.tewtjournal.org/

Roscoe, R. D., Segedy, J. R., Sulcer, B., Jeong, H., & Biswas, G. (2013). Shallow strategy development in a teachable agent environment designed to support self-regulated learning. *Computers & Education, 62*, 286-297. doi:10.1016/ j.compedu.2012.11.008

Roberts-Mahoney, H., Means, A. J., & Garrison, M. J. (2016). Netflixing human capital development: Personalized learning technology and the corporatization of K-12 Education. *Journal of Education Policy, 31*(4), 405-420. doi:10.1080/02680939. 2015.1132774

Sams, A., & Bergmann, J. (2013). Flip your students' learning. *Educational Leadership, 70*(6), 16-20. Retrieved from http://www.ascd.org

Sanders, K. (2012). *An examination of the academic networking site Edmodo on student engagement and responsible learning* (Doctoral dissertation). Retrieved from ProQuest Dissertations, & Theses Global. (UMI No. 1038138655)

Savery, J. R. (2015). Overview of problem-based learning: Definitions and distinctions. In C. E. Hmelo-Silver & P. A. Ertmer (Eds.), *Essential readings in problem-based learning: Exploring and extending the legacy of Howard S. Barrows* (pp. 5-15). West Lafayette, IN: Purdue University Press.

Schmitt, C. (2002). *Technology in schools: Suggestions, tools, and guidelines for assessing technology in elementary and secondary education*. Washington, DC: U.S. Department of Education.

Shaw, L. H., Conti, G. J., & Shaw, B. S. (2013). Youth in transition: Are they adult learners? *Journal of Adult Education, 42*(2), 34-54. Retrieved fromhttps://www.mpaea.org/?page=publications

Shroff, R. H., Deneen, C. C., & Ng, E. W. (2011). Analysis of the technology acceptance model in examining students' behavioural intention to use an e-portfolio system. *Australasian Journal of Educational Technology, 27*(4), 600-618. doi:10.14742/ajet.940

Siemens, G., & Tittenberger, P. (2009). *Handbook of emerging technologies for learning*. Retrieved from http://www.bucks.edu/media/bcccmedialibrary/documents/academics/facultywebresources/Handbook_Emerging-Technologies.pdf

Simpson, T., & Park, S. (2013). The effect of technology-supported, student-centered instruction on seventh grade students' learning in English/language arts. In R. McBride & M. Searson (Eds.), *Proceedings of society for information technology, & teacher education international conference 2013* (pp. 2431-2439). Chesapeake, VA: Association for the Advancement of Computing in Education.

Singh, S., & Garg, A. (2015). A comparative study of holistic growth amongst student-centered and teacher centered learning institutions. *International Journal of Management, & Behavioural Sciences, 6*, 367-371. Retrieved from http://www.behavsci.ir/

Snyder, C., Paska, L. M., & Besozzi, D. (2014). Cast from the past: using screencasting in the social studies classroom. *The Social Studies, 105*(6), 310-314. doi:10.1080/00377996.2014.951472

Soare, E. (2014). Using the eportfolio to enhance teaching and learning. *ELearning & Software for Education, 1*(2), 460-463. doi:10.12753/2066-026X-14-126

Stefaniak, J. E., & Tracey, M. W. (2015). An exploration of student experiences with learner-centered instructional strategies. *Contemporary Educational Technology, 6*(2), 95-112. doi:10.1007/978-3-319-16504-2_4

Stobaugh, R. R., & Tassell, J. L. (2011). Analyzing the degree of technology use occurring pre-service teacher education. *Educational Assessment, Evaluation and Accountability, 23*(2), 143-157. doi:10.1007/s11092-011-9118-2

Su, H., Marinas, C., & Furner, J. (2011). Number sense made simple using number patterns. *International Journal for Technology in Mathematics Education, 18*(1), 39-49. Retrieved from http://www.researchinformation.co.uk/time.php

Sucipto, A., Lilo, T., Efendi, A., Hanif, H. N., & Budiyanto, C. (2017). The influence of learning management technology to student's learning outcome. *International Journal of Pedagogy and Teacher Education (IJPTE), 1*, 1-10. doi:10.20961/ijpte.v1i1.4606

Sumak, B., Heričko, M., & Pusnik, M. (2011). A meta-analysis of e-learning technology acceptance: The role of user types and e-learning technology types. *Computers in Human Behavior, 27*(6), 2067-2077. doi:10.1016/j.chb.2011.08.005

Tambouris, E., Zotou, M., & Tarabanis, K. (2014). Towards designing cognitively-enriched project-oriented courses within a blended problem-based learning context. *Education and Information Technologies, 19*(1), 61-86. doi:10.1007/s10639-012-9209-9

Tienken, C. H. (2018). Unstandardized and personalized. *Kappa Delta Pi Record, 54*(3), 106-108. doi:10.1080/00228958.2018.1481320

Tomory, A., & Watson, S. L. (2015). Flipped classrooms for advanced science courses. *Journal of Science Education and Technology, 24*(6), 875-887. doi:10.1007/s10956-015-9570-8

Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence. *Educational Technology Research and Development, 65*(3), 555-575. doi:10.1007/s11423-016-9481-2

Trust, T. (2017). Motivation, empowerment, and innovation: Teachers' beliefs about how participating in the Edmodo math subject community shapes teaching and learning. *Journal of Research on Technology in Education, 49*(1), 16-30. doi:10.1080/15391523.2017.1291317

