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Meeting The Technology Demands of The 21st Century Student

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Author Note

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Abstract

This mixed-method research study examines the scale of technology initiatives, funding options, and the implementation of technology in the classroom in grades four and five in schools in the state of Maine. In this research study, an overwhelming percentage of the fifty-eight schools that responded to a quantitative google survey offer one-to-one technology to their 4th and 5th grade students. A high percentage of those schools are funding their technology initiatives with district funds. Forty-nine teachers of the represented schools responded to a qualitative google survey, and it was found that technology is being used extensively in the classroom to teach and supplement curriculum. Recommendations for school administrators in Maine are to create a technology plan that includes funding a one-to-one technology initiative for grades four and five, and also include the provision of professional development opportunities for teachers, in order to best implement the technology initiative into the classroom.

Keywords: **technology initiative, one-to-one, district funds, implementation, student engagement, curriculum**

Introduction

A 21st-century classroom needs to look at preparing students for a global economy. A global economy can simply be defined as goods and services bought and sold all over the globe. Companies are unlimited in their global opportunities. Students need to be prepared for employment after graduation. Critical thinking, creativity, collaboration, and communication are the 21st Century skills that students need to be exposed to in education (Spires, Morris, & Zhang, 2012). A one-to-one technology initiative provides teachers the opportunity to supply access to students to these skills and immeasurable opportunity for learning. Teachers and students need to work together to promote these changes in the classroom. They both need to be part of the reconstruction and rewriting of the educational playing field (Smith, 2013).

Individualized programming in the elementary classroom allows students to learn at their own pace. Having access to technology devices in elementary classrooms creates opportunity for teachers to provide individualized instruction. Students are encouraged to access leveled academic content using the tools that are provided by technology and to use multiple pathways to show proficiency in content areas. Teachers request technology devices to improve individualized instruction, and to encourage students to have more voice and choice in their learning. Transferring academic responsibility to the student, and allowing learning choices, increases academic performance, and increases students' motivation to learn. In two 4th grade classroom in California, researchers discovered that student access to technology improved testing scores across a two year grade span (Harris, Al-Bataineh, & Al-Bataineh, 2016). To meet the needs of students, and provide teachers with the necessary tools to increase academic

performance, schools might consider making budget adjustments to provide one-to-one devices in elementary schools.

Meeting technology demands, during a time when schools are facing declining resources, is part of school budget conversations. A device in a student's hands allows for a teacher to provide differentiation of instruction, and encourages an increase in student engagement while learning the most current content in a variety of ways. In the State of Maine, as schools implement a proficiency based educational model, they are moving away from the traditional teacher lecture model in order to meet the needs of the individual student. Proficiency based education is an education model that individualizes instruction for students and creates opportunity for students to show proficiency in a standard before moving to the next standard. A classroom becomes a community of individual learners that are all working on their own educational goals to meet proficiency in standards. One to one technology provides the tools that teachers need to encourage students to have voice and choice in their learning. With one to one technology, students can demonstrate learning in a variety of ways. They have a creative outlet. In order for a one to one technology initiative to be productive, teachers need to be involved in the process. Professional development, continuous improvement, and available technology leadership are all integral parts of developing digital literacy for teachers, so that they may provide students with the best possible learning experiences (Anthony, 2012). When considering one to one initiatives, professional development provides teachers with the opportunity to learn best practices to implement technology at their grade level. In order for a technology initiative to be successful, the program needs to be monitored and teachers need input to allow for continuous improvement of the program. Teachers need technology leadership so when they have questions

and concerns, they can reach out to a leader and feel confident and comfortable when they implement technology in the classroom. Technology leaders can be teacher leaders, IT directors, principals, or other technology staff providing support to teachers when they need it to implement a technology initiative in the classroom.

