ABSTRACT

Title of Dissertation: FACTORS THAT INFLUENCE TECHNOLOGY INTEGRATION IN THE CLASSROOM

Maureen C. Montgomery, Doctor of Education, 2017

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Education is one area where the use of technology has had great impact on student learning. The integration of technology in teaching and learning can significantly influence the outcome of education in the classroom. However, there are a myriad of factors that influence technology integration in the classroom. The purpose of this study was to investigate the variation of teacher integration of technology into classroom instruction. Factors that teachers perceive as being the most influential will be analyzed. The investigation also serves to inform school leaders about specific ways to ensure maximum use of instructional technology by all staff members.

The study involved a comprehensive high school centrally located in a suburban county in Maryland with an on-time graduation of above 95%. This study surveyed 49 teachers who are employed at this high school and represent various years' experience. Their teaching assignments range from standard level to advanced placement courses in one of the following content areas: English, science, social studies, or math. The research design in this study is quantitative in nature and was conducted through an on-line anonymous, eleven question survey using the Qualtrics platform.

A total of 44/49 participants, or 90%, provided responses to all of the questions asked on the anonymous survey. Results indicated that content, grade, skill level of student, and years' experience had no effect on the integration of technology in the classroom as 84% reported daily integration. Smart Boards and Laptops were the most frequently used while responders/clickers and the document camera were the least frequently used. Teachers reported using the Internet to develop lessons, Moodle, and video clips from the Internet were the most common uses of technology. Furthermore, results indicated that personal interest, availability, and professional development had the greatest influence over a teacher's decision to integrate technology.

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Section I: Introduction

Introduction to the Problem

In 1995, the State of Maryland initiated a plan outlining how technology could best support k-12 education. The plan was titled, the *Maryland Plan for Technology in Education* (MSDE, 2006) and it was developed by the Committee of Technology in Education (COTE). COTE included stakeholders from around the state and involved administrators, teachers, and parents. The plan served as a blueprint for Maryland schools to use for technologies that were available to support teaching and learning and improve administrative functions (MSDE, 2006). At the start of the committee's work in 1995, podcasting, blogging, text messaging or connecting to the internet were unheard of as tools to support education (MSDE, 2006). Computers were just beginning to make their way into the classroom and schools were not wired for the Internet. However, technology was visible and precipitately changing, increasing interest and use across the country.

It was necessary for teachers to grow and refine their skills in order to use technology to improve teaching and learning so students could use technology to enhance their content learning, be better prepared to join the world of work and persist in their own learning. Administrators also needed to support the use of technology in schools by securing resources and fostering school climates that promote technology literacy. New teaching models emerged which were highly influenced by advances in technology and were believed to contribute to advances in student achievement (MSDE, 2006). Reading and math scores on the Maryland School Assessment (MSA) improved in all 24 Local Education Agencies (LEA), to include improved performance of students in measured

subgroups, Special Education, African American and Economically Disadvantaged, (MSDE, Press Release, August 16, 2006).

Maryland and other states across the nation have experienced a colossal escalation in online and multimedia instruction and "virtual schools" (USDE, 2004). The National Report on NetDay's 2005 Speak Up Event, which surveyed teachers and students across the nation, identified themes that were published in Our Voices, Our Future (NetDay, 2006). Students indicated that they use new technologies both in and out of school and are becoming more and more proficient in their technology use. They also indicated that they were motivated by their desire to use new technology and that they believe the use of technology is critical to their learning and preparation. Both teachers and students reported frustration that available technologies were not always readily accessible in schools. Teachers reported they were becoming more comfortable but had an increased need for professional development to keep up with advances in order to keep up with students. Additionally, because students were more proficient than their teachers were when it came to the use of technology, this created an opportunity to empower students to become leaders in the classroom.

During the last 10 years, progress towards integrating technology and instruction continues but still has not become a part of the culture in every Maryland classroom. Data reported from *Where Do We Stand in 2006*? (MSDE, 2006), as reported by the Maryland Business Roundtable for Education, indicated that many students still did not have access routinely to technology, particularly if they lived in poverty. *The Maryland Technology in Education Plan* sought to ensure all students and teachers were prepared to have access to and use a variety of technology resources in the classroom.

In 2007, the Maryland Plan for Technology was revised to reflect the rapidly changing technology expectations for k-12 educators. The core vision remained intact emphasizing that technology should be used in order for every child to reach his or her potential and that individualized learning and differentiation remained a priority. Educators realized that technology appears to shift daily and students are quick to grip each new innovation. Since students are secure using technology in their daily lives and do so consistently, schools need to keep up and acclimate to this change. Today's educators must recognize technology as an essential component of the instructional program, engage all students more fully in leaning, and provide students with 21st Century work and life skills. Throughout this evolution, there was discussion about standards that would be important for the effective infusion of educational technologies into Maryland classrooms.

Teachers and students are required to use technology. The Maryland State Department of Education adopted technology standards in March 2002 (MSDE, 2002). The seven standards and outcomes are:

- Information access, evaluation, processing and application
- Communication
- Legal, social and ethical issues
- Assessment for administration and instruction
- Integrating technology into the curriculum and instruction
- Assistive technology
- Professional growth

Each standard has indicators that identify specific ways to gauge or measure the technology standards. According to the Maryland State Department of Education, teachers are expected to use technology to evaluate information critically, to organize and store information and to apply technology accurately to solve a problem or answer a question. They also need to develop classroom procedures to manage technology safely. The standards address how teachers are expected to assess and identify appropriate technology to meet instructional needs for students as they maximize student learning. It is an expectation for technology to be utilized in the classroom to improve instruction, to meet individual student needs, to asses learning, and for teachers to use technology for their own professional growth. Technology standards are in place to emphasize the importance of using technology in the classroom.

The Maryland Career and College Readiness standards (MSDE, 2015) emphasize higher order thinking skills and real world problem solving. Rote memorization no longer is enough for students to be successful in high school and beyond. New pedagogies that accentuate creativity and collaboration are emphasized in the MCCRS. Students will be competing in a global economy, which requires them to be prepared as modernizers and strategic thinkers; therefore, we must develop their critical thinking and problem solving skills. The International Society for Technology in Education Standards highlight the need for teachers to apply technology to prime students. Technology gives educators the capacity to work in real time with contemporaries across the globe, to articulate knowledge with an assortment of media, and broadcast ideas to far reaching audiences. These skills transform the way we communicate, work, and live. It is the responsibility of

educators to use technology tools in order to enable students to keep up with the ever-shifting world.

Local evaluation systems also note and rate a teacher's use of technology, emphasizing its importance. St. Mary's County Public Schools (SMCPS) utilizes the Teacher Performance Assessment System (SMCPS, 2015). The TPAS rates teachers in five areas: (1) Planning and Preparation; (2) the Learning Environment; (3) Instruction; (4) Professional Responsibilities; and (5) Student Learning (SMCPS, 2015). Four out of five domains have at least one component that addresses a teacher's use of technology. In *Planning and Preparation* (SMCPS, 2015), a teacher is rated on the component, "Teacher fully utilizes school and district resources, including technology, in instruction and seeks out other resources" (p. 31). Additionally, rated in this domain is, "All materials and resources are suitable to students, support the instructional goals, and must engage students in meaningful learning. There is evidence of appropriate use of available technology and student participation in selecting or adapting materials" in the *Learning Environment* (SMCPS, 2015, p. 32). "Both teacher and students arrange physical resources and use technology aids (e.g. technology, projection devices, displays, lab areas) optimally, and students work to ensure that all learning is equally accessible to all students" (SMCPS, 2015, p. 39).

In the third domain**,** *Instruction* (SMCPS, 2015), "The use of instructional materials and resources, including appropriate and available instructional technologies, are suitable to the instructional outcomes, and engage students in higher level thinking and active learning. Students initiate the choice, exploration, adaptation, or creation of materials to enhance their own purposes" (SMCPS, 2015, p. 42). In the fourth domain**,**

Professional Responsibilities (SMCPS, 2015), the components state, "Teacher provides frequent information to families, as appropriate, about the instructional program and effectively uses electronic communication to communicate instructional expectations and student progress," (p SMCPS, 2015, p. 47) in addition to stating that the teacher must engage in such a way as so that he or she "communicates effectively and consistently with staff and families through a variety of approved modes, to include electronic medium (e.g., student information system), email, and telephone, as well as traditional, face-to-face communication" (SMCPS, 2015, p. 47). The components of the Teacher Performance Assessment System identified relate to technology, underscoring the significant need for teachers to use technology to meet instructional objectives in the classroom. Since teachers are evaluated using TPAS, prominently linking technology in every domain signifies its importance. However, the problem is the variability in technology use across classrooms. Given the expectations for teachers specified in the MSDE standards, as well as in teacher evaluation tools, there is a demonstrated need for every teacher to have access to a full range of technologies and to be competent in using these to support instruction.

Justification/ Rationale for Solving the Problem

When technology is used effectively, it provides a positive model for students as educators prepare them for the 21st-century workplace. The students are the reason for everything educators do. The ultimate goal of the standards is to prepare students for their future whether they choose a career or college or both. The International Society for Technology in Education (ISTE) has identified five standards that effective teachers model and apply as they design, implement, and assess lessons to engage students:

1. Facilitate and inspire student learning and creativity by modeling creative and innovative thinking, engaging in the exploration of real-world issues and authentic problem solving, promoting reflection using collaborative tools, and modeling collaborative knowledge in virtual environments.
2. Design and develop relevant, individualized digital-age learning experiences and assessments that assess progress and use data to inform learning through multiple and varied formative and summative assessments aligned with content and technology standards.
3. Model digital-age work and learning by demonstrating fluency in technology, collaborating to support innovation, communicating relevant information, and modeling effective use of current digital tools to support learning.
4. Promote and model digital citizenship and responsibility by advocating and modeling the legal and ethical use of technology, addressing the needs of diverse learners, and promoting responsible social interactions related to the use of technology.
5. Engage in professional growth and leadership by participating in professional growth activities and promoting the effective use of technology (International Society for Technology in Education, 2008).

As noted above, MSDE has developed seven Teacher Technology Standards: (1) information access, evaluation, processing, and application; (2) communication; (3) legal, social, and ethical issues; (4) assessment for administration and instruction; (5) integrating technology into curriculum and instruction; (6) assistive technology; and (7) professional growth (MSDE, 2002).

Maryland has provided specific indicators for each technology standard, emphasizing the importance of technology in education (MSDE, 2002). In addition to the MSDE standards and the International Society for Technology in Education standards for teachers, the International Society for Technology in Education has developed standards for students. As previously stated, the students are the reason for everything educators do. These standards for students describe the skills and knowledge they need to interact and contribute productively in an increasingly global and technology-rich society and address the need for technology use in the classroom. The International Society for Technology in Education standards for students focus on students being creative, innovative, collaborative, fluent with research and information, critical thinkers, problem solvers, and decision makers. Additionally, students are living in a world where digital citizenship is expected and, therefore, they are expected to be familiar with technology operations and concepts. These standards exist for teachers and for students; therefore, in order for teachers to adequately prepare students, it is incumbent upon the educators to be proficient users of technology.

Documentation Supporting the Problem

Is the available technology being used to support instruction in ways that ensure maximum effectiveness? The problem is the variability of technology use among teachers in one district in Maryland, not the availability of technology resources. In this district, many technology tools are available to teachers and students. These include laptops, iPads, SMART clicker-response devices, document cameras, and scanners. High schools in this Maryland district are implementing technology throughout each content-focused department. The teaching staff in the high schools have varied years of teaching

experience and involvement in various teacher preparation programs. As an illustration of the problem, I informally observed technology use in the high school selected for this study while serving in my former role as a member of the administrative staff, specifically in the role of principal. This school enrolled 1,856 students in fall, 2015, in grades 9 to 12. The student body is primarily white with 10.8% of the students identified as non-white and 12% who receive Free and Reduced Meals (FARMS); 9% of the student body have been identified as special needs (MSDE, 2015). There are 92 professional staff members, including 81 teachers and 5 guidance counselors and 6 administrators. Almost all of the classroom instructional spaces are equipped with SMART Boards and/or LCD projectors. There were no other devices observed for use and the software information was not provided or witnessed during the observation (2015 HS classroom inventory). A laptop computer is issued to each staff member for use as a device to access grades and to communicate electronically Students also bring to school their own devices, such as cell phones, Kindles, and MacBook Air computers. This is notable since research indicates that Smart phone adoption among teens has increased substantially, and mobile access to the Internet is pervasive. One in four teens are "cell-mostly" Internet users, who say they mostly go online using their phone (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013). This means that cell phones may be technology that can be utilized in classroom instruction. Technology use in the classroom is encouraged and observed. During informal observations, technology was observed being used for: (a) instructional purposes in the classroom, (b) communication, and (c) administrative purposes.

The researcher conducted an internet search of the available technology for use in today's educational setting and discovered that technology used for instructional purposes facilitates a lesson a teacher is delivering to students. This type of technology may be used for planning purposes, for the delivery of instruction, or for assessment. For example, a teacher may use the SMART Board to access a website for a class or show a YouTube clip of a concept (SMARTech.com, 2016). The SMART Board can also be interactive: for example, having geometry student's measure and draw angles or solve linear equations on the SMART Board (SMARTech.com, 2016). The teacher can upload a page from a primary or secondary source document, such as a text. If it can be accessed on the Internet, the teacher can display it on the SMART Board to allow student interaction (SMARTech.com, 2016). The teacher can also use SMART Response clickers to assess student learning and obtain live data, thereby allowing them to provide immediate feedback (SMARTech.com, 2016). In addition, there is the capability for use of smart phones, Kindles, or MacBook Air computers that belong personally to students that can be utilized in downloading materials or research a topic (SMARTech.com, 2016).