Tucker, B. (2012). The flipped classroom: Online instruction at home frees class time for learning. *Education Next, 12*(1). Retrieved form https://www.educationnext.org/

Underwood, J. D. M., & Stiller, J. (2014). Does knowing lead to doing in the case of learning platforms? *Teachers & Teaching, 20*(2), 229-246. doi:10.1080/13540602.2013.848569

Ursavaş, Ö. F. (2013). Reconsidering the role of attitude in the TAM: An answer to Teo (2009), Nistor and Heymann (2010), and Lopez-Bonilla and Lopez-Bonilla (2011). *British Journal of Educational Technology*, *44*(1), E22-E25. doi:10.1111/j.1467-8535.2012.01327.x

U.S. Department of Education. (2010). *Transforming American education learning powered by technology: National education technology plan 2010*. Washington, DC: Author.

U.S. Department of Education. (2017). *Reimagining the role of technology in education: 2017 National Education Technology Plan update*. Washington, DC: Author.

Vajda, J., & Abbitt, J. T. (2011). Evaluation of teacher perceptions and potential of open office in a K-12 school district. *Computers in the Schools*, *28*(2), 117-139. doi:10.1080/07380569.2011.575752

Vaughan, M. (2014). Flipping the learning: An investigation into the use of the flipped classroom model in an introductory teaching course. *Education Research and Perspectives, 41*, 25-41. Retrieved from http://www.erpjournal.net/

Veletsianos, G. (2010). A definition of emerging technologies for education. In *Emerging technologies in distance education* (Vol. 1, pp. 3-22). Edmonton, Alberta: Athabasca University Press.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*, 425-478. doi:10.2307/30036540

Wang, S. K., & Hsu, H. Y. (2017). A design-based research capturing science teachers' practices of information and communication technologies (ICTs) integration using the new literacy framework. *Journal of Computers in Mathematics & Science Teaching*, *36*(4), 387-396. Retrieved from https://www.learntechlib.org/primary/p/178282/

Walkington, C., & Hayata, C. A. (2017). Designing learning personalized to students' interests: Balancing rich experiences with mathematical goals. *Zentralblatt für Didaktik der Mathemati, 49*(4), 519-530. doi:10.1007/s11858-017-0842-z

Watson, S., & Watson, W. R. (2011). The role of technology and computer-based instruction in a disadvantaged alternative school's culture of learning. *Computers in the Schools, 28*(1), 39-55. doi:10.1080/07380569.2011.552042

Watson, W. R., Watson, S. L., & Reigeluth, C. M. (2015). Education 3.0: Breaking the mold with technology. *Interactive Learning Environments, 23*(3), 332-343. doi:10.1080/10494820.2013.764322.

Wendt, J. L., & Rockinson-Szapkiw, A. (2014). The effect of online collaboration on middle school student science misconceptions as an aspect of science literacy. *Journal of Research in Science Teaching, 51*(9), 1103-1118. doi:10.1002/tea.21169

Widyatiningtyas, R., Kusumah, Y. S., Sumarmo, U., & Sabandar, J. (2015). The impact of problem-based learning approach to senior high school students' mathematics critical thinking ability. *Indonesian Mathematical Society Journal on Mathematics Education, 6*(2), 30-38. doi:10.22342/jme.6.2.2165.107-116

Youker, B. W., Zielinski, A., Hunter, O. C., & Bayer, N. (2016). Who needs goals? A case study of goal-free evaluation. *Journal of Multidisciplinary Evaluation, 12*(27), 27-43. Retrieved from http://journals.sfu.ca/jmde/

Zaare, M. (2013). An investigation into the effect of classroom observation on teaching methodology. *Procedia-Social and Behavioral Sciences, 70,* 605-614. doi:10.1016/j.sbspro.2013.01.099

Zhao, J., Fang, S., & Jin, P. (2018). Modeling and quantifying user acceptance of personalized business modes based on TAM, trust and attitude. *Sustainability, 10*(2), 356-360. doi:10.3390/su10020356

Zhao, Y. (2007). Social studies teachers' perspectives of technology integration. *Journal of Technology and Teacher Education, 15*(3), 311-333. Retrieved from http://www.aace.org

Zion County Public Schools. (2012a). *Three-year technology plan: July 1, 2012 – June 30, 2015.* Retrieved from http://www.[redacted]us/departments/technology/new/techplan/TechPlan2015.pdf

Zion County Public Schools. (2012b). *ZCPS strategic improvement plan 2012-2017.* Retrieved from http://www.[redacted].us

Zion County Public Schools. (2014). *Academic achievement plan: Version 2015.04.* Retrieved from http://www[redacted].us

Zion County Public Schools. (2017). *Academic achievement plan 2017.* Retrieved from http://www[redacted].us

Appendix A: Policy Recommendation

Teachers' Instructional Technology Use Policy

The purpose of the following policy recommendation is to establish rules and guidelines for ways that a county's teachers should use technology in their classrooms. I made the policy recommendation based on my study of ways that teachers from three of a county's high schools accepted and used Edmodo in the classroom. Before presenting my recommendation, I will share the problem, research design, instrument, analysis of data, and findings of my study. I will discuss the rationale, implementation, and evaluation of the recommendation, while providing some background and context by reviewing literature.