Schools have limited funding and need to understand the benefits and barriers of a technology initiative in order to have accurate information when creating budgets. Barriers of a technology initiative are any obstructions that would inhibit a successful integration in the classroom. When key barriers are removed, technology integration works in the classroom. Technology barriers may include the amount of technology available, and the sustainability of the initial investment. Also considered a barrier, is the location of technology in a school, and the fair and equitable use of technology. A one-to-one initiative is a significant investment, but allows students fair and equitable access. Teachers need to buy into the new teaching strategies involved in a successful technology integration. The amount of designated instructional time using the technology will vary in each classroom, and the commitment to innovating teaching techniques requires sufficient support staff and professional development for teachers, designated to the integration of technology in the classroom. Removing barriers precedes reducing the resistance to change and reduces teacher stress and tensions when committing to technology integration in the classroom. Carver (2016) surveyed K-12 teachers enrolled in a graduate program and they expressed the greatest barrier to a technology initiative is the availability of technology in the classroom.

When schools make a substantial financial commitment to a technology initiative, have a clear vision of implementation, and remove barriers that increase teacher stress, the benefits of a

technology initiative include an increase in student engagement, an increase in student understanding, an increase in instructional differentiation, increased exposure to more current curriculum content, and an increase in the opportunity to use research and evaluation skills (Carver, 2016). Schools that are committed to teaching 21st-century skills to students and have the same degree of implementation in classrooms, see a positive effect on student engagement and a positive impact on student achievement recorded through an increase in test scores (Harris, Al-Bataineh, Al-Bataineh, 2016). Benefits of a successful implementation of a technology initiative provides teachers with the tools to move from instructive lecture learning to constructive, student centered, individualized project based learning.

Literature Review

Academic Benefits of a Technology Initiative

A successful technology initiative can provide students with the tools that they need to increase their academic achievement in the classroom. Teachers providing individualized instruction, student centered, and project based learning using technology allows students the opportunity to improve their academic achievement. Access to technology also provides opportunity for a student to have multiple pathways to show proficiency in their learning. This is an environment that students appreciate, and with the opportunity to have choices in their education, they become invested in the 21st-century skills that they will need in a global economy. Schools see a positive impact on academic achievement recorded through test scores and an increase in proficiency of standards and learning goals. Middle school students in Chilean schools showed an increase in math skills and mastered more math skills by using Khan Academy in the classroom. Individualized instruction allowed students to move at their own

pace, and the gamification of learning engaged students to learn. Students became more confident in their math skills and technology provided an improved learning environment. Students were invested in their learning and began to tutor each other (Light & Pierson, 2014).

Elementary students provided with technology devices showed a clear increase in academic achievement recorded through test scores. Students in a southern California school were split in a laptop group and a non-laptop group. The laptop group had a significant increase in ELA scores on a California Standardized test in a grade span from third grade to fifth grade. Researchers predicted that there would be even more positive change in a lengthier study, due to the first year learning curve of the laptop introduction (Suhr, Hernandez, Grimes, & Warschauer, 2010).

Secondary students also showed an increase in academic achievement when provided with technology devices. Students in a secondary school were taught in two groups. One group of students were taught in a lecture conventional setting and one group of students were taught in a setting that incorporated technology including computers, projectors, internet infrastructure, powerpoint, and downloading capabilities. In the group with technology exposure, researchers found that students had greater achievement scores on post tests and that the use of technology enhanced students' academic performance (Oluwatumbi, 2015).

Using a virtual science curriculum in elementary schools, fourth grade students from the United States and Australia had a significant increase in test scores. The science curriculum was instructed using a virtual gaming environment titled, Quest Atlantis, and was provided free from the Arizona State University. Researchers discovered that test scores on a pre and posttest went

up significantly to show gains in knowledge. Students were observed using 21st-century skills while using the online science curriculum (Smith, 2014).

Engagement and Motivation Benefits of a Technology Initiative

Student motivation and engagement are important in a classroom because they have a positive impact on student achievement. Researchers found that using Khan Academy as a virtual math learning tool in Chilean middle schools was a powerful tool to increase student engagement in math. Researchers conducted teacher interviews, held focus group interviews with students, went on school walkthroughs, and conducted classroom observations. While using the integrated math program, students completed more math goals and tended to be more persistent in their learning. Researchers found that Khan Academy offered a supportive learning environment, the gamification of the site appeared to motivate students to learn, students became engaged to tutor each other, and students became more confident in their math skills. (Light & Pierson, 2014).