Students also can use their own devices to provide answers to quiz or test questions by using an iPhone app designed to support this type of use (Vanwelenaers, 2012). Technology to support instruction has moved beyond word processing and conducting research on the Internet. Technology used to communicate includes e-mail, websites, or Moodle pages (Vanwelenaers, 2012). E-mail is used to communicate with students, other staff members, or administrators (Vanwelenaers, 2012). Websites are

often used to communicate with families and other members of the community. Moodle is an integrated system that a teacher uses to create personalized leaning for the class. PowerPoint projects, notes, homework assignments, and test or quiz information can be housed through Moodle (Vanwelenaers, 2012).

Technology used administratively includes platforms such as, the Home Access Center, Performance Matters, and eSchool (Pittsburg Public Schools, 2016). The Home Access Center (HAC) is a way for the parent to receive all information about their student (Pittsburg Public Schools, 2016). The HAC provides parents with grades on assignments, as well as information about attendance and discipline (Pittsburg Public Schools, 2016). A parent or student can access live data at any time through the HAC (Pittsburg Public Schools, 2016). The online grading system generates progress reports for parents and students and allows both stakeholders to review live data related to a student's progress (Pittsburg Public Schools, 2016). Other data also are tracked in the online system; parents and students can review attendance and discipline via the HAC (Pittsburg Public Schools, 2016). The online grading system has improved communication between teachers and students and parents. Students and parents can access updated information about the progress a student is making in class. Performance Matters is used to gather assessment information about students (Pittsburg Public Schools, 2016). For example, teachers can upload and then analyze diagnostic assessment data through Performance Matters (PM) (Performancematters.com, 2016). PM can produce a report about nonperforming standards by class, by individual students, or by subgroups including: (1) economically disadvantaged; (2) minority; and (3) special needs students (Performancematters.com, 2016). This information provides an opportunity for

teachers to use data to guide their instruction. All teachers use laptops for e-mail and to access the online grading system (HAC) (Performancematters.com, 2016).

There is an opportunity for teachers to request that a technology committee review new technology tools that are not currently available for use in the classroom. The technology committee is made up of teachers, who volunteer to serve on the committee, as well as administrators and support staff. The committee is co-chaired by the media specialist and an assistant principal. The technology committee meets monthly and works directly with the county's instructional technology department when new technology is requested. The technology committee also sets up professional development based on individual requests and the technology options currently available.

Two times per month, the media center closes and offers differentiated professional development throughout the day. The staff is given a menu of options and can come to the media center throughout the day to receive individualized or small group support. The professional development is also differentiated by level as one can request introductory user level support or advanced level support. In addition, technology integration is an agenda item through Media Moments at each monthly faculty gathering. During Media Moments, the technology committee provides an overview and/or demonstration of a particular technology option. These examples are provided as a way to establish the need for the research study. Schools are offering multiple avenues to deliver professional development that will support technology use in the classroom. Despite the technology availability and the differentiated approach to professional development, classroom technology integration to support student achievement and engagement varies across teachers and across schools.

Based on formal and informal observations in the 2013-2014 school year and the 2014-2015 school year, teachers varied in their use of technology to support instruction. In addition, an equipment checkout log maintained in the school indicates that during school year 2014, 31% of the technology checked out was to English teachers, (HS checkout log, 2014). Further review of the checkout log revealed that 17% of the technology checked out was to teachers in the social studies department, 24% to math teachers and 22% to science teachers. Teachers use technology regardless of age variances within differing departments: English, social studies, math, and science. The teachers the content areas, English, social studies, math, and science, were the focus of this study. These are the CORE subjects that students are required to take in order to earn their high school diploma.

As previously noted, a majority of the instructional spaces at the high school are equipped with interactive SMART Boards. The teachers are using them, but there are differences in the degree of use. Some teachers have demonstrated limited use of the SMART Board as a substitute for the chalkboard while other teachers use more advanced capabilities, such as the SMART Response clickers. SMART Response clickers consist of a set of remotes that students can use to answer questions on the SMART Board, thereby providing immediate feedback to both teachers and students. Teachers can prepare either single questions or entire quizzes using this system. Each student in the class has a remote to use to answer the questions (*Using the SMART Response System*, 2016). Some teachers allow their students to use their smart phones for instructional purposes. For example, a lesson was observed in an AP Environmental class where the teacher had notes on the SMART Board needed for a lab. Rather than have the students

take the time to copy notes or to pass out a handout with the notes, the teacher instructed students to take a picture of the notes posted on the SMART Board before transitioning to lab stations. The practice, which was quite effective and represented a good example of a positive yet easy way to incorporate technology in the classroom environment, was shared with other teachers. However, many teachers express concerns about allowing the use of electronic devices in the classroom, thinking it will lead to inappropriate behavior. The current SMCPS policy states that a student may use electronic devices when given permission by a staff member (Student Code of Conduct, 2015).

Literature Review

Student Achievement and Technology Use in the Classroom

Students' lack of access to available technology, which is used to increase engagement and improve achievement, is a contributing factor to the problem of practice. A study conducted as early as 1994 (Grinager, 2006) revealed that technology use does support improved student achievement. That study reported that, on average, students who were exposed to computer-based instruction scored at the 64th percentile in all areas of student achievement compared to the 50th percentile for students in the control conditions without computer-based instruction. Additionally, students learned more information in a shorter period of time and reported enjoying their classes more when they were in the computer-based instruction group (Schacter, 1999). A similar study tested student achievement results for both general and special education students in elementary through middle school. A national sample of 6,227 fourth graders and 7,146 eighth graders achievement on the *National Assessment of Educational Progress*.

Students who were learning in technology-rich environments experienced increased achievement in all areas (Schacter, 1998).

These early studies support what current research continues to support. In 2014, Stanford's Graduate School of Education (Zielezinski & Darling-Hammond, 2014) reviewed and reported on more than 70 research studies that provided examples of how technology-rich environments made a positive difference in students' achievement of learning outcomes. The researchers specifically reported on studies that focused on students at risk for dropping out. With regard to the problem, the first hypothesized cause for varied use of technology in the classroom is a lack of professional teacher development, possibly in teacher preparation programs (Zielezinski & Darling-Hammond, 2014). The experienced teachers are potentially overwhelmed with too much, too fast if they have not received a training base related to technology in their teacher preparation programs (Zielezinski & Darling-Hammond, 2014). Aside from staff members' expressing concerns, stress and anxiety have been observed at as teachers attempted to integrate instructional technology into their planning. Interviews were conducted by administrators with teachers, which eventually led to leadership team involvement (Zielezinski & Darling-Hammond, 2014). The leadership team developed a plan to address the technology infusion. It was necessary to consider many factors, such as planning time, before- and after-school commitments, staff development days, and faculty meetings. Informal interviews with staff and the leadership team, along with the documentation collected regarding the checkout procedure (who, when, and what department), precisely confirmed the hypothesized cause for the problem in SMCPS (Zielezinski & Darling-Hammond, 2014).

Teacher Capacity

The second hypothesized cause for the problem was a lack of teacher experience and teachers' comfort level with the new technology. As Taplin and Clark (2012) noted, change is difficult, and some of the staff in the study are reported to have stated that the "old way" was effective and thought the "new way" might not be. Articulating the long-term goal of using technology to increase student engagement, therefore leading to an increase in student achievement, is clearly establishing the need (Taplin & Clark, 2012). The old way is defined as using materials of instruction such as textbooks, giving pencil-and-paper assignments and tests, providing feedback following a lesson through the use of quiz or test data, using computers in a computer lab, and accessing technology during scheduled time in the media center (Taplin & Clark, 2012).

According to Taplin and Clark (2012), students historically have viewed technology as a social media tool, not an instructional tool. The new way includes using laptops connected to the Internet in the classroom; being able to receive immediate feedback through the use of SMART Response clickers; taking tests and quizzes on smart phones, again allowing for immediate feedback. The old rule was "no devices at school" but now a different, possibly confusing, message is being delivered to students (Taplin & Clark, 2012). Due to teachers' possible lack of experience, students are more proficient users of technology than are staff members (Taplin & Clark, 2012). Noteworthy is the observation that most of the laptop checkouts were by staff with fewer than 10 years of experience (Taplin & Clark, 2012). There were staff members with more experience accessing the new technology, but the majority consisted of teachers with fewer than 10 years of experience (Taplin & Clark, 2012). This information was confirmed as a

hypothesized cause for the problem by collecting anecdotal information from staff and the leadership team and by collecting documentation regarding the checkout procedure (who, when, and what department) (Taplin & Clark, 2012).

The work of Frazier and Sadera (2011) entitled "Technology Use in Pre-Service Teacher Internships: Opportunities and Obstacles" questioned whether technology integration techniques learned in teacher training programs translated into actual practice. The researchers surveyed 300 teacher candidates enrolled in their final teaching internship and data also were gathered from a supervisor observation checklist and a teacher candidate focus group (Frazier & Sadera, 2011). The following factors that influenced technology integration by the 300 teacher candidates were identified: 92.3% personal interest; 89.1% mentor teacher support; 88.4% lesson content; 78.2% teacher preparation programs; and 51.2% school level administration's influence (Frazier & Sadera, 2011). It should be noted that participants were preservice teachers who were not yet being directly evaluated by a school-based administrator and that they had not yet had the opportunity to be influenced by a principal or to experience the culture of a school with respect to making decisions about technology integration (Frazier & Sadera, 2011).

SAMR: Substitution, Augmentation, Modification, & Redefinition

The SAMR Model or the 'Substitution, Augmentation, Modification, Redefinition' model was introduced in the work of Puentedura (2009) which provided a systematic method of reviewing how computer technology might affect teaching and learning. The model illustrates a progression that technology adopters go through as they use technology to support instruction in the classroom (Puentedura, 2009). As a teacher moves along the continuum, computer technology becomes more important in the

classroom; however, and perhaps more importantly, the use of the same is becoming synonymous with the definition of good teaching and learning (Puentedura, 2009). Puentedura states that substitution occurs when technology is used to perform a task that was done before without the technology (2009). For example, if a teacher asks a student to review email etiquette and guidelines, students would read an online article discussing the concepts and guidelines. In substitution, they are merely substituting one format for another. They could have read a paper copy of the article or they could use an online version. One substitutes one for the other (Puentedura, 2009). The augmentation phase might be such that asks the student to read an article about such as email etiquette and involve students reading the online article that possibly included links to examples of email etiquette (Puentedura, 2009). Puentedura (2009) reports that in the 'modification' phase that students might watch a video about the concepts and guidelines of email etiquette and then create a Twitter account for example, and Tweet their top five tips for email etiquette. Puentedura (2009) states that in the phase known as 'redefinition' that students might watch the guideline video, then assess examples of email etiquette violations and indicate which guidelines should be applied to correct/improve on the examples. Clearly, the use of the SAMR examples are such that can serve to transform the classroom and improve student achievement (Puentedura, 2009). According to (Puentedura, 2009) instruction of the classroom during the redefinition phase results in critical thinking and critical analysis on the part of students and their application of the knowledge gained to real-world situations.

Engagement

Edwards (2015) reported that a superintendent in Mooresville, NC led an initiative to create a new learning environment for teachers and students. The school district provided every student and teacher with a laptop (Edwards, 2014). The goal was to increase student engagement and, therefore, student achievement (Edwards 2014). Results were positive in the district according to Edwards (2014).

Devaney (2013) reported the difference between using digital tools at home versus at school. This reference is beneficial because it is important to understand how students are already using technology at home so that staff can build on their experiences at school. Devaney also discussed how successful technology implementers find enthusiastic "early adopters" and give them support to define the initiative. These early adopters help with transition because they figure out the problems before rolling them out to a broader audience; the adopters become the resource for other faculty members. Having the technology does not necessarily change the traditional instructional delivery; however, the early adopters provide support as the traditional methods are redesigned (Devaney, 2013).

Madrazo (2011) reported the examination of instructional technology and its impact on student motivation to learn. Specifically stated by Madrazo (2011) is that with the challenges associated with the education of students who are at-risk that "one possible solution links success to motivation. By using instructional technologies (ITs), school systems are attempting to increase student motivation…" (p. 4). Madrazo (2011) goes on to relate that allowing students a voice in the manner in which they learn results in

students being "more invested in their learning" and serve to enhance outcomes in the area of achievement (p. 4).

Earle (2002) conducted an interesting study focused on determining what factors need to be in place for technology to support instructional gains. The study reviewed a nationwide survey conducted by a private company, Jostens Learning Corporation. Jostens surveyed teachers, principals, and superintendents. The author concluded that technology has the potential of producing a variety of positive outcomes in the classroom with thoughtful integration. Six factors necessary for technology to support instructional gains were identified: leadership, solid educational objectives, professional development, technology resources, time, and evaluation (Earle, 2002).

Irving (2006) reports that the environment of the connected classroom is reported to provide support for student positive "thinking habits such as seeking alternative representations for problems, comparing and contrasting different solution strategies, and explaining and describing problem solving strategies" (p. 16-17). In addition, Irving (2006) reports that the development of these specific habits "support active engagement and intellectual growth" (p. 17).