The Problem

As part of the county's reaccreditation process, the AdvancEd (2013) rated the digital learning environment at 1.62 on a 4-point scale. Observation teams used the effective learning environment observation tool (ELEOT) to determine how teachers and students used technology in the classroom (AdvancEd, 2013). AdvancEd (2013) reported that instruction was mainly teacher-centered, especially in secondary classrooms, and students' use of technology lacked rigor and creative, independent inquiry.

Results of the 2018 AdvancEd Engagement Review Report for Zion Public Schools (ZCPS; a pseudonym) indicated that the problem continues. The same learner-centric classroom observation tool, ELEOT, was used in both reports (AdvancEd, 2013, 2018). The digital learning environment rating increased to 1.86, and the active learning environment rating increased from 2.57 (AdvancEd, 2013) to 2.91 (AdvancEd, 2018).

Because capabilities of technology in classrooms have changed, teaching methods have not, and technology use continues as teacher-centered. For example, Blackwell, Lauricella, and Wartella (2014) posited little existed to confirm whether wide spread implementation of technology has occurred by U.S. teachers. Even with mobile technology and computers available, actual classroom use of technology is infrequent and limited to creating teaching tools, such as grade books, lesson plans, and presentations (Blackwell et al., 2014; Gray, Thomas, & Lewis, 2010).

Research Design and Question

I began with an understanding that today's technology was more available to schools and students, and technology was more powerful, mobile, and accessible. Other researchers recommended student-centered use of technology, but most teachers remained using teacher-centered teaching methods. Therefore, I investigated the relation between teachers' teaching styles (student-centered/teacher-centered) and their acceptances and uses for technology. The technology in question was the learning management systems (LMS), Edmodo.

I used a quantitative correlative design strategy. I asked teachers to complete a survey that employed the Principles of Adult Learning Scale (PALS) to determine their teaching styles and the technology acceptance model (TAM) to explain teachers' acceptances and uses of Edmodo. Forty-eight teachers from three of the county's high schools participated.

Against the background of the stated problem and the related literature review, I explored the following research questions (RQ):

RQ1: What is the relationship between teaching style, as measured by PALS, and suburban high school teachers' acceptance of Edmodo as modeled by TAM?

RQ2: What is the relationship between teaching experience and Edmodo acceptance as modeled by TAM?

Research Procedure

I will present a summary of my research procedure. I received approval of my IRB application, a provisional approval by Walden, on June 6, 2017. After which, I submitted a research review board application to the county; on August 24, 2017, it was approved with the condition that I received permission from the principals of the permitted high schools. I emailed letters to four high school principals requesting permission to conduct research. With permission granted from those three principals, I received the final Walden IRB approval on October 16, 2017.

I emailed the three high school principals the teacher invitation letters, which they then forwarded to all their teachers. The letters contained a link to the online survey. After 2 weeks, I asked principals to forward a reminder letter to all teachers. At the end of 3 weeks, I extended the survey time due to low participation numbers. I sent principals an extension letter, which they again forwarded to teachers. Data collection occurred from October 30, 2017 to December 18, 2017.

Data Analysis and Findings

As recommended by Conti (1989), calculating the indicators of teaching styles led to building disbalanced student-centered ($n_1 = 2$) versus teacher-centered ($n_2 = 43$) teaching style subgroups, which disabled any further planned statistical analysis. After

conducting a main component analysis with Oblimin rotation and Anderson-Rubin procedure, PALS questionnaire items were dropped, and two clusters were generated. Cluster 1 was the *student-centered teaching style* cluster (n_1 = 20 participants), and cluster 2 was the *teacher-centered teaching style* cluster (n_2 = 25 participants)

I determined no significant relationship existed between teaching style clusters and the TAM variables when tested using a one-way ANOVA. The implication w that teaching styles (student-centered or teacher-centered) did not have a relationship with the perceptions of the usefulness (PU), ease of use (PEU), attitude (A), or actual use (AU) of Edmodo. The moderating correlation with teaching style indicated PU was the most important acceptance factor for teachers practicing a teacher-centered teaching style. Conversely, teachers practicing a student-centered teaching style regarded PEU as most important. Although not at significant difference, a two-way contingency table analysis of the AU variables showed that 50% of the teachers with a student-centered teaching style used Edmodo six or more times the previous month, whereas 60% of the teacher-centered teachers used Edmodo three or less times in same time.

The findings of this study indicated support for the stated problem that ZCPS' high school teachers were teacher-centered in their instructional approaches and in how they used technology in their classrooms. Research and ZCPS' accrediting agency indicated teachers employed a more student-centered approach. Informed by the review of the literature and the findings of my study, I developed a policy recommendation to address the problem.

Policy Description

Ensuring that the instructional practices of educators of ZCPS remain with current research-based best practices is a paramount concern. The policy should address the documented problem of teachers' teacher-centered instructional use of technology. I documented that teachers continued to use an outdated teaching style that did not resonate with students. Therefore, I developed this policy to establish parameters for teachers' instructional use of technology. As endorsed by research, teachers should implement instructional practices that support the student-centered use of technology. This policy is meant to complement existing federal, state, and local laws and other ZCPS policies.

Definition of Terms

Terms used in this policy may be unfamiliar to some readers; therefore, the following presents definitions to terms used in the policy.

Blended learning: Blended learning refers to a formal education strategy where students learn part-time in the traditional face-to-face method and part-time online (Powell et al., 2015).

E-learning: E-learning refers to learning conducted through electronic media, especially on the Internet ("E-learning," n.d.).