Teachers appreciate the integration of technology on student engagement and motivation to learn. According to researchers, teachers often choose technology when it is available, and incorporate it into lesson planning when possible, because it has an impact on student engagement (Carver, 2016). For instance, when elementary students used a virtual environment for instruction in science, and teachers were surveyed on classroom observations of students using the the online curriculum, researchers reported 90% of the students were highly engaged in the curriculum (Smith, 2014).

When learning English Language Arts, fourth grade students in California, that were taught a laptop group and a non-laptop group in a two-year study, were reported to have a high

level of engagement in writing and research. Researchers collected the data using teacher interviews, classroom observations and student and teacher surveys. Teachers reported a high level of student engagement.

Carver (2016) conducted a qualitative research study with graduate students, that were also teachers, were questioned in an open ended online survey, and researchers discovered that student engagement was perceived by teachers as a the most cited benefit to technology integration. Teachers expressed in the survey that when technology was available, they incorporated it into instruction to enhance student engagement.

Barriers to a Successful Technology Initiative

The benefits of technology initiative in schools are well documented in research. In order for schools to implement a successful technology initiative at any level, key barriers to the technology initiative must be addressed and removed. A common barrier to achieving a successful initiative is the significant investment of the initial initiative, as well as the cost of sustaining the initiative in the following years. Providing a sufficient infrastructure, as well as technology and human support has to be factored in the cost over time. Teachers need appropriate professional development, as well as continuous, available support to feel confident in adopting new strategies and committing to a new and innovating way of teaching.
To provide fair and equitable access to technology, schools need to develop a long term technology integration plan.

In order to understand the perceptions of students in what constitutes a successful technology integration, fifteen first year college students were interviewed. The interviews were transcribed to help understand the students' perceptions of their own technology experiences in

high school. Researchers found that students were frustrated with the condition of laptops, the low internet access speed, and insufficient training for teachers that resulted in wasted time in the classroom. Even with frustrations, students felt that the initiative was beneficial, but students did not have an understanding of, if the initiative was to benefit standardized testing, or had other goals (Grundmeyer, 2014).

A lack of professional development in how to integrate technology successfully into best teaching practices is a barrier to a successful technology initiative. Hundreds of teachers completed an online survey in the southeastern part of the United States and researchers discovered that only half of teachers used technology in the classroom every day. The teachers stated that using technology was important to prepare students for the future, and teachers had a strong interest in using technology in the classroom. The lack of integration was a surprise to researchers who were conducting the research study to explore the type and use of technology in the classroom (Martin & Carr, 2015).

Schools are always searching for the best practices for the education of students. Technology initiatives allow teachers to individualize instruction using student centered, project based learning tools. When key barriers are removed, teachers incorporate technology into instruction. For instance, Carver (2016) conducted on online survey of teachers in the southeast of the United States, and the most cited barrier in the classroom is the amount of technology available for students. Location of technology, amount of instructional time, availability of support staff, and teacher knowledge and skills are also cited as barriers.

To have a successful technology integration, it is necessary to have technology leadership, continuous program improvement, teacher input, and professional development. In a

middle school in Westwood School District in the midwestern part of the United States, interviews were conducted with two teachers and a technology planning committee, and the researcher discovered that teacher input, a technology leadership committee, professional development and continuous improvement of the technology implementation program, influenced the nature and frequency of the teacher's integration of technology (Anthony, 2012).

Commitment to Innovation Using Technology

Teachers are willing to prepare students for a global economy and integrate technology into the classroom. According to Spires, Morris, and Zang, (2012) teachers in the United States and China, are willing to integrate technology into the classroom to prepare students for a global workforce. The researchers conducted interviews and an online survey and teachers indicated that to implement emerging technologies, schools need to provide professional development and administrative support.

Schools need to provide funding to improve and change education to meet the needs of students in the 21st-century . Change in best teaching practices in schools needs to happen to prepare students for public life after graduation. According to Smith (2013) teachers and students need to promote that change by becoming digital renegades. Teachers and students need to work together to be part of the reconstruction of education..

Schools in the southeastern part of the United States were surveyed and researchers discovered that teachers realize that utilizing technology in the classroom is important to prepare students for the future, and teachers are willing to be trained, and seek out available resources (Martin & Carr, 2015).