School Leadership and Technology Use in the Classroom

The work of Dawson and Rakes (2003) entitled "The Influence of Principal's Technology Training on the Integration of Technology in Schools" reports having questioned whether the training a principal receives regarding technology can influence the use of technology in the classrooms at the trained principal's school. The Texas School Technology and Readiness Chart Assessment (STaR), an online data collection survey instrument, was used in the study reported by Dawson and Rakes (2003) and

involved the researchers collecting information from 398 participants, who were all educators. The study considered the age, sex, years of administrative experience, size of the school, grade level of the school, and types of training received for the principals (Dawson & Rakes, 2003). The types of technology training the principals received did not vary significantly (Dawson & Rakes, 2003). The study revealed a need to educate school administrators about the importance of technology integration as principals have significant influence over how much technology is integrated in the classroom (Dawson & Rakes, 2003). Two other interesting factors in this study, which influenced technology integration in the classroom, were the age and level of experience of the principal (Dawson & Rakes, 2003). Findings in the study include that a principal's influence regarding technology integration is a relevant factor. The principal makes decisions about how resources are allocated in a school, both human and capital, what the professional development focus will be from year to year, and what the expectation will be for the staff to integrate technology (Dawson & Rakes, 2003). The principal's office also establishes the culture of the school, supporting the emotional side of change that teachers experience as well as the technical side. Establishing a culture that is supportive will influence a staff's willingness to deviate from the known instructional practice (Dawson & Rakes, 2003).

The work of Honeycutt (2013) entitled "*Examining the Effects of Leadership Practices on Sustaining a Technology Innovation"* suggested possible solutions for the problem of practice and specifically examined were leadership practices necessary to sustain an innovation, specifically a technology innovation. Leaders are called upon to facilitate change to create 21st-century learning in which they provide staff development

about a particular technology in addition to a change of culture focused on supporting the innovation as this is cited as being the key to sustainability and is the responsibility of the leader (Honeycutt, 2013) Honeycutt (2013) additionally reports that while money is important, of greater importance is the leadership needed to support change.

The work of Hayes, Wilson and Greaves (2010) entitled "*Project Red: The Technology Factor: Nine Keys to Student Achievement and Cost Effectiveness"* reports a study in which 997 schools in 49 states and the District of Columbia were surveyed. The aim of the study was to determine the impact of technology on student achievement, specifically in terms of improvement (Hayes, Wilson, & Greaves, 2010). The survey participants were principals, teachers, and students (Hayes, Wilson, & Greaves, 2010). Types of devices being used, usage patterns, funding sources, principal and teacher training, and leadership were survey topics (Hayes, Wilson, & Greaves, 2010). Nine key implementation factors were identified as substantially improving student achievement through technology integration (Hayes, Wilson, & Greaves, 2010). The most compelling, critical factor was the principal's ability to lead change (Hayes, Wilson, & Greaves, 2010). The importance of school level leadership was identified as an essential factor in technology integration in the classroom (Hayes, Wilson, & Greaves, 2010).

District Policies

Tondeur (2008) examined the relationship between school system policies and actual use of instructional technology in the classroom. Clear goals and systematic strategies designed to direct change are important, along with strong leadership to guide the change process (Tondeur, 2008). A survey was administered to 574 teachers and 53 principals from 60 different schools (Tondeur, 2008).

The study surveyed teacher and principal perceptions regarding instructional technology use in the classroom (Tondeur, 2008). Structured interviews also were conducted to determine school system policies. IT training, IT support, and IT planning were significant factors identified for successful technology integration to occur in a school (Tondeur, 2008). It is reported that leadership, including the ability to lead change, is identified as a critical factor (Tondeur, 2008). How the leader chooses to support or not support the integration of technology is especially important because the policy requires permission from a staff member for a student to use the technology. If a principal views the technology negatively, as a way to decrease engagement by interrupting instruction, classroom teachers will be less likely to integrate technology options in their classrooms (Tondeur, 2008).

If a principal embraces technology options and wants staff members and students to find ways to coexist with its use for instructional benefits, teachers will be more inclined to infuse technology options (Tondeur, 2008). Tondeur additionally identified other significant factors such as professional development, time, and money (2008). The office of the principal controls the professional development focus of a school, how time for professional development is spent, and how both human and capital resources are allocated (Tondeur, 2008).

Data Management

The work of Irving (2006) entitled "The Impact of Educational Technology on Student Achievement: Assessment of and for Learning" reports that one primary advantage of the use of information technology programs in the classroom is "their readily accessible stores of data. Teachers and policymakers need to access, analyze and interpret student

achievement data if these resources are to guide decision making and strategy selection to improve student learning" (p. 15). Irving (2006) additionally reports that the 'connected classroom' is an educational technology that supports achievement of students. The technology known as 'connected classroom' is reported to refer to "a networked system of personal computers of handheld devices specifically designed to be used in a classroom for interactive teaching and learning" (p. 16). Included in this technology network is reported to be: (1) response systems; (2) classroom communication systems; and (3) newer systems included under the name CATAALYST or Classroom Aggregation Technology for Activating and Assessing Your Student's Thinking" (Irving, 2006, p. 16). However, Irving (2006) reports that the success of the use of the Connected Classroom is dependent upon the instructor skills.

Academic Self-Efficacy and Technology in the Classroom

The work of Baker (2015) entitled "The relationship of Technology Use with Academic Self-Efficacy and Academic Achievement in Urban Middle School Students" reports a study that focused on the gap in achievement between students in various socioeconomic classes and states specifically "In this new era, students have the opportunity to exhibit more control over their individualized learning through technology use" (p. 1). Baker (2015) states that the study reported examined three questions through the application of the social cognitive theory framework, with the questions being those stated as follows: (1) What is the relationship between perceived academic self-efficacy and academic achievement in students at each successive grade level? (2) What is the relationship between perceived academic self-efficacy and educational technology use for mathematics and reading instruction at each grade level? and (3) What is the relationship

between educational technology use for mathematics and reading instruction and academic achievement? (Baker, 2015, p. 1). There were 414 urban middle school students that participated in the study (Baker, 2015). The findings of the study reported that there were "significant relationships between technology use and academic self-belief measures" (Baker, 2015, p. 1).

Teacher Perceptions of Self-Efficacy and Technology Integration

Burke (2015) reports in the work entitled "Teachers' Perceived Self-Efficacy in Integrating Technology into Pedagogical Practice and Barriers to Technology Integration" that a study was conducted with the purpose of making a determination of the self-efficacy of teachers in their integration of technology into their instructional practice and the barriers that they perceived in this integration. A questionnaire was administered and a focus group study followed. The primary findings in this study are reported to provide indications that "not all teachers felt prepared and confident to integrate technology in the classroom. Qualitative data indicate that teachers were willing to integrate technology, but many felt ill prepared or unsupported to change their practice" (Burke, 2015, p. 1).

National Education Technology Standards for Teachers

The work of Sam (2011) entitled "Middle School Teachers' descriptions of Their Level of Competency in the National Education Technology Standards for Teachers" reports a study that examined the competency self-description of teachers in urban middle schools within the framework of the National Education Technology Standards for Teachers. Also examined in the study were how technology is presently being utilized by these teachers as teaching supports for learning of students. Sam (2011) states that it is

indicated in the research that there is a need for ongoing support of skill development in teacher technology skills to promote learning among students. Findings of the study report that many of the teachers possessed no knowledge about the National Education Technology Standards for Teachers (Same, 2011).

Technological Clusters

The work of Millen and Gable (2016) entitled "Closing the Gap Between Technological and Best Practice Innovations: TPACK and DI" reports that the majority of research on the use of classroom technology has been "on the diffusion of a single innovation rather than on a technology cluster" reported to be defined as "a set of interrelated innovations that complement each other in a way that adoption of one innovation might naturally lead to adoption of one or more of the other innovations" (p. 3). However, if this is to be accomplished, teacher awareness concerning the available technological infrastructure within the school and within the district is required (Millen & Gable, 2016). In addition, Millen and Gable (2016) reported that teachers must have their attitudes focused on the acceptance of these types of innovations within the organization of the school and as well must be accepting of the dynamics which are changing in the learning environment. A requirement was reported for teacher to strengthen their content knowledge concerning technology in their pedagogical practice so that they can put into place best practices (Millen & Gable, 2016). Greaves, Hayes, Wilson, Gielniak, and Peterson (2010) stated that implementation of technology that is effective in nature is "a complex puzzle. Hundreds of interrelated factors play a role. The presence of computers in a school does not guarantee students achievement. Ultimately the implementation of best practices is as important as the technology itself" (p. 10).

State Reports of Successful Classroom Technology Implementation

The International Society for Technology in Education Policy Brief (2008) entitled "Technology and Student Achievement – The Indelible Link" reports on achievements of different states in the U.S. who have implemented the use of technology in classroom instruction. Stated to be among those that are the most comprehensive in nature is that of Missouri in their eMINTS program reported to focus on "innovative instructional processes, and supporting teacher to develop student-centered, inquiry-based instructional practices through multimedia and computer technology" (International Society for Technology in Education Policy Brief, 2008, p. 5). It is reported that research has demonstrated "statistically significant differences in the performance of eMINTS students" when compared to non-eMINTS students and that this includes a wide range of content areas (International Society for Technology in Education Policy Brief, 2008, p. 5).

In addition, students in eMINTS are reported to have had consistent better math achievement performance statewide. It is additionally reported that Michigan in its 'Freedom to Learn' program makes provision to students of laptops along with professional development for teachers and integration of technology and enhancement to the curriculum (International Society for Technology in Education Policy Brief, 2008). Research studies demonstrate that for Freedom to Learn student participants there were "significantly higher levels of engagement in their work and in using technology as a learning tool when compared with national averages" (International Society for Technology in Education Policy Brief, 2008, p. 5).

The International Society for Technology in Education Policy Brief (2008) reported that, in the state of Texas, the Technology Immersion Pilot states that for students involved, that these were engaged fully and realized increases in achievement scores in math between 5% and 42% for all grades. The International Society for Technology in Education Policy Brief (2008) stated that there are seven specific factors in the successful implementation of technology in the classroom and that these include: (1) professional development that is effective in nature for teachers in technology being integrated into instruction which provide support for learning of students; (2) the direct application by teachers of the technology must be in alignment with the curriculum standards of the local and state; (3) there must be incorporation of technology into the learning schedule on a daily basis; (4) applications and programs utilized must make provision of feedback that is individualized in nature to teachers and students so that teachers are able to formulate lessons that are based on the student's individual needs; (5) the use of technology must take placed in an environment that is collaborative in nature to be effective; (6) learning that is project-based and that involves simulations of the real-world should be the primary objective of technology instructional practices; and (7) integration of technology in an effective manner makes a requirement of support, leadership as well as modeling from all stakeholders including parents, the community, administrators and teachers (International Society for Technology in Education Policy Brief, 2008).

Summary of Literature Reviewed

In summary, the literature reviewed in this study first examined use of technology in the classroom on the achievement of students and related how the lack of access to

technology for increasing engagement and bringing about improvements in achievement is an ongoing problem in education. Research studies have definitively demonstrated that technology in classroom instruction improves academic achievement of students. Students are able to learn more material in a shorter time when technology is used in classroom instruction and are shown in research findings to enjoy learning much more and to be more engaged in learning. Research has however demonstrated that use of technology is classroom instruction is often difficult for teachers who are not in possession of the education, training and skills needed to successfully use technology in the classroom instructional practice. While technology is often viewed by students as merely a social tool, the use of technology in classroom instructional practices in the connected classroom enables students to value technology as a learning tool. One study reviewed in the literature review related that the teachers who were newer and had less experience in teaching were those with more experience in using new technologies indicating that teachers who have been teaching the longest are likely to be those who need education, training and skills in using classroom instructional technology the most. Factors that impact technology integration into the classroom has been demonstrated in the literature reviewed in this study to include those of personal interest, mentor teacher support, lesson content, teacher preparation programs, and the influence of the school administration.

The literature reviewed in this study additionally noted that the SAMR Model, or Substitution, Augmentation, Modification, Redefinition, is a model that makes provision of a method of review of the potential impact of technology on classroom instruction. This model, in essence demonstrates how the progression of technology implementation

takes place in the classroom. Engagement of students through use of technology in classroom instruction was also reviewed in this study and the literature reviewed demonstrated that the use of technology in classroom learning is very effective in gaining the interest and ultimately the engagement of students in classroom learning activities. One study reviewed demonstrated that there are six components necessary to instructional gains to be realized from technology and that those components included: (1) leadership; (2) solid educational objectives; (3) professional development; (4) technology resources; (5) time; and (6) evaluation. Technology in the classroom makes provision of students to develop thinking habits in which they begin to seek alternative strategies for solving problems.

The literature reviewed in this study demonstrated the importance of the school leadership being 'on board' with technology implementation in classroom instruction and the importance of the support of school administration and teachers in the school. This support includes specialized education, training and skills development for teachers in using technology in the classroom instructional environment. The literature reviewed in this study additionally highlighted the need for district and school policies on the use of information technology in the classroom instructional practice of teachers. As well, the literature reviewed in this study emphasized the need for technology in the classroom instructional practice for management of data and providing feedback to students in the learning process. The literature reviewed in this study set out the increases in student self-efficacy through use of technology in the learning process. Furthermore, this study reviewed literature that demonstrated increases in self-efficacy among teachers who make use of technology for classroom instructional purposes. The National Education

Technology Standards for Teachers was also reviewed in this study and how these standards can be used to measure the use of technology by teachers in classroom instruction and the effectiveness of the use of this technology.

The literature review in this study examined what are known as 'technological clusters" of the use of various technological implementations in unison all connected to one another to create a very effective information technology for instruction in schools and classrooms. These connected technologies complement one another and cause the entire system to be highly useful and effective for instructional purposes. Lastly, this literature review examines some of the successful technological applications being used in various states in the U.S. and how this technology for classroom instruction is a driver for increases in achievement of studies across a wide-range of subject areas.