Recommendations

I present these policy recommendations to facilitate the needed change in teachers' teaching style and their instructional use of technology as suggested by research and expected by ZCPS' accrediting agency. I use this policy to address how ZCPS high

school teachers should use technologies in their classrooms. I address how and how much teachers should use technologies. I present policy implementation goals and evaluate the policy for effectiveness. The recommendations are as follows:

1. All high school teachers must use student-centered instructional practices.
2. Teachers should use technology (e-learning) so they leverage all innovative capabilities to facilitate student-centered learning environments.
3. High school teachers should facilitate lessons with a student-centered instructional use of technology at least twice a week.

Leaders shall mandate that teachers use methods and strategies that foster the personalized, adaptive learning and student collaboration that characterize student-centered teaching styles. Based on the findings from the research, leaders shall create a county-wide policy to facilitate the teachers' use of e-learning tools in their classrooms.

The implementation of this policy does not solely influence high school teachers. This policy applies to all high school teachers, but it has implications for all who support, train, and evaluate U.S. high school teachers. The roles of key stakeholders, including teachers, students, principals, and the information technology department should be explained in this policy, as well. High school teachers shall implement the student-centered instructional use technology. The student-centered use of technology should remain deliberate and routine. All high school teachers, regardless of teaching subjects and levels, shall adhere to this policy. Teachers shall use methods and strategies that foster following elements of a student-centered teaching style.

Along with teachers, school librarians are important to implementing personalized learning in schools. For decades, librarians have assisted teachers by collecting resources that support what students were learning in the classroom. With today's technology, librarians support student learning by curating digital resources that students can retrieve anytime and place. Students' library experiences can be personalized with technology that allows students to select what they read based on their individual preferences, interests, and ability levels (Easley, 2017).

Although this policy was written to address the problem at the high school level, leaders still require additional policies for the elementary and middle school levels. Policies and curriculums need to be developed to ensure that students are prepared for a student-centered style of teaching. By the time students get to high school, they need the required technology and learning skills to use technology and apply higher order thinking skills.

Rationale for the recommendations. The use of technology, such as using the LMS, Edmodo, and other e-learning solutions, makes blended learning possible. Teachers using blended learning will aid the student-centered teaching style. I explain the personalized, adaptive learning and student collaboration, the two student-centered characteristics of the recommendations, and I offer an overview of two instructional practices that embody the characteristics.

Personalized and adaptive learning. Personalized learning is an innovative (Paz-Albo, 2017) and popular teaching approach that is support by the Race to the Top federal education policy and the Gates Foundation (Bingham, Pane, Steiner, & Hamilton,

2018). Personalized learning refers to an instructional design principle that requires teachers to tailor students' learning by considering the strengths, needs, and interests of each student (Easley, 2017; Patrick, Worthen, Frost, & Gentz, 2016). An instructional approach considers the academic and personal interests of students and provides a real-world learning experience that is both meaningful and relevant (Patrick et al., 2016). With flexibility and personalization, students are more responsible for their own learning.

Personalization allows for understanding, which is established by students' connections to prior knowledge. Teachers educate mandated concepts using students' interests. The acquisition of new ideas is easier for students when teachers place new ideas in the contexts of music, video games, or sports with which students have interest; similarly, Walkington and Hayata (2017) posited teachers could present a lesson on ratios using contexts that interest students. Therefore, teachers could discuss ratios using batting average, likes per hour, or damage per second to draw from students' interests in sports, social media, and video games (Walkington & Hayata, 2017).

Adaptive learning refers to personalized learning powered by adaptive computer-based systems that make curriculum and instructional decisions based on student data (Roberts-Mahoney, Means, & Garrison, 2016). Adaptive learning systems take students' assessment results, the unique characteristics of students and students' current statuses to plot a learning trajectory by determining what happens next (Y. Chen, Li, Liu, & Ying, 2018). A student's next step may involve watching a video lecture, completing a practice assignment, or moving to the next skill.

Collaborative learning. Borup (2016) and Retnowati, Ayres, and Sweller (2017) defined collaborative learning as happening when two or more students learn while working together. Learning occurs as students interact with others as they work toward a goal. Retnowati et al. (2017) further defined active social interactions, group goals, and individual accountability as the required features for collaborative learning. Teachers can use technology to accelerate the capabilities of the collaboration process with students (Charoenwet & Christensen, 2016).

For instructors using blended learning methods, collaboration occurs in the classroom and online. In-class collaboration may involve group work, and collaborative online activities may involve students participating in a discussion board or group project. Whether an assignment is given in the classroom or online, it must fulfill a specific goal. In blended courses, Oliver and Stallings (2014) linked student satisfaction to opportunities for communication and interaction.

Student participation in a discussion board involves students posting responses to discussion questions, and then commenting on the posts of at least two classmates. Teachers usually require this process as part of online learning (Borup, 2016). Students can use the asynchronous discussion board to post based on convenience.