Purpose of the Study

The purpose of the study was to investigate the variation in teacher integration of technology. This researcher analyzed which factors teachers perceive as the most influential factors on their use of technology in the classroom. This study revealed what encouraged them the most to incorporate technology tools into their instruction. This investigation: (a) measured the degree to which various staff members in one high school in a Maryland district used the available technology; (b) identified which staff members participated in professional development related to technology use in the classroom; and (c) assessed the variation in technology integration considering level of experience and other factors that may impact a teacher's decision to integrate technology into the classroom. The data collected for this study provided specific information related to experiences, skills, technology implementation, and influences on the teachers

participating in the study. This investigation also served to inform school leaders about specific ways to ensure maximum use of instructional technology by all staff members.

Section II: Investigation – Generating and Defending an Original Solution

Introduction

Technologies in education have increased rapidly while teacher's professional training and education to use such technology has not kept pace with this growth. While teachers report becoming more comfortable with the use of technology applications they also reported an increased need for professional development in order to keep up with advances and be able to pace with the students. In 2007, the Maryland Plan for Technology was revised to reflect the rapidly changing technology expectations for k-12 educators. The core vision remained intact emphasizing that technology should be used in order for every child to reach his or her potential and that individualized learning and differentiation remained a priority. Educators realized that technology appears to shift daily and students are quick to embrace each new innovation. Since students are secure in their use of technology and do so consistently, schools need to reflect these changes and acclimate accordingly.

Today's educators must recognize technology as an essential component of the instructional program, engage all students more fully in learning, and provide students with 21st Century work and life skills. The core vision remained intact emphasizing that technology should be used in order for every child to reach his or her potential and that individualized learning and differentiation remained a priority. Educators realized that technology appears to shift daily and students are quick to grip each new innovation. The purpose of this study was to investigate the variation in teacher integration of technology

in the classroom. This researcher analyzed which factors teachers perceive as the most influential on their use of technology in the classroom.

Research Questions

In spite of the availability of the technology and of the differentiated approach to professional development, the variability in classroom integration to support student achievement and engagement varies. The following research questions guided my study:

(1) Does the frequency of teacher integration of technology vary by content area?

(2) Does the level of technology use, based on the SAMR model, vary by teachers' demographic characteristics?

(3) What factors do teachers indicate influence their decisions to integrate technology into their classrooms?

Hypotheses

Three hypotheses have been identified for testing in the completion of the study:

H1: Teachers differ in their frequency and type of technology use by content area.

H2: Teachers differ in their use of technology based on their demographic characteristics.

H3: Some factors have a greater influence on a teacher's decision to use technology than others do.

Methods/ Procedures

Participants

The study took place at a high school that is centrally located in a suburban county in Maryland. The area combines high-tech businesses along with a rich heritage and multiple recreational opportunities. The county's 372.5 square miles includes 37.7 square miles of water area and 536 miles of shoreline. The locality allows for easy access to several major metropolitan areas. With a total population of 105,151, the median age of residents is 36.0 years. Twenty-two percent of the population are school aged, 5-19 years old. The average household income is $99,551. In 2015, 94.3% of the students in the county graduated on time in four years. 53.9% of 2015 graduates were University System of Maryland completers; 27.2% were Career and Technology (CTE) completers; and 17.9% met BOTH the USM and CTE completer requirements.

The school selected for this study is centrally located in the county and is one of four high schools. The on-time graduation rate for this particular school was above 95% for the Class of 2015. Additionally, there are 4 middle schools and 17 elementary schools. This study was conducted during the 2016-2017 school year using a sample of forty-nine teachers who are employed at the school selected for this study. The teachers represented various years' experience and their content will be English, social studies, math or science. The subjects' teaching assignments range from standard level to advanced placement. The data collection for this study was quantitative and the survey gathered information from the teachers anonymously.

Instrument

The research design in this study is quantitative in nature and was conducted through a questionnaire/survey. The survey was developed after reading multiple technology surveys drawn from public domain sources that are available to all educators. The following information was gathered from teachers who took the survey: (1) The subject they teach; (2) The grade level of students they teach; (3) The level of class they teach; (4) Their years' experience teaching; (5) How often they integrate technology into their instruction; (6) What specific technology tools they are using in their classroom; (6) How often they are using devices they selected; (7) What they use each device for in the classroom; (8) What influenced their decision to integrate technology into their classroom. The unit of analysis was high school English, social studies, math and science teachers. Influential factors may be a teacher's pre-service preparation program, mentor teacher influence, professional development, administrative expectations, internships, availability at the school, or personal interest. The information provided insight regarding my problem of practice. Information gathered from staff will assist in the development of a targeted plan for professional development in the area of instructional technology integration. The Qualtrics platform was used to develop the survey. The Qualtrics platform was used to distribute the survey via email. The Qualtrics platform was also used to collect the data from respondents and to interpret the results.

The research instrument utilized in this study was a questionnaires which will be administered to the teachers in this study. The following table illustrates the possible answers and range of responses that are in a Likert-type study for five of the questions on the survey, indicated in Figure 2, below.

Figure 2 – Response scale

Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
5	4	3	2	1

The survey also included six multiple-choice questions. The instrument is located in Appendix A.

Field Testing the Instrument

Prior to beginning the study, the survey was pilot tested. The survey was distributed for feedback to five individuals who are current or retired central office administrators. All participants selected for the pilot are knowledgeable about available technology in the district. After administering the pilot survey, each question was reviewed with participants. Adjustments included revising interview questions for clarity according to the feedback received. The pretest also allowed for assessing the amount of time needed to complete the survey. Last, pretesting helped to establish the validity of both instruments (Lunenberg & Irby, 2008).

Data Collection

The surveys were distributed to English, social studies, math and science teachers during the second marking period using the Qualtrics platform. First, the school's principal was contacted by phone to introduce the project, state the purpose of the research, verify members of each department and verify e-mail addresses. The first e-mail was distributed through Qualtrics after the introduction. The e-mail explained the purpose of the research and timelines for the survey and that an incentive of a $5 gift card to

Starbucks was offered for completing the survey. The e-mail also contained a link to the survey. The participants were asked to complete the survey within 2 weeks. After the first deadline for responses passed, a second e-mail with the link to the survey as a reminder was distributed to those teachers who did not complete the survey.

Data Analysis

The data obtained was analyzed from the online surveys using the Qualtrics software application to inform the research questions. Descriptive statistics were computed, including frequencies and percentages, for each item (Lunenburg & Irby, 2008). All results were presented through the use of visual displays of data. Multiple choice and Likert items were used to "measure respondents' attitudes to a particular question or statement" (University of St. Andrews, 2016, p. 1). Additionally, "Likert-type data is ordinal data" meaning that it is only possible to "say that one score is higher than another, not the distance between the points" (University of St. Andrews, 2016, p. 1).

It is not possible to use "the mean as a measure of central tendency" using the Likert-type data and the measure that is most appropriate is that of the responses that are most frequent (St. Andrews University, 2016, p. 1). Therefore, data analysis will present the percentages for each rating on the scale by question.

Limitations

As with any research study, limitations are recognized. The following limitations were identified in this study:

1. Likert scales distortion due to central tendency bias or the participants making an "attempt to portray themselves in a more favorable light" known as social desirability bias (University of St. Andrews, 2016, p. 1).

2. Small sample size. Small sample sizes may influence the validity of the study. There are only 49 teachers, which when divided between two groups does not provide many per group. Of course the obvious danger of a small sample size is a lack of power, but also it might lead to improper solutions or bias because the sample is so unrepresentative of the whole (Wolf, et al., 2013).

3. Self-report. Self-reported data are subject to bias across a variety of subjects, which affects the validity of the findings. For example, Holzberger, Philipp, and Kunter (2013) found that teachers might have a positive or negative self-perception bias or a lack of self-awareness. In their study, they were somewhat able to control for this effect by also obtaining student ratings.

4. Sensitivity of the instrument. Hypothesis 3 (some factors have a greater influence on a teacher's decision to use technology than others) is the hypothesis that may need greater sensitivity. Only question 9 asks about what influenced teachers' decisions. The other questions obtain demographic information or types and frequencies of use. If mentor, school, principal, and so on are weighted similarly, it may require a follow up study to determine priorities among these factors. The Likert scale forced choice among five possibilities may not be sufficient to make nuanced judgments (Cummins & Gullone, 2000).

Although the questionnaire was confidential, subjects may have had concerns that their responses could be linked to them. To prevent an infringement on confidentiality, this researcher preserved the data collected through the on-line survey. Each respondent

was provided access to the survey, and the researcher was the only person with access to the questionnaire data.

Sampling

The sampling method utilized in this study is the purposive sampling method. The purposive sampling method is also the "judgmental, selective or subjective sampling" and is also "a type of nonprobability sampling technique" (Laerd, 2016, p. 1). The work of Tongco (2007) entitled 'Purposive Sampling as a Tool for Informant Selection" states that purposive sampling is utilized as the "sampling method for informant selection" when the "question the researcher is interested in answering is of utmost importance" (p. 146). The steps in purposive sampling as related in the work of Tongco (2007) include those listed in the following table.

Figure 3 - Steps in Purposive Sampling

1. Decide on the research problem.

2. Determine the type of information needed.
    - Information from every individual in the community is potentially valuable > use random sampling
        - o Time and resources are too limited for random sampling > use purposive sampling with caution
    - Information is held by only certain members of the community > use purposive sampling
        - o Information needs a high degree of interpretation regarding cultural significance > use key informants

3. Define the qualities the informant(s) should or should not have.

4. Find your informants based on defined qualities.
    - Research about the area and community.
    - Ask for help before going to the site and upon arrival at the site.
    - Realize finding informants may be a trial and error process. Be patient and persistent!

5. Keep in mind the importance of reliability and competency in assessing potential informants.

6. Use appropriate data gathering techniques.

7. In analyzing data and interpreting results, remember that purposive sampling is an inherently biased method.
    - Document the bias.
    - Do not apply interpretations beyond the sampled population.

Source: Tongco (2007)

According to the work of Tongco (2007), purposive sampling is such that can be utilized "with a number of techniques in data gathering. A study may be started with a survey, then purposive sampling done based on the survey" (p. 147). The work of Robbins et al (1969) is reported to have made use of a questionnaire "as a systemic way to find informants in a study about acculturation. Tongco (2007) additionally reports that there is no existing "cap on how many informants should make up a purposive sample, as long as the needed information is obtained" (p. 152). The work of Seidler (1974) is reported to have undertaken a study of various sizes of informant samples that were chosen through purposive selection and reported, "at least five informants were needed for the data to be reliable" (Tongco, 2007 p. 152). Purposive sampling methods are useful in qualitative study (Tongco, 2007). Tongco (2007) reports that there is danger using the purposive sampling method in that the "researcher exercises judgment on the informant's

reliability and competency" (p. 153). Therefore, the researcher must necessarily be "certain of the knowledge and skill of the informants when doing purposive sampling, as inappropriate informants will render the data meaningless and invalid. The survey was piloted informally, using five central office administrators. The survey was refined based on their feedback.

Summary

The purpose of this study was to examine the use of technology in Maryland classrooms by teachers as well as the proficiency of teachers in using technology in the classroom as compared to the requirements of the Maryland standards set out for technology use in the classroom. This chapter has set out the conceptual framework of the study and has stated the focus of this study to examining the proficiency of teachers in relation to the needs of students in the areas of the: (1) use of technology in Maryland classrooms; and (2) the proficiency of teachers to use this technology in Maryland classrooms in accordance with Maryland standards on the use of technology in classrooms. This study intended to identify the areas that need to be changed in order to support the use of technology in Maryland classrooms in accordance with the Maryland standards on technology use in classrooms. The research design in this study is quantitative in nature and was conducted through use of questionnaire/surveys among forty-nine teachers from a high school centrally located in a public school district in Maryland. There were differing types of information gathered through use of a survey. The survey was used to collect information about the available technology at the school in this study and how comfortable the staff was in using this available technology. Additionally, the survey was used to reveal how often available technologies are being

used and who is using them. Studied as well was the characteristics of teachers that influence their use of technology. This study was expected to find that there were various influences and characteristics that affect teacher use of available technology including lack of professional training and proficiency in using the available technologies. The questionnaire/surveys analyzed through use of quantitative analyses and the results reported in the following chapter in this study.

Section III: Results

Introduction

The purpose of this study was to investigate the variation in teacher integration of technology in the classroom. In order to fulfill this purpose data was collected from teachers regarding the different factors they perceived as the most influential on their use of technology in the classroom. A total of 44/49 participants, or 90%, provided responses to the questions asked. In presenting the analyzed data, the answers are divided based on the question being asked for the purposes of providing clarity in analysis and increased readability.

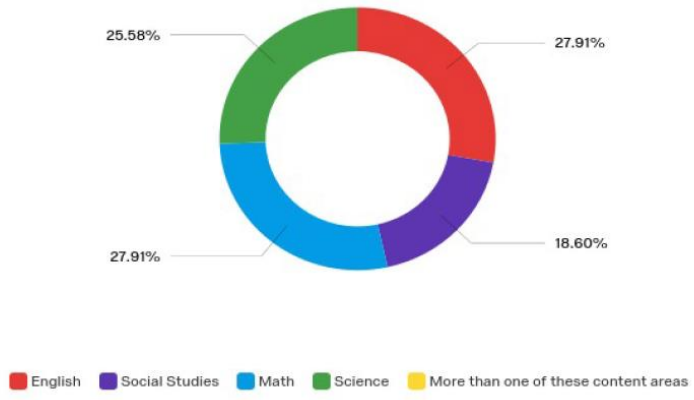
Results

Prior to being able to provide an effective resolution to the identified research questions, it becomes necessary to review the data collected, analyzing it for the identification of emerging themes within the collected data. Once these themes have been identified, it becomes possible to effectively answer the research questions and make recommendations regarding potential areas of future study. In analyzing the results on a question by question basis and then synthesizing the analyzed data with the collected, synthesized literature review, it becomes possible to not only increase the validity and reliability of the study through confirmation of previously identified generalities to the field, it likewise becomes possible to determine the areas in which the identified gap has been reduced and in which areas further gaps have been identified that warrant additional exploration.

Subject Taught

Teachers were first requested to indicate the subject area in which they primarily taught. The options they had to select from were English, social studies, math, science, or more than one of these content areas. The answers were fairly evenly divided amongst the different areas, with English and math receiving the highest number of responses, tied at 12 responses for each area. One individual elected to abstain from answering, resulting in a total of only 43 answers for this particular question. It was believed that this and other demographic data collected on teacher participants would serve as a means of identifying possible trends within other responses. Figure 3.1, below, provides a breakdown of the responses received.

Figure 3.1: Subject Taught

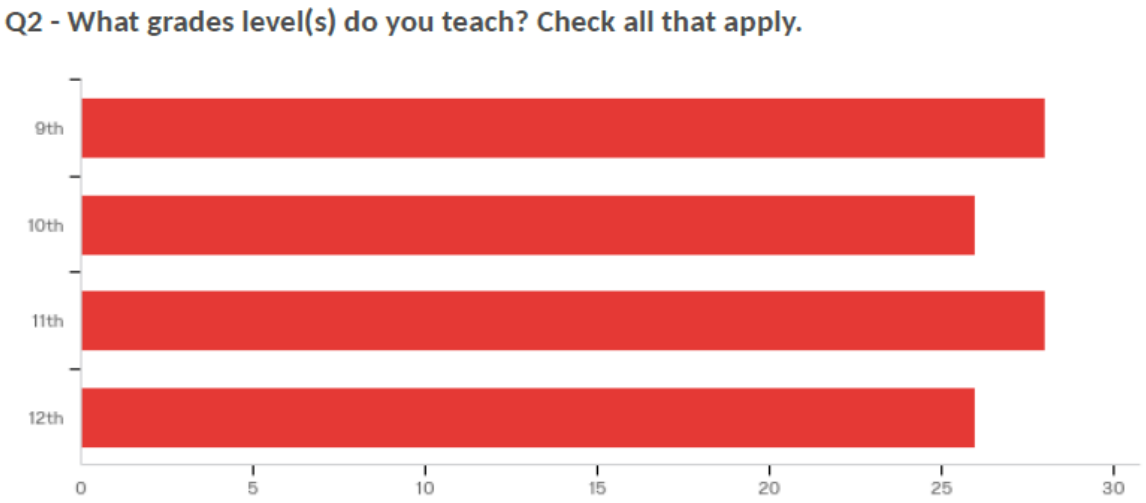


Grade Level Taught

As with the subject level taught, the researcher wished to identify certain demographic characteristics of teachers to assist in determining whether these demographic factors affected or influenced the likelihood of technology integration within the classroom setting. In order to gain a better understanding of the data collected,

teachers were also asked to indicate the grade level at which they taught. As the study was only open to high school level teachers, the options available for selection included 9th, 10th, 11th, and 12th grade. If a teacher was responsible for teaching a class to more than one grade level, he or she had the option of making multiple selections, however only 44 answers were received. As with the subjects taught, the results were somewhat evenly divided, with the highest number of teachers indicating participation in 9th and 11th grade respectively, with a total of 28 responses in each of the two categories. Figure 3.2, below, indicates a breakdown of the responses.

Figure 3.2: Grade Level Taught

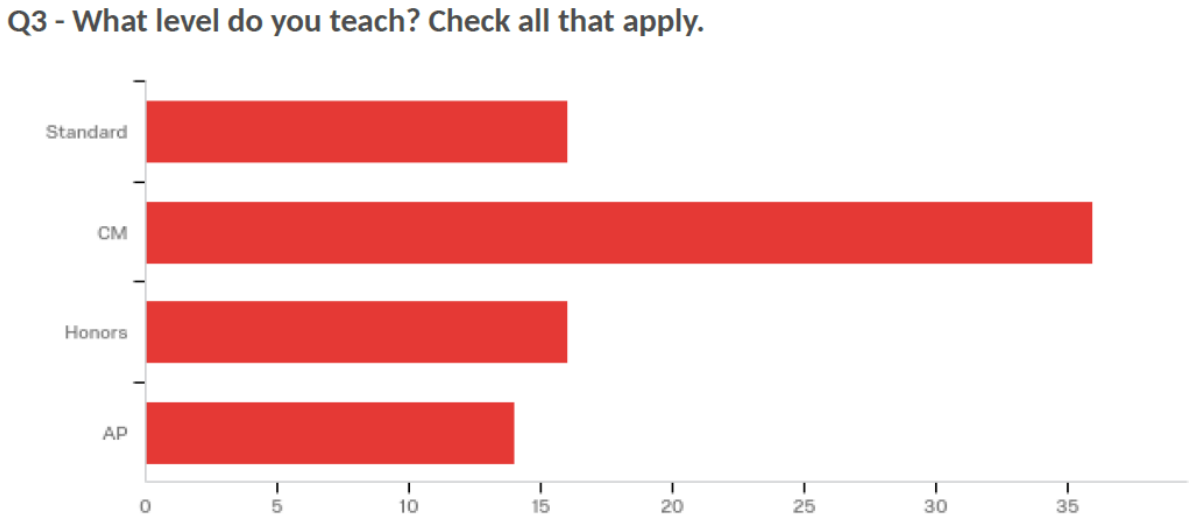


Skill Level

The identification of the skill level being taught by the teachers was believed to have a potential bearing on the influences of technology integration within the classroom and the actual integration of technology within the classroom. In order to determine whether the student learning level affected the utilization of technology in the classroom,

teachers were asked to indicate the level that they taught, whether they presided over a standard course, where pacing is adjusted to allow for increased instructional scaffolding and extra processing time for students; a Certificate of Merit (CM) course, where specified courses are required that are more rigorous than standard level courses and have a World Language requirement; an honors course, where students demonstrate an advanced ability on coursework and assessments; or an Advanced Placement (AP) course, where more complex and rigorous academic content are offered to highly able students. The responses to this question were more varied, with the majority of participants, 81.82 percent, indicating that they taught a CM course. Honors courses and standard courses were tied at 16 teachers per level, with the least amount of teachers teaching at the AP level, 14.

Figure 3.3: Course Skill Level

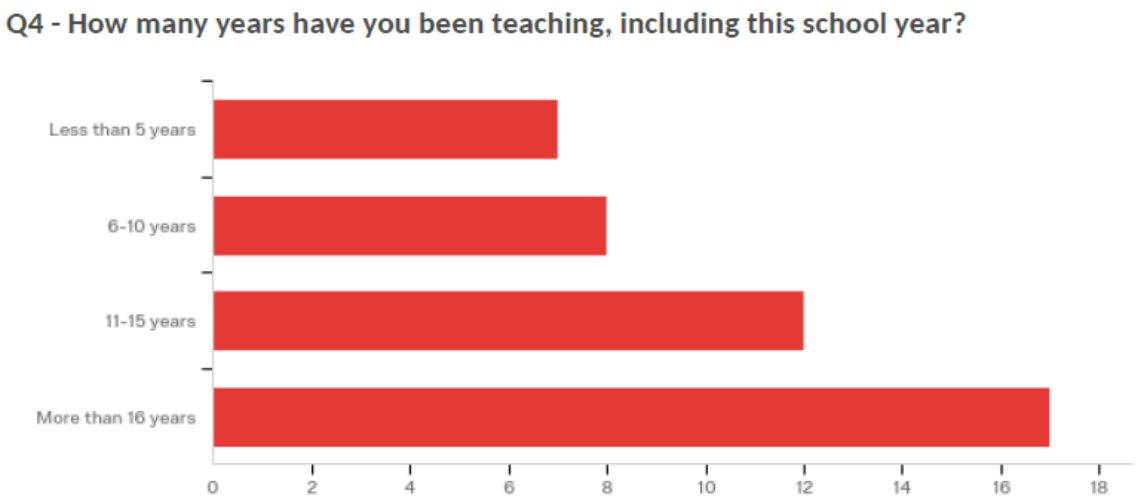


Years as a Teacher

Respondents were next asked to indicate the approximate number of years that they had been teaching. This was the final piece of demographic data requested from participants. It was believed that there could be a possible correlation between the amount of time that the individual had been a teacher and his or her likelihood to accept increased technology integration within the classroom and, what's more, increase or decrease his or her own integration of technology within the classroom. In order to collect data on this demographic statistic, date ranges were provided for participants to indicate the number of years in which they had been working in a teaching position. Possible option choices ranged from less than five years to more than 16 years. Respondents were requested to take into account the current school year, though not yet completed, in identifying the number of years taught. Responses for this particular question were more widely dispersed. Over 50 percent of respondents had been teaching for more than ten years. Overall, the choice that had the greatest number of responses was more than 16 years,

with 38.64 percent of respondents, or 17, indicating they had been teaching for this duration.

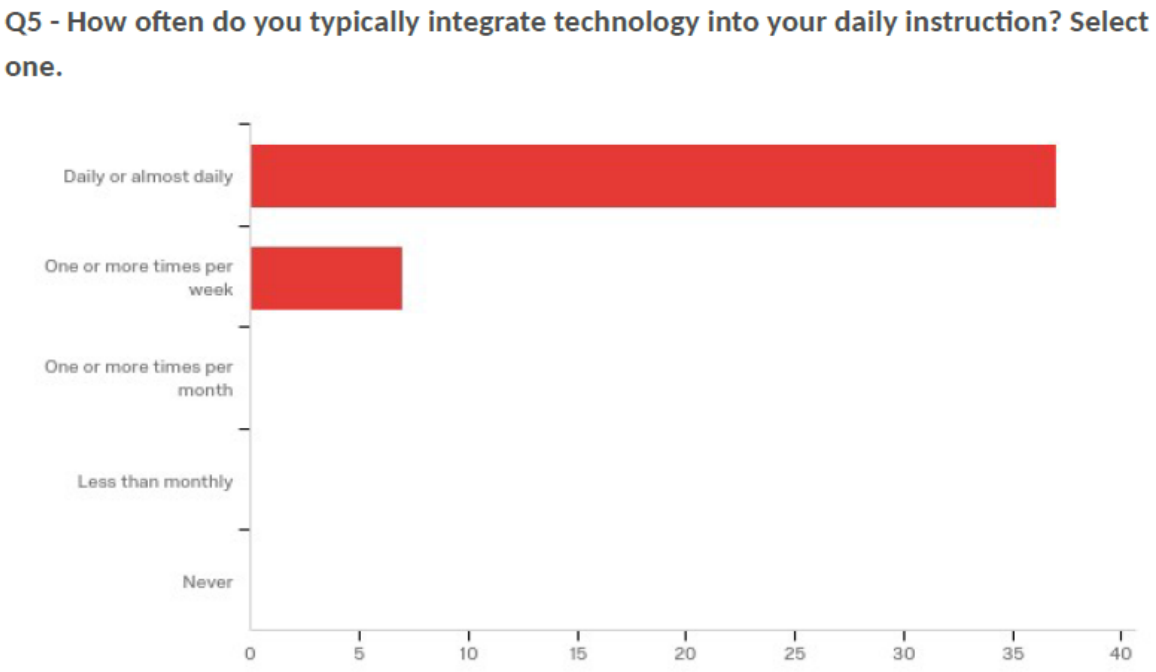
Figure 3.4: Years Teaching



Technology Integration

After the collection of basic demographic data indicating that all teachers were single subject teachers, that they were roughly equally dispersed across all levels of high school, taught primarily in CM courses, and that the majority had taught for more than ten years, participants were next asked to identify the frequency in which they integrated technology within daily instruction in the classroom setting. Possible choices available for selection ranged from never to daily or almost daily. All respondents indicated that they used technology within the classroom on at least a weekly basis, with the majority of participants, more than 84 percent, indicating that they used technology in the classroom daily or almost daily. This serves to indicate that there does not appear to be a correlation between the number of years teaching, the subject being taught, grade level, or skill level of the classroom in terms of usage of technology.