Project-based learning and problem-based learning. Problem-based learning (PBL) refers to an instructional technique where teachers require students to apply prior knowledge and develop skills for problems that they must solve as a group. Students work together to solve usually ill-structured problems; students work in small collaborative groups to formulate questions, gather information through investigation,

and then resolve the problem (Merritt, Lee, Rillero, & Kinach, 2017). Remijan (2017) listed the following as the process to follow: (a) meet the problem, (b) identify needs, (c) define the problem, (d) gather and share information, (e) generate solutions and determine the best solution, and (f) present the best solutions as PBL's crucial actively engaging steps. Through real-world practice, meaningful learning occurs in project-based learning (PjBL) as students ask authentic questions of real-world problems (Kokotsaki, Menzies, & Wiggins, 2016). Dell'Aringa and Fick (2015) provided the following illustration. Students participating in a PjBL science lesson acted as true scientists as they solved relevant real-world problems. The more students took part in the PjBL process, the more comfortable they became acting, thinking, and questioning like scientists (Dell'Aringa & Fick, 2015). By solving real-world problems, students can construct knowledge. The PBL process involves thorough asking and refining questions; designing and conducting investigations; gathering, analyzing, and interpreting information and data; developing conclusions; and reporting findings (Kokotsaki et al., 2016).

Flipped classroom learning. The flipped classroom model refers to a blended or hybrid, student-centered pedagogical approach where the typical in-class lecture occurs at home, and students complete homework at school (Clark, 2015; Gough, DeJong, Grundmeyer, & Baron, 2017). In this model, direct instruction involves homework. Direct instruction involves students watching lecture videos that the teachers recorded (Sams & Bergman, 2013; Gough et al., 2017) or videos from other sources (L. I. Chen, 2016). While watching videos at home or whenever, students can rewind, pause, and rewatch the lectures as needed (Sams & Bergman, 2013; Gough et al., 2017). Teachers

post lecture videos online or use podcasts for students (Snyder, Paska, & Besozzi, 2014). In addition to watching lectures, teachers may also require students to take notes (Sams & Bergman, 2013), complete reading assignments (L. I. Chen, 2016), and participate in interactive lessons (Tucker, 2012). Teachers use these at-home assignments to prepare students for in-class activities.

In a study conducted in Southwest and South-Central Minnesota, Gough et al. (2017) assessed K-12 teachers' perceptions concerning flipped classrooms and differences between grade levels and content areas of flipped classrooms. Gough et al. (2017) found that the 44 "participants perceived that the flipped classroom creates time for varied instructional techniques, including active learning and higher order thinking, along with increased student-to-teacher interaction" (p. 390). Although teachers perceived that flipped classrooms did not improve student learning, it did increase instructional time and time for personalized learning, while benefitting struggling and absent students.

Summary

Because technology "has the potential to accelerate, amplify, and expand the impact of powerful principles of learning" (U.S. Department of Education, 2017, p. 12), teachers should use it in today's student-centered pedagogical strategies. E-learning tools like Edmodo create opportunities for learning in and outside of the classroom, help the personalization process, and make collaboration possible. Implementing instructional practices, such as PBL/PjBL and a flipped classroom, can involve personalized/adaptive learning and students collaborating in the classroom. By implementing the policy

recommendation, the county's high school teachers will grow to be more student-centered in their instructional uses of Edmodo or any other technologies. Including the two approaches already explained, Table A1 lists 10 examples of student-centered uses of technology.

Table A1

Examples of Student-Centered Uses of Technology

Student-Centered Approach	References
Collaborative Concept Mapping	Chang et al. (2017) Alkhataba, Abdul-Hamid, & Ibrahim (2018)
Collaborative Writing	Greenhow & Askari (2017)
Digital Storytelling	Kim (2014)
Digitized Literature	Marlatt (2018)
ePortfolio	Soare (2014)
Flipped Classroom	Snyder et al. (2014)
Gaming (concept mapping & teaching narrative)	Roscoe, Segedy, Sulcer, Jeong, & Biswas (2013)
Jigsaw and Guided Inquiry	Bialangi, Zubaidah, Amin, & Gofur (2016)
Multimodal Writing Process	Edwards-Groves (2012)
Project-Based Learning and Problem-Based Learning	Dole, Bloom, & Doss (2017)

Personalized learning does not depend on or require technology, but it does make it easier. Teachers can use LMS to help the personalization process by automating, tracking, and organizing classroom management tasks (Bulger, 2016; Easley, 2017). Edmodo makes collaboration possible outside of the classroom. Teachers can use Edmodo to assign students to groups, and then Edmodo facilitates peer-to-peer collaboration through discussions, inquiries, and reflections (Wendt & Rockinson-Szapkiw, 2014). Tambouris, Zotou, and Tarabanis (2014) noted that technology was needed to make some instructional strategies, like PBL, available in blended learning environments. Edmunds, Arshavsky, Glennie, Charles, and Rice (2017) observed students using technology for collaborative learning, research, writing scripts, filming,

and editing. This technology makes the flipped classroom possible in the research previously discussed. Technology is necessary for students to access instructional videos outside of class (Vaughan, 2014).

Informed by the review of the literature and the findings of my study, I developed a policy recommendation. I addressed teachers' teaching styles and their instructional uses of technology. The implementation of a policy that mandates and sets the expectations for teachers' student-centered instructional uses of technology will ensure progress toward solving the problem of teachers' outdated teacher-centered instructional uses of technology.

References

AdvancEd. (2013, April 13). *External report:* [redacted]. Retrieved from http://www.[redacted].us/administration/accountability/index.asp

AdvancEd. (2018, March 18-21). *AdvancED engagement review report: AdvancEd Performance Accreditation, results for* [redacted]. Retrieved from https://www[redacted]/common/pages/UserFile.aspx?fileId[redacted]

Alkhataba, E. H. A., Abdul-Hamid, S., & Ibrahim, B. (2018). Technology-supported online writing: An overview of six major web 2.0 tools for collaborative-online writing. *Arab World English Journal, 9*(1), 433-446. doi:10.24093/awej/vol9no1.30

Bialangi, M. S., Zubaidah, S., Amin, M., & Gofur, A. (2016). Development of students' social attitudes in biology classroom through jigsaw and guided inquiry. *Development, 1*(10), 1-7. Retrieved from http://www.academicjournal.in/

Bingham, A. J., Pane, J. F., Steiner, E. D., & Hamilton, L. S. (2018). Ahead of the curve: Implementation challenges in personalized learning school models. *Educational Policy, 32*(3), 454-489. doi:10.1177/0895904816637688

Blackwell, C. K., Lauricella, A. R., & Wartella, E. (2014). Factors influencing digital technology use in early childhood education. *Computers & Education, 77*, 82-90. doi:10.1016/j.compedu.2014.04.013

Borup, J. (2016). Teacher perceptions of learner-learner engagement at a cyber high school. *The International Review of Research in Open and Distributed Learning*, *17*(3), 231-250. doi:10.19173/irrodl.v17i3.2361

Bulger, M. (2016). Personalized learning: The conversations we're not having. *Data and Society*, *22*. Retrieved from https://datasociety.net/pubs/ecl/Personalized Learning_primer_2016.pdf

Chang, C. C., Liu, G. Y., Chen, K. J., Huang, C. H., Lai, Y. M., & Yeh, T. K. (2017). The effects of a collaborative computer-based concept mapping strategy on geographic science performance in junior high school students. *Eurasia Journal of Mathematics, Science and Technology Education, 13*(8), 5049-5060. doi:10.12973/eurasia.2017.00981a

Charoenwet, S., & Christensen, A. (2016). The effect of Edmodo learning network on students' perception, self-regulated learning behaviors and learning performance. In N. Callaus, B Sanchez, A. Tremante, & F. Welsch (Eds.), *The 10th international multi-conference on society, cybernetics and informatics* (IMSCI) (pp. 297-300). Orlando, FL: International Institute of Informatics and Systemics.

Chen, L. l. (2016). Impacts of flipped classroom in high school health education. *Journal of Educational Technology Systems, 44*(4), 411-420. doi:10.1177/0047239515626371

Chen, Y., Li, X., Liu, J., & Ying, Z. (2018). Recommendation system for adaptive learning. *Applied Psychological Measurement*, *42*(1), 24-41. doi:10.1177/01466 21617697959

Clark, K. R. (2015). The effects of the flipped model of instruction on student engagement and performance in the secondary mathematics classroom. *Journal of Educators Online, 12*(1), 91-115. doi:10.9743/jeo.2015.1.5

Conti, G. J. (1989). Assessing teaching style in continuing education. *New Directions for Adult and Continuing Education, 43,* 3-16. Retrieved from https://onlinelibrary.wiley.com/journal/15360717

Dole, S., Bloom, L., & Doss, K. K. (2017). Engaged learning: Impact of PBL and PjBL with elementary and middle grade students. *Interdisciplinary Journal of Problem-Based Learning, 11*(2), 9. doi:10.7771/1541-5015.1685

Easley, M. (2017). Personalized learning environments and effective school library programs. *Knowledge Quest, 45*(4), 16-23. Retrieved from http://knowledgequest.aasl.org/

Edmunds, J., Arshavsky, N., Glennie, E., Charles, K., & Rice, O. (2017). The relationship between project-based learning and rigor in STEM-focused high schools. *Interdisciplinary Journal of Problem-Based Learning, 11*(1), 1-22. doi:10.7771/1541-5015.1618

Edwards-Groves, C. (2012). Interactive creative technologies: Changing learning practices and pedagogies in the writing classroom. *Australian Journal of Language & Literacy, 35*(1), 99-113. Retrieved from https://www.alea.edu.au/resources/australian-journal-of-language-and-literacy-ajll-2

E-learning. (n.d.). In *Oxford English Dictionary*. Retrieved from http://www.oed.com

Gough, E., DeJong, D., Grundmeyer, T., & Baron, M. (2017). K-12 teacher perceptions regarding the flipped classroom model for teaching and learning. *Journal of Educational Technology Systems, 45*(3), 390-423. doi:10.1177/00472395 16658444

Gray, L., Thomas, N., & Lewis, L. (2010). *Teachers' use of educational technology in US public schools* (NCES 2010-040). Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Greenhow, C., & Askari, E. (2017). Learning and teaching with social network sites: A decade of research in K-12 related education. *Education and Information Technologies, 22*(2), 623-645. doi:10.1007/s10639-015-9446-9

Kim, S. (2014). Developing autonomous learning for oral proficiency using digital storytelling. *Language Learning & Technology, 18*(2), 20-35. Retrieved from https://www.lltjournal.org//

Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools, 19*(3), 267-277. doi:10.1177/1365480216 659733

Marlatt, R. (2018). Literary analysis using Minecraft: An Asian American youth crafts her literacy identity. *Journal of Adolescent & Adult Literacy, 62*(1), 55–66. doi:10.1002/jaal.747

Merritt, J., Lee, M. Y., Rillero, P., & Kinach, B. M. (2017). Problem-based learning in K–8 mathematics and science education: A literature review. *Interdisciplinary Journal of Problem-Based Learning, 11*(2), 3. Retrieved from http://docs.lib.purdue.edu/ijpbl/

Oliver, K., & Stallings, D. (2014). Preparing teachers for emerging blended learning environments. *Journal of Technology and Teacher Education, 22*(1), 57-81. Retrieved from https://www.aace.org/pubs/jtate/

Patrick, S., Worthen, M., Frost, D., & Gentz, S. (2016). *Promising state policies for personalized learning*. Vienna, VA: International Association for K-12 Online Learning.