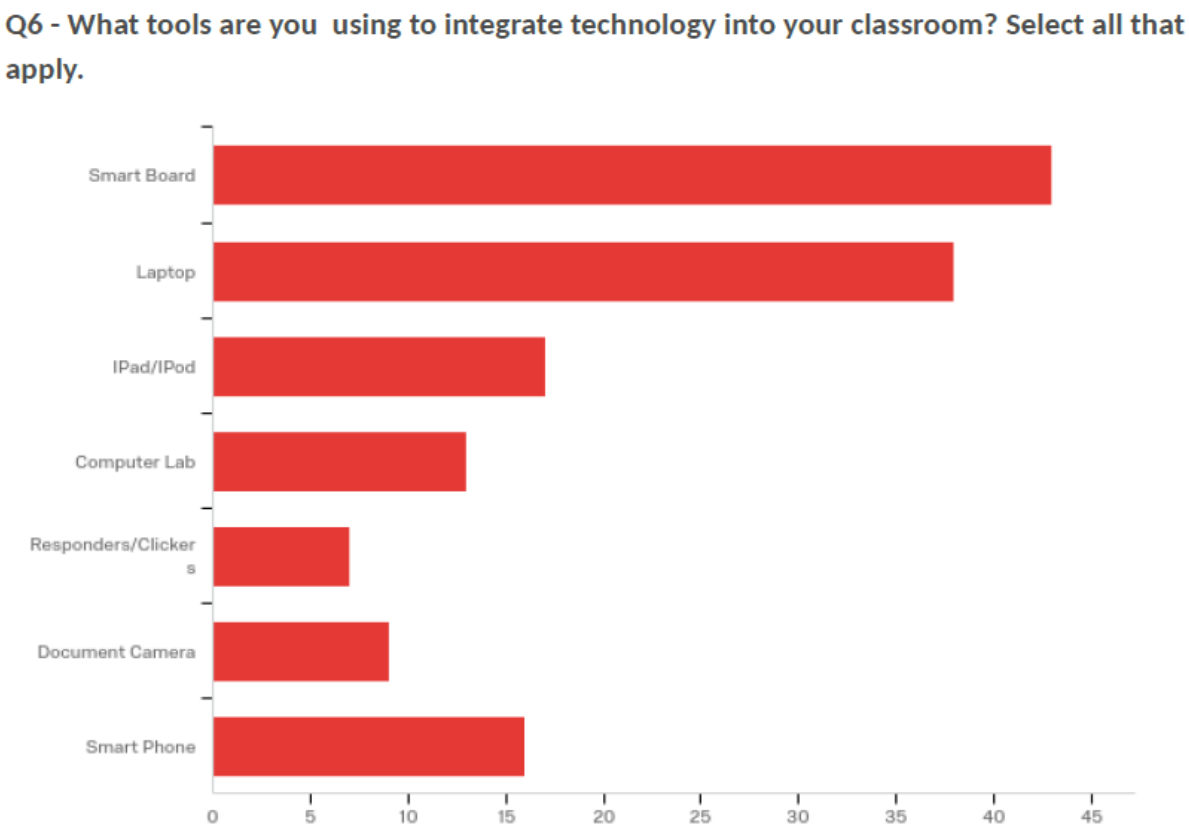
Figure 3.5: Technology integration in the classroom



Tools for Technology Integration

Teachers were next requested to indicate the different types of technology they used in the completion of their classroom lessons. Possible choices included smart board, laptop, iPad, iPod, computer lab, responders/ clickers, document cameras, and smart phones. Participants were requested to indicate all of the different types of technologies used, resulting in a larger number of responses than was obtained on previous questions. The two most commonly used technological tools were the smart board and the laptop, with 43 instances of use and 38 instances of use, respectively. Responders/ clickers were utilized the least, with only seven teachers indicating their use in the classroom setting.

Figure 3.6: Tools/ technologies used in the classroom

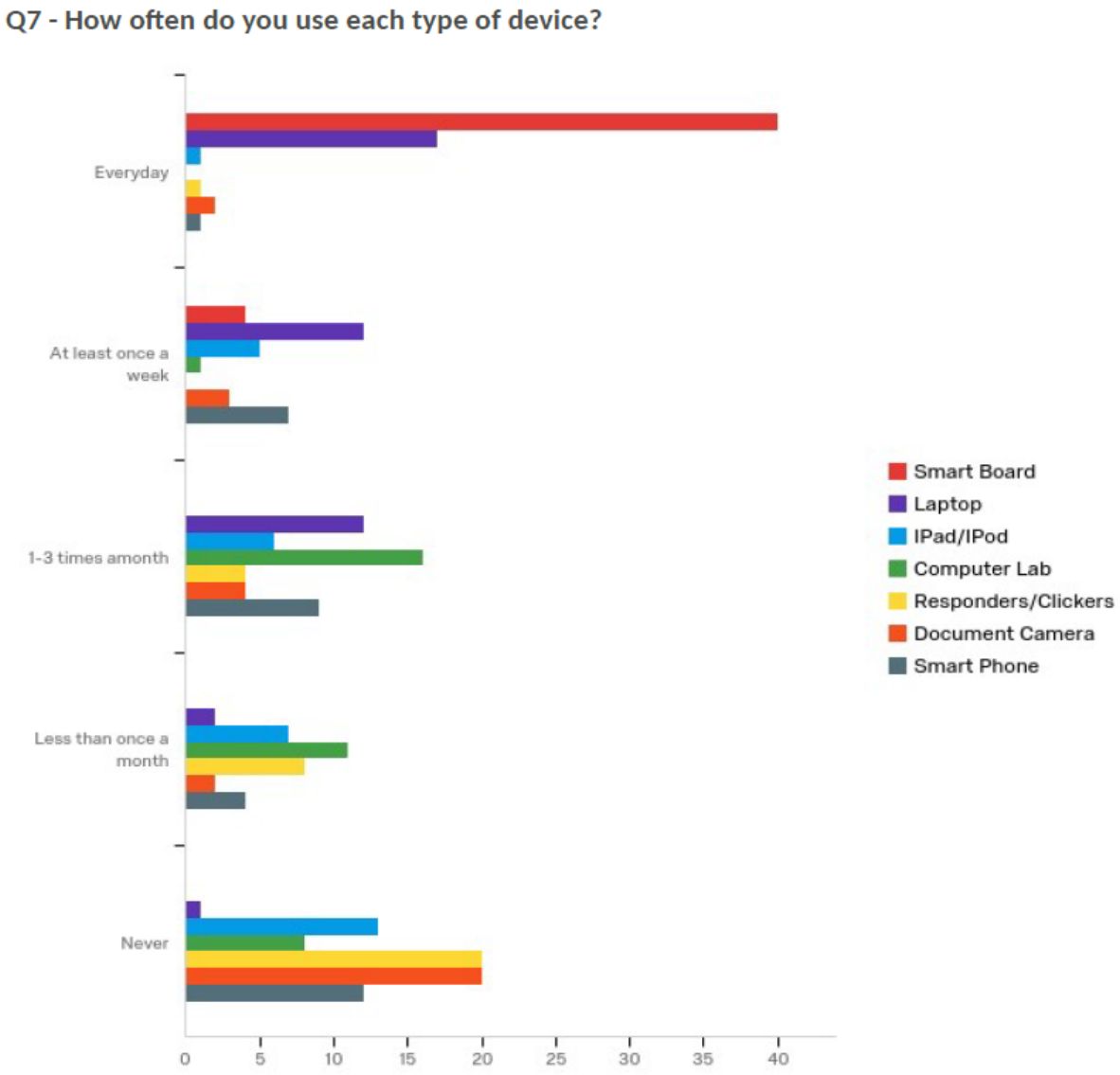


Device Usage

It was not enough to simply identify the types of technology used within the classroom setting. It was also important to identify the amount of use that each teacher got from each of the different types of technological devices being discussed. For each of the types of technology identified in the previous question teachers were asked to provide an indication of how frequently they used the particular tool. Answer choices included every day, at least once a week, one to three times a month, less than once a month, and never. The purpose of this question was to identify the types of technology that receive both the most and least frequent usage within the classroom setting. Responses received

indicated that the most commonly used piece of technology within the classroom was the smartboard, used by 40 of the 44 participants on a daily basis. The laptop was the second most commonly used piece of technology on a daily basis, followed by the document camera. Respondents indicated that the laptop was the most commonly used weekly item, followed by the smart phone, and then the iPad or iPod. The responders/ clickers were the least frequently used item, along with the document camera, with the majority of participants indicating that they never used either of these items.

Figure 3.7: Frequency of technology device usage

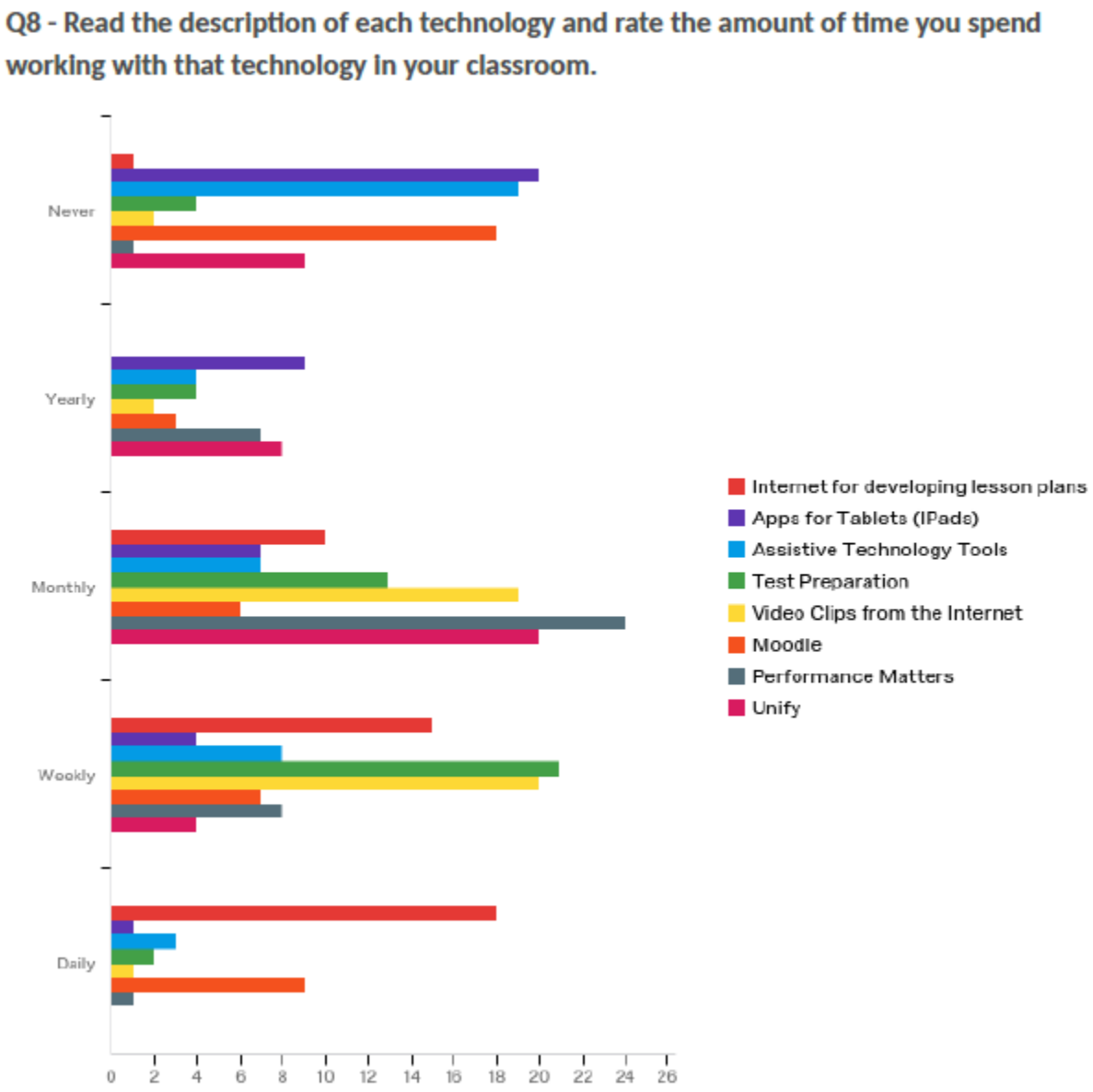


Amount of time spent working with a device

Question 8 had a different format from all of the previous formats. Participants were asked to read the different descriptions of tasks completed through the use of various types of technology and then indicate the amount of time that they spent working with that type of technology in the completion of the identified task within the classroom setting. There were eight different areas of technology application identified. These included the use of the internet to develop lesson plans, using apps on tablets (iPads), the

use of assistive technology tools, test preparation, video clips from the internet, Moodle, performance matters, and unify. Participants were asked to indicate whether they completed each of these technology based tasks daily, weekly, monthly, yearly, or never. Participants indicated that the most commonly used daily integration of technology in the classroom was the use of the internet for the development of lesson plans, followed by the use of Moodle, an online classroom platform. Weekly, the most commonly used integrations of technology within the classroom were test preparation, followed closely by video clips from the internet. On a monthly basis, performance matters and unify were most commonly employed. The idea behind this question was to see the likelihood of use of the different types of technologies. The data collected, however, simply served to indicate that different tools were used at different times based on the utility of the tool itself. For example, the frequency of use of the performance metrics software likely correlates with the submission of grades, and would not be a piece of technology used frequently. Indeed, the amount and frequency of technology usage based on functionality of device and device type seems normal within a classroom context.