Paz-Albo, J. (2017). Is personalized learning the future of school? *Childhood Education, 93*(4), 295-299. doi:10.1080/00094056.2017.1343581

Powell, A., Watson, J., Staley, P., Patrick, S., Horn, M., Fetzer, L., . . . Verma, S. (2015). *Blending learning: The evolution of online and face-to-face education from 2008-2015. Promising practices in blended and online learning series*. Vienna, VA: International Association for K-12 Online Learning.

Remijan, K. W. (2017). Project-based learning and design-focused projects to motivate secondary mathematics students. *Interdisciplinary Journal of Problem-Based Learning, 11*(1), 1-10. doi:10.7771/1541-5015.1520

Retnowati, E., Ayres, P., & Sweller, J. (2017). Can collaborative learning improve the effectiveness of worked examples in learning mathematics? *Journal of Educational Psychology, 109*(5), 666-370. doi:10.1037/edu0000167

Roberts-Mahoney, H., Means, A. J., & Garrison, M. J. (2016). Netflixing human capital development: Personalized learning technology and the corporatization of K-12 Education. *Journal of Education Policy, 31*(4), 405-420. doi:10.1080/02680939.2015.1132774

Roscoe, R. D., Segedy, J. R., Sulcer, B., Jeong, H., & Biswas, G. (2013). Shallow strategy development in a teachable agent environment designed to support self-regulated learning. *Computers & Education, 62*, 286-297. doi:10.1016/j.compedu.2012.11.008

Sams, A., & Bergmann, J. (2013). Flip your students' learning. *Educational Leadership, 70*(6), 16-20. Retrieved from http://www.ascd.org

Snyder, C., Paska, L. M., & Besozzi, D. (2014). Cast from the past: Using screencasting in the social studies classroom. *The Social Studies, 105*(6), 310-314. doi:10.1080/00377996.2014.951472

Soare, E. (2014). Using the eportfolio to enhance teaching and learning. *ELearning & Software for Education, 1*(2), 460-463. doi:10.12753/2066-026X-14-126

Tambouris, E., Zotou, M., & Tarabanis, K. (2014). Towards designing cognitively-enriched project-oriented courses within a blended problem-based learning context. *Education and Information Technologies, 19*(1), 61-86. doi:10.1007/s10639-012-9209-9

Tucker, B. (2012). The flipped classroom: Online instruction at home frees class time for learning. *Education Next, 12*(1), 81-84. Retrieved form https://www.educationnext.org/

U.S. Department of Education. (2017). *Reimagining the role of technology in education: 2017 National Education Technology Plan update*. Washington, DC: Author.

Vaughan, M. (2014). Flipping the learning: An investigation into the use of the flipped classroom model in an introductory teaching course. *Education Research and Perspectives, 41*, 25-41. Retrieved from http://www.erpjournal.net/

Walkington, C., & Hayata, C. A. (2017). Designing learning personalized to students' interests: Balancing rich experiences with mathematical goals. *ZDM*, *49*(4), 519-530. doi:10.1007/s11858-017-0842-z

Wendt, J. L., & Rockinson-Szapkiw, A. (2014). The effect of online collaboration on middle school student science misconceptions as an aspect of science literacy. *Journal of Research in Science Teaching*, *51*(9), 1103-1118. doi:10.1002/tea.21169

Appendix B: The Teaching Style and Edmodo Acceptance Survey

Section 1: Demographical Information

Gender:
1. Male
2. Female

Age
1. Less than 25
2. 25-30
3. 30-40
4. 40-50
5. Above 50 years old

Years of teaching experience
1. Less than 1 year
2. More than 1 year and less than 3 years
3. More than 3 years and less than 5 years
4. More than 5 year and less than 10 years
5. More than 10 years

Experience in this county
1. Less than 1 year
2. More than 1 year and less than 3 years
3. More than 3 years and less than 5 years
4. More than 5 year and less than 10 years
5. More than 10 years

Which department is your subject matter in
English/Language Arts
Math
Science
Social Studies
Foreign Languages
Career, Technical and Agricultural Education

Section 2: Teaching Style

Question/Item	Always	Almost Always	Often	Seldom	Almost Never	Never
1. I allow students to participate in developing the criteria for evaluating their performance in class.						
2. I use disciplinary action when it is needed.						
3. I allow older students more time to complete assignments when they need it.						
4. I encourage students to adopt middle class values.						
5. I help students diagnose the gaps between their goals and their present level of performance.						
6. I provide knowledge rather than serve as a resource person.						
7. I stick to the instructional objectives that I write at the beginning of a program.						
8. I participate in the informal counseling of students.						
9. I use lecturing as the best method for presenting my subject material to adult students.						
10. I arrange the classroom so that it is easy for students to interact.						
11. I determine the educational objectives for each of my students.						
12. I plan units which differ widely as possible from my students' socio-economic backgrounds.						
13. I get a student to motivate himself/herself by confronting him/her in the presence of classmates during group discussions.						
14. I plan learning episodes to take into account my students' prior experiences.						
15. I allow students to participate in making decisions about the topics that will be covered in class.						
16. I use one basic teaching method because I have found that most students have a similar style of learning.						
17. I use different techniques depending on the students being taught.						
18. I encourage dialogue among my students.						
19. I use written tests to assess the degree of academic growth rather than to indicate new directions for learning.						
20. I utilize the many competencies that most students already possess to achieve educational objectives.						
21. I use what history has proven that students need to learn as my chief criteria for planning learning episodes.						
22. I accept errors as a natural part of the learning process.						
23. I have individual conferences to help students identify their educational needs.						