Figure 3.8: Technology integration within the classroom

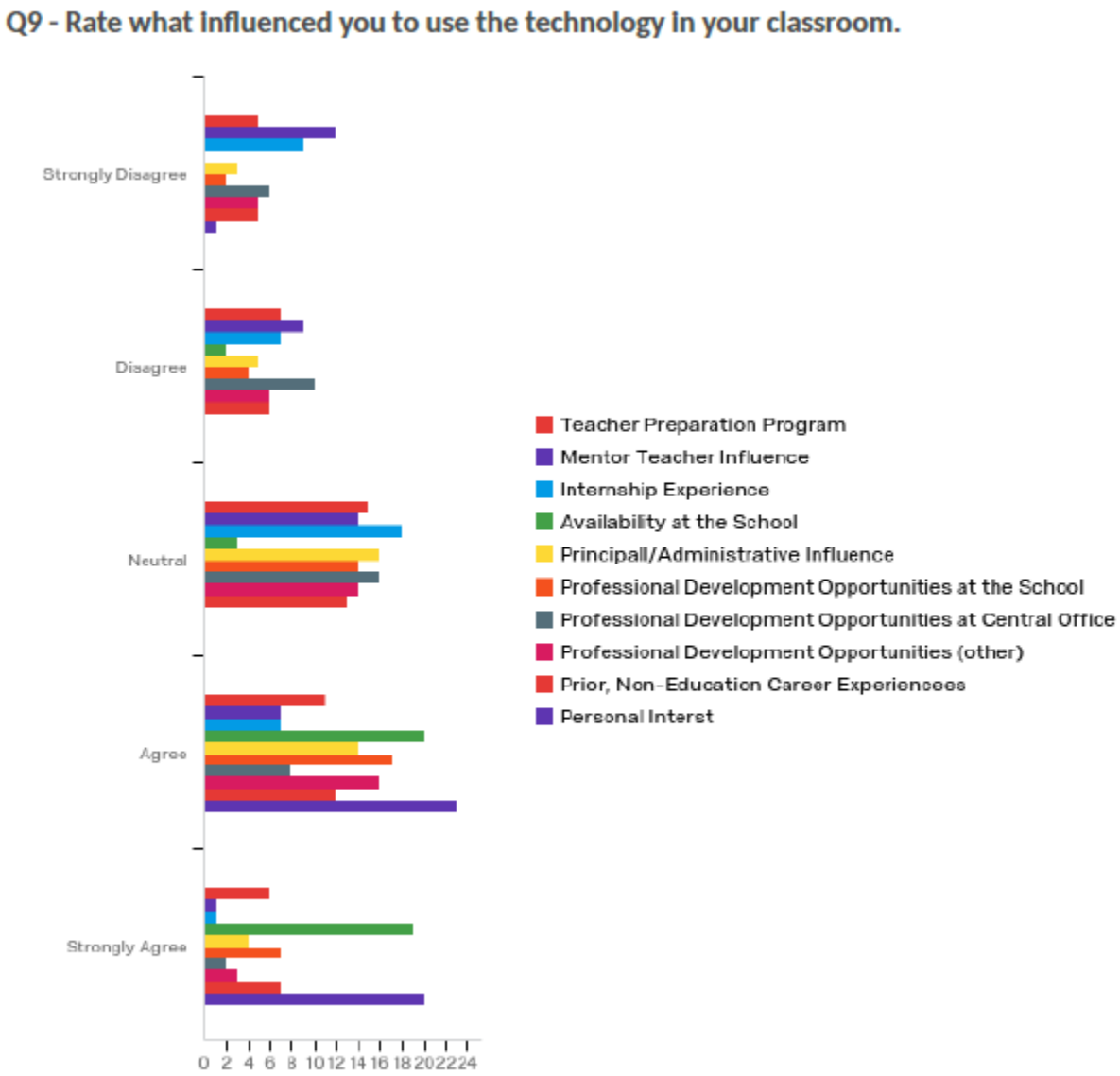


Influencers of technology use

The next question asked teachers to identify the aspects that were most likely to influence the use of technology within the classroom setting. Possible choices were teacher preparation programs, mentor teacher influences, internship experiences, availability at the school, principal or administrative influence, professional development

opportunities at the school, professional development opportunities at the central office, professional development opportunities (other), prior, non-education career experiences, and personal interest. For each of these different categories of influence, participants were asked to indicate whether they strongly agreed, agreed, were neutral, disagreed, or strongly disagreed that the aspect had influenced their use of technology integration within the classroom setting. The results indicated that personal interest in the use of the technologies and the availability of the technology at the school were the primary motivating factors regarding use of technology within the school setting. In these areas and in the use of professional development opportunities at the school, the primary reasons for the integration of technology within the classroom setting were identified.

Figure 3.9: Influencing Factors for Technology Integration in the Classroom Setting



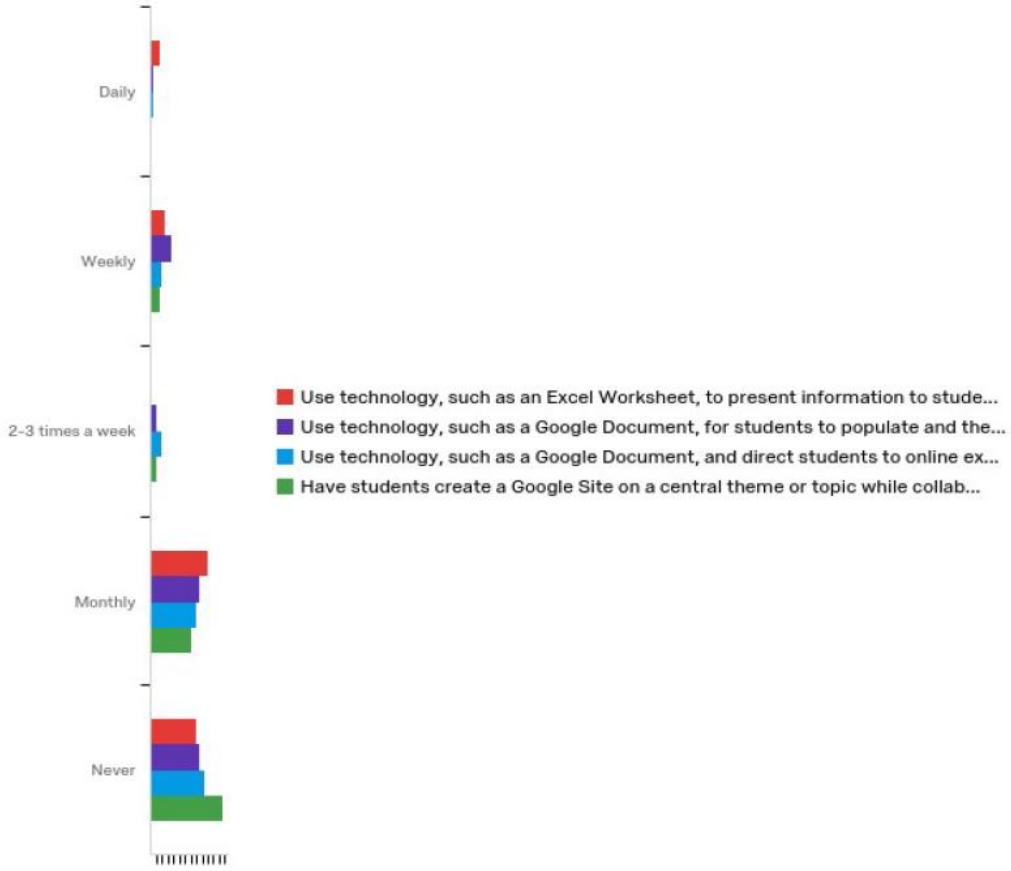
Potential Future Incorporations of Technology in the Classroom Setting

In the second to last question asked of participants was to review the different potential technology integration options provided and indicate the possible frequency in which they would be likely to incorporate the activity within the classroom setting. Activities teachers were asked to rate in terms of their potential likelihood of use included the use of technology, such as an Excel worksheet; to present information to students, the use of technology, such as a Google Document, for students to populate and then for the teacher to provide comments directly on the document; the use of technology, such as a Google Document, to direct students to online examples with supplementary learning materials on the topic provided, providing teacher comments on the completed document; and have the students create a Google site on a central theme or topic while collaborating with other students, presenting this site along with information learned on the central topic. Teachers had the option of indicating that they would never use one of the recommended technology integrations within the classroom, that they would use the technology integration on a monthly basis, 2 to 3 times per week, weekly, or daily. The majority of respondents indicated that they would not use such technologies as a means of classroom integration at all. Others indicated that they might use them monthly, but very few individuals indicated that they would use them more frequently than that. While an argument could be made toward a refusal to incorporate additional technologies within the classroom based on the negative responses received to the possible future integrations of technology recommended within the context of this question, closer review of the potential responses indicates that no assumptions can be made. The use of these technologies in the identified manner would have the potential to pose an issue for the

teacher in terms of awareness of the individual completing the work. Some suggestions, like the creation of a project by the student using current technologies, which require a definite finished product that cannot be replicated or duplicated from one student to the next work to allow the teacher to integrate technologies within the classroom setting without creating additional problems. In these such instances, there was positive support for the potential future integration of such a recommendation, indicating that the concern on the part of the teacher is not associated with any generalized integration of technology, but is instead focused on the integration of specific types of technology within the classroom setting and the benefit of the same versus the potential detrimental side effects associated therewith.

Figure 3.10: Possible future integrations of technology in the classroom setting

Q10 - Read the instructional activities below and rate how often you might incorporate an activity such as these in your classroom.

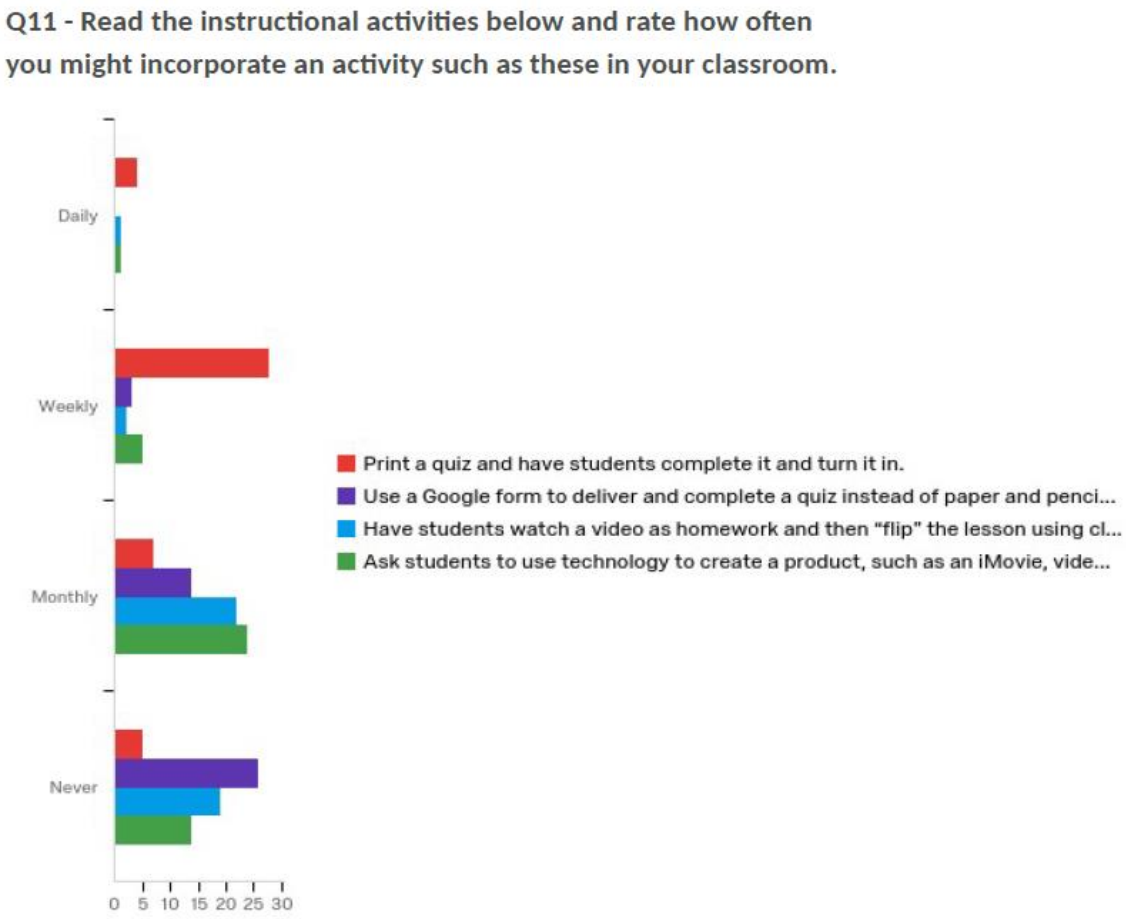


Potential Future Incorporations of Technology in the Classroom II

The final question asked of participants was identical to the last, with participants indicating the frequency in which they may be willing to incorporate possible technologies in the classroom setting in the future. Four different activities were presented this time, including: printing a quiz and having students complete it and turn it in; using a Google form to deliver and complete a quiz instead of paper and pencil; having students watch a video as homework and then flip the lesson using class time to discuss and reinforce what was presented in the video; and asking students to use technology to create a product such as an iMovie, video, website, or Twitter account, answering an essential question and providing original examples. The choices provided to this question were daily, weekly, monthly, and never. The majority of respondents indicated they would be likely to print a quiz on a weekly basis, that they would ask students to use technology to create a product on a monthly basis, that they would have students watch a video for homework and discuss it in class on a monthly basis, and would never use a Google form to deliver a quiz. Figure 3.11 indicates the different responses received for each category of possible technology integration and at what frequency they would be likely to implement such options within the classroom setting. The preference on the part of teachers seems to be the best means of technology integration while working to decrease the likelihood of potential cheating on the part of students. Google Docs allows for the editing of a document by multiple individuals, and although it does require login to be able to make changes, and that the login has permissions to make changes, as opposed to simply view the document, there is no indication based on handwriting or other similar markers that the person whose login is

used is the person who completed the assignment. In this, the choices made by the teachers appear to err toward caution and a knowledge of the potential for issue with the proposed technology integration solutions.

Figure 3.11: Potential future technology integration



Synthesis

In reviewing the analyzed data in the context of the reviewed literature, there are certain aspects that stand out, either due to their contradiction with the current body of literature or as a result of their support of the current body of literature. While the first topic discussed within the context of the literature review, associated with the benefits

received as a result of the integration of technology within the classroom setting, but a decreased amount of usage due to availability of funds, cannot be explored within the context of the collected data given the fact that the budgeting of funds is an administrative level and not a teacher level task, this does not mean that other areas cannot be explored within the context of the literature. Areas pertinent to the collected data and not solely associated with the presentation of generalized background information are reviewed within the context of the analyzed data.