Question/Item	Always	Almost Always	Often	Seldom	Almost Never	Never
24. I let each student work at his/her own rate regardless of the amount of time it takes him/her to learn a new concept.						
25. I help my students develop short-range as well as long-range objectives.						
26. I maintain a well-disciplined classroom to reduce interference to learning.						
27. I avoid discussion of controversial subjects that involve value judgments.						
28. I allow my students to take periodic breaks during class.						
29. I use methods that foster quiet, productive desk work.						
30. I use tests as my chief method of evaluating students.						
31. I plan activities that will encourage each student's growth from dependence on others to greater independence.						
32. I gear my instructional objectives to match the individual abilities and needs of the students.						
33. I avoid issues that relate to the student's concept of himself/herself.						
34. I encourage my students to ask questions about the nature of their society.						
35. I allow a student's motives for participating in continuing education to be a major determinant in the planning of learning objectives.						
36. I have my students identify their own problems that need to be solved.						
37. I give all my students in my class the same assignment on a given topic.						
38. I use materials that were originally designed for students in elementary and secondary schools.						
39. I organize student learning episodes according to the problems that my students encounter in everyday life.						
40. I measure a student's long term educational growth by comparing his/her total achievement in class to his/her expected performance as measured by national norms from standardized tests.						
41. I encourage competition among my students.						
42. I use different materials with different students.						
43. I help students relate new learning to their prior experiences.						
44. I teach units about problems of everyday living.						

Section 3: Technology Acceptance

Question/Item	Extremely Likely	Quite Likely	Slightly Likely	Neither	Slightly Unlikely	Quite Unlikely	Extremely Unlikely
Perceived Usefulness							
Using EDMODO in my job would enable me to accomplish tasks more quickly.							
Using EDMODO would improve my job performance.							
Using EDMODO in my job would increase my productivity.							
Using EDMODO would enhance my effectiveness on the job.							
Using EDMODO would make it easier to do my job.							
I would find EDMODO useful in my job.							
Perceived Ease of Use							
Learning to operate EDMODO would be easy for me.							
I would find it easy to get EDMODO to do what I want it to do.							
My interaction with EDMODO would be clear and understandable.							
I would find EDMODO to be flexible to interact with.							
It would be easy for me to become skillful at using EDMODO.							
I would find EDMODO easy to use.							
Attitude toward Using (A)							
I think it is worthwhile to use EDMODO							
I like using EDMODO							
In my opinion, it is very desirable to use EDMODO for academic and related purposes							
I have a generally favorable attitude toward using EDMODO							

Actual Use (AU) Check the most appropriate option	Not at all	Once a week	2-3 times a week	4-5 times a week	6 times a week	7 times a week	More than once a day
Overall to what extent do you use EDMODO?							
	Not at all	2	3	4	5	6	To a great extent
To what extent did you use EDMODO last month?							
To what extent did you use EDMODO last week?							

Appendix C: Permission To Use Survey Davis

Dr. Fred Davis
Rawls College of Business,

Dear Dr. Davis:

I am Tshimpo Mukenge, a doctoral student from Walden University writing my dissertation titled *The Impact of Teaching Style on Suburban High School Teachers' Acceptance of Edmodo*, under the direction of my dissertation committee chaired by Dr. Nicolae Nistor, who can be reached at nicolae.nistor@waldenu.edu. The Walden University's Institutional Review Board (IRB) can be contacted by email at irb@waldenu.edu.

I would like your permission to use some questions from your Technology Acceptance Model survey/questionnaire instrument in my research study. I would like to use and print your survey under the following conditions:

- I will use the surveys only for my research study and will not sell or use it with any compensated or curriculum development activities.
- I will include the copyright statement on all copies of the instrument.
- I will send a copy of my completed research study to your attention upon completion of the study.

If these are acceptable terms and conditions, please indicate so by replying to me through e-mail at [redacted].

Sincerely,

Tshimpo Mukenge
Doctoral Candidate

Appendix D: Permission to Use Survey Conti

Dr. Gary Conti
Professor of Adult Education (Retired)

Dear Dr. Conti:

I am Tshimpo Mukenge, a doctoral student from Walden University writing my dissertation titled *The Impact of Teaching Style on Suburban High School Teachers' Acceptance of Edmodo*, under the direction of my dissertation committee chaired by Dr. Nicolae Nistor, who can be reached at nicolae.nistor@waldenu.edu. The Walden University's Institutional Review Board (IRB) can be contacted by email at irb@waldenu.edu.

I would like your permission to use your Principles of Adult Learning Scale survey/questionnaire instrument in my research study. I would like to use and print your survey under the following conditions:

- I will use the surveys only for my research study and will not sell or use it with any compensated or curriculum development activities.
- I will include the copyright statement on all copies of the instrument.
- I will send a copy of my completed research study to your attention upon completion of the study.

If these are acceptable terms and conditions, please indicate so by replying to me through e-mail at [redacted].

Sincerely,

Tshimpo Mukenge
Doctoral Candidate