One of the potential causes identified as a reason for the lack of technology integration within the classroom setting was a lack of teacher experience or a lack of a teacher comfort level with new technologies. Researchers have shown that individuals in general have difficulties adopting new practices and new methods of doing things (Taplin & Clark, 2012). Based on the data collected for the purposes of this study, it must be stated that such is not a viable reason for a lack of technology integration within the classroom setting. The majority of respondents had been teaching for over ten years; of those, more had been teaching for more than sixteen years. Technologies in use within the classroom today came out during this time period, and respondents indicated that they used such technologies with a high degree of frequency. The high frequency usage of smart boards, laptops, the internet, and Moodle, among others, serves to indicate that fear of change does not affect the integration of technology within the classroom setting.

Looking at the matter through the SMAR Model, the data collected does not support the true application of this model (Puentedura, 2009). While the model serves to illustrate the progression that technology adopters go through as they use technology to support instruction in the classroom, the progression of technology adoption in the

classroom was not one of the aspects explored through the survey instrument. Results indicated that all participants had adopted the use of technology within the classroom setting on a highly frequent basis, indicating that the participants were at the acceptance stage for classroom technology integration. The teachers indicated that they used the tools frequently, and the frequency of that usage indicated a familiarity with the technologies (Dawson & Rakes, 2003). While the integration of technology on the part of teachers can work to influence the use of technology within the school setting as a whole and can increase the use and frequency of such technologies by students, data was not collected on student technology use within the classroom setting of the participating teachers; furthermore, the frequency and use of technology by administrators was likewise not documented, creating an area that will warrant further exploration.

The district policies and the school policies will have an effect on the integration of technology within the classroom as well as influencing the technology budget for the district (Tondeur, 2008). These district and school level policies can in turn affect leader support for the integration of technology within the classroom setting, which can likewise influence the likelihood of teachers to integrate technology within the classroom setting (Tondeur, 2008). The district level and school level policies were not documented due to the need to maintain anonymity and confidentiality of participants. Furthermore, administrators were not included in the completed study, so the effects of leadership on technology integration within the district would need to be explored within a subsequent study.

Millen and Gable (2016) indicated that the majority of research focuses on a single innovation as opposed to looking at a technology cluster within the classroom,

even though the adoption of one technology might lead to the adoption and integration of other technologies within the classroom setting. While this study did not explore technology clusters within the context presented by Millen and Gable (2016), the results do indicate that teachers are integrating multiple types of technologies within the classroom setting, regardless of subject being taught, years working as a teacher, skill level being taught, or grade level being taught. Furthermore, the results indicate that teachers are utilizing those technologies on a frequent basis; this lends credence to the idea of a technology cluster adaption within the classroom setting; however additional research would be necessary in order to confirm.

Conclusions – Resolution of the Research Questions

Three primary research questions were identified for resolution during the course of this study. The first research question stated was "Does the frequency of teacher integration of technology vary by content area?" The second research question stated was "Does the level of technology use, based on the SAMR model, vary by teachers' demographic characteristics?" The final research question asked was "What factors do teachers indicate influence their decisions to integrate technology into their classrooms?" Looking at each of these questions in order and in relation to the collected, analyzed data, it becomes possible to see the resolutions affected.

First, the results indicate that the frequency of teacher integration of technology did not vary by content area. The content areas of the participants were roughly evenly split between the primary areas of instruction. No one area indicated a higher integration of technology than another.

Second, the level of technology use did not vary by any of the other demographics collected on the teachers themselves. If the SAMR model is applied within this context, it is possible to see that there is still no change. Overall, all teachers employed multiple forms of technology in the classroom, with a similar degree of frequency. While some technologies were implemented more than others, there was no teacher who indicated a lack of use of technology in the classroom, indicating that the integration of technology in the classroom and the likelihood and frequency of the same is affected by other outside influences, most likely at the administrative or district level.

Finally, the primary factors that teachers indicated influenced their decisions to integrate technology within the classroom setting, were concentrated in three areas. The results indicated that personal interest in the use of the technologies and the availability of the technology at the school were the primary motivating factors regarding use of technology within the school setting. In light of this, to the degree in which teachers have control over the amount of technology integrated within the classroom setting, the greatest area of influence was personal preference in using the technologies. Accessibility to technologies is crucial in the integration of technology within the classroom, but such an area cannot be fully explored within the context of this study. Access to technologies includes factors such as the technology budget for the school, the types of technologies available to teachers through the school itself, and other such considerations. While it is possible for a teacher to gain additional technologies for the classroom through the writing and obtaining of grants outside of the school specific technology budget, this is a less frequent occurrence, given the number of individuals in competition for those grants.

Recommendations

Should this study be recreated in the future, several changes are recommended. First, it is recommended that the survey questions be modified in order to collect additional data regarding technology integration in the classroom, including the level of accessibility of those devices used. If the school is in a low income district, it may be possible that teachers have to check out technologies from the library, with limited quantities to go around, which could affect the ability of the teacher to integrate technologies within the classroom setting. Additionally, it is recommended that an alternative framework theory be employed, due to the primary association of the framework with student adoption and the collection of data at the teacher level. It is further recommended that a second questionnaire be created for the purpose of collecting additional data from administrative personnel regarding the capabilities of technology integration at a practical level. In spite of these recommended changes, should this study be recreated, areas of future study were likewise identified as a result of data collected.

In keeping with the extant body of literature, it is recommended that an additional study be conducted to determine what benefits of technology integration within the classroom setting are identified in schools transitioning from no technology integration within the classroom to the integration of technologies within the classroom setting. Researchers indicated that higher levels of technology use worked to increase student engagement and improve achievement levels in students (Grinager, 2006; Schacter, 1999; Zielezinski & Darling-Hammond, 2014). In light of the presentation of such information within the extant body of literature, documentation of a no-technology classroom

transitioning to a technology integrated classroom should provide more concrete data on this phenomenon.

As previously indicated, should the study be recreated, it is recommended that the SAMR model not be implemented; however, this does not mean that a study should not be conducted that does employ that framework. Researchers indicated that the progression of technology integration and the frequency of use of such technologies by students indicates how the integration of technology can change the teaching and learning process. In order to more appropriately explore this topic within the construct of this framework, the integration of a new technology would need to be introduced within the classroom setting, observing the changes in teachers and students alike in order to effectively determine the successful or unsuccessful application of the theory within the context of this topic.

It is further recommended that an exploration of the district and school level policies and their effects on technology integration be explored. In order to identify the true level of influence of policies at each of these levels, a multiple case study should be conducted, looking at the school level policies of multiple schools within a given district and then comparing those to the district level policies and the school level policies of schools in another district. The results of the comparative data would allow for a confirmation or refutation of Tondeur's (2008) theories regarding the level of effect that varying policy levels have on classroom technology integration.

It is further recommended that the cluster adoption of technologies within the classroom setting be explored, identifying what technologies serve as primary adopter technologies and which technologies serve as satellite technologies, implemented after

the primary technology and as a result of the technology. Identification of primary technologies that result in cluster adoptions could assist in improving technology integration, particularly in schools wherein the budget for technologies is not high. In working to complete studies in each of these different areas of recommendation it will be possible to work to further reduce the gap in the literature while at the same time working to advance this particular field of knowledge. As our society becomes increasingly technologically connected, there is a definite need to determine what the effects of that technology integration are and, in cases where the effects are positive, such as technology integration within the classroom setting, identification of the influencing factors that can serve to provide boosts to those areas.

Appendices

Appendix A: Survey Instrument

1. What subject do you teach?

English

Social Studies

Math

Science

Math

2. What grade levels do you teach?
Check all that apply.

9th

10th

11th

12th

3. What level do you teach? Check all
that apply.

Standard

CM

Honors

Advanced Placement

4. How many years have you been teaching,
including this school year?

Less than 5 years

6-10 years

11-15 years

More than 16 years

5. How often do you typically integrate technology into your daily instruction? Select one.

Daily or almost daily

One or more times per week

One or more times per month

Less than monthly

Never

6. What tools are you using to integrate technology into your classroom? Select all that apply.

Smart board

Laptop

iPad/iPod

Computer lab

Responders/clickers

Document camera

Smart phone

7. How often do you use each type of device?

	Every day	At least once a week	1-3 times per month	Less than once a month	Never
Smart board	5	4	3	2	1
Laptop	5	4	3	2	1
iPad/iPod	5	4	3	2	1
Computer lab	5	4	3	2	1
Responders/clickers	5	4	3	2	1

Document camera	5	4	3	2	1
Smart phone	5	4	3	2	1

8. Read the description of each technology and rate the amount of time you spend working with technology in your classroom.

	Daily	Weekly	Monthly	Yearly	Never
Internet for developing lesson plans	5	4	3	2	1
Apps for tablets	5	4	3	2	1
Assistive technology tools	5	4	3	2	1
Test preparation	5	4	3	2	1
Video clips from the Internet	5	4	3	2	1
Moodle	5	4	3	2	1
Performance Matters	5	4	3	2	1
Unify	5	4	3	2	1

9. Rate what influenced you to use the technology in your classroom.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Teacher preparation program	5	4	3	2	1
Mentor teacher influence	5	4	3	2	1
Internship experience	5	4	3	2	1
Availability at the school	5	4	3	2	1
Principal/administrative influence	5	4	3	2	1
Professional development opportunities at the school	5	4	3	2	1
Professional development opportunities at central office	5	4	3	2	1

Personal interest 5 4 3 2 1

10. Read the instructional activities below and rate how often you might incorporate an activity such as these in your classroom.

	Daily	Weekly	Monthly	Never
Print a quiz and have students complete it and turn it in.				
Use a Google form to deliver and complete a quiz instead of paper and pencil.				
Have students watch a video as homework and then "flip" the lesson using class time to discuss and reinforce what was presented in the video.				
Ask students to use technology to create a product, such as an iMovie, video, website, or Twitter account, answering an essential question and providing original examples.				

11. Read the instructional activities below and rate how often you might incorporate an activity such as these in your classroom.

	Daily	Weekly	Monthly	Never
Use technology, such as an Excel Worksheet, to present information to students.				
Use technology, such as a Google Document, for students to populate and then for you to provide comments directly on the Google Document.				
Use technology, such as a Google Document, and direct students to online examples with supplementary learning materials on the topic. Provide teacher comments on the Google Document as students work through the supplementary materials provided.				
Have students create a Google Site on a central theme or topic while collaborating with other students. Present the Google Site along with information learned about the				

central theme or topic.				

Appendix B: School Principal Participation Recruitment Email

Re**:** Examining Factors that Influence Technology Integration in the Classroom Survey
From: XXX (XXX)
To: SMCPS High School Principal (Insert Name)

Dear (Insert Name), High School Principal,

I am inviting you, as the Principal in one of our high schools housing grades 9-12, to assist in my study to identify factors that influence technology integration in the classroom. The information gathered could assist our schools and district in strengthening technology use in the classroom to support our goals for increased student achievement and college and career-readiness.

This study will focus on High School English, social studies, math and science teachers. The research is being conducted as part of my dissertation under the direction of Dr. XXX, Professor, at the University of XXX and has been approved by Dr. XXX, SMCPS Chief Strategic Officer.

The research will consist of an online survey administered to high school English, social studies, math, and science teachers. I am requesting your assistance in forwarding a recruitment email to each of your teachers in these respective departments. The survey instruments for my study will be accessible through the University of XXX secure and confidential Qualtrics survey platform link. Each person who receives the recruitment email will be able to directly access the survey through a specific link. Upon accessing the link each person will find an Informed Consent form. Upon agreeing to participate, the survey will open. If someone does not consent to participate, the survey will close.
Please note that the survey is being conducted through "Anonymous Distribution," thereby providing anonymity and confidentiality to the data collection process. I plan on conducting the study January 3-15, 2017.

If you would like to set up a time to discuss the study with me either in person or over the phone, please let me know. I can provide an overview of the study and discuss the timeline and expectations. If you prefer to discuss this directly with my advisor, please contact Dr. XXX at the University of XXX XXX.edu. At the end of the study, I also plan on sharing the aggregate results with you, your school, and the district.

I would really appreciate your assistance and participation! My goal is to have 100% of your teachers involved complete the survey. If you help me to reach my goal, I will award you and each participant with a $5.00 Starbucks gift card.

Thank you for considering my request and I look forward to hearing from you soon.

Respectfully,

XXX

Appendix C: Survey Recruitment Email to High School English, Social Studies, Math and Science Teachers

Re: Examining Factors that Influence Technology Integration in the Classroom

From: School Principal on behalf of XXX (XXX)

To: High School English, Social Studies, Math or Science Teacher

Dear High School Teacher,

Our colleague, Mrs. XXX, has asked our assistance in collecting data about factors that influence technology integration in the classroom. You are being recruited to participate because you provide direct instruction to high school students in English, social studies, math or science and your experiences are very important. The information gathered from this survey will be able to help SMCPS in strengthening technology use in the classroom.

Her survey is being sent to all English, social studies, math and science teachers in the high school and is part of her dissertation conducted under the direction of Dr. XXX at the University of XXX. The study has been approved by the Institutional Review Board (IRB) of the University of XXX and the SMCPS Office of Strategic Planning.

This study will be conducted through a brief 5 minute survey that you will be able to access electronically through the University of XXX's Qualtrics survey platform link January 3-15, 2017: (insert link here).

When you click on the link, you will find a "Letter of Consent." If you choose to participate in her survey, click "Yes" and the survey will open for you. If you do not choose to participate, please click "No" and the survey will close.

Our goal is to have 100% of our English and social studies teachers complete the survey. As an incentive, Mrs. XXX is offering $5.00 Starbucks gift cards to all participants. Please help her reach her goal of 100% participation!

I encourage you to participate. Please note your employment status in the county will not be affected by your participation or non-participation in this study.

Thank you,

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