Conclusion

In order to prepare our students for a global economy in the 21st-century, students need access to technology. Schools are looking for ways to best allocate possible funding options, and administration needs to understand the barriers and benefits of a technology initiative and where to spend budget dollars. Researchers have shown that an initial technology implementation in a classroom can level off after a period of time (Harris, Al-Bataineh, & Al-Bataineh, 2016). When preparing to fund a technology integration at the elementary level, administration might consider a one-to-two technology implementation. One to two computing allows for an effective way to achieve a balance between student productivity, student engagement, social activity, and individualized learning (Larkin, 2012).

Researchers have found that there is academic, motivational, and engagement benefits for students when integrating technology in the classroom. Researchers have also found that schools need to fully fund the initiative and provide technology leadership, professional development, and funding for continuous improvement of both the hardware and software necessary for a successful integration of technology. In order to provide school administrators more information for a fourth and fifth grade one to one technology initiative, it will be beneficial to understand the following research questions:

Are schools in Maine providing one to one technology in grades four and five and if so, what devices are provided to students?

How are schools in Maine funding technology in grades four and five?

In schools in Maine, how are fourth and fifth grade teachers integrating technology in the classroom?

It is a significant investment for schools to provide funding for a successful technology initiative. It will be beneficial to have an understanding of how other schools in the state of Maine are implementing technology, how they are funding technology initiatives, and how other schools are best meeting students' needs in the changing challenges in education.

Research Design

The Purpose of the Research

A successful technology initiative will improve students' academic achievement. Suhr, Hernandez, Grimes, and Warschauer (2010) conducted a comparison research study of two fourth grade groups in Southern California. One group was assigned one-to-one laptops, and the other was considered the non laptop group. Students issued one-to-one laptops had a significant increase in English Language Arts test scores over a two year period when compared to the non laptop group.

Student engagement and student motivation is increased when technology is integrated into the classroom. Smith (2014) surveyed thirty teachers regarding classroom observations when students used a virtual science curriculum. Smith discovered that test scores went up significantly and students were highly engaged.

The purpose of this research was to collect information regarding the implementation, and integration of technology for students in grades four and five in schools in Maine. With the need for teachers to provide individualized learning plans to engage students in curriculum, and

to provide evidence of proficiency in Common Core Standards, it was beneficial to understand what was being provided for technology in grades four and five in the state of Maine, how it was being funded, and how teachers were integrating the technology in the classroom. School leaders make significant investments in technology initiatives and they need information in order to better understand where best to spend declining budget dollars to have the most impact on student learning.

Obtaining survey information allowed me to have data to approach school leaders, and promote the perspective of a technology plan that would provide one-to-one devices in grades four and five in elementary schools. The data also offered a perspective of how a one-to-one technology initiative in grades four and five would be integrated into the curriculum in the classroom and provide a more individualized approach to student learning.

The Research Questions

Are schools in Maine providing one-to-one technology in grades four and five and if so, what devices were provided to students? How were schools in Maine funding technology in grades four and five? In schools in Maine, how were fourth and fifth grade teachers integrating technology in the classroom?

This research explored technology initiatives in grades four and five in schools in the State of Maine. It was beneficial to collect information outlining what technology initiatives were being implemented in other schools in Maine, and how they were being funded, to ensure school leaders have data to establish a technology plan for the future and designate budget

dollars to establish a fair and equitable program.

To plan for a substantial long term financial investment, school leaders need to commit to a long term plan that provides devices, professional development for teachers, sufficient infrastructure to support more technology, and continuous available support to ensure a successful implementation of a technology initiative. According to Carver (2016) teachers surveyed online expressed concerns about the amount of technology available to students, the availability of support staff, and the lack of teacher knowledge and skill regarding the integration of technology.

The Central Concepts Related to the Investigation.

Declining budget dollars for school districts mean that school leaders need to research the best possible tools for best teaching practices for student learning. Schools need to provide students with fair and equitable access to technology, in order to ensure students are prepared for employment in a global economy after graduation. Education initiatives are requiring teachers to shift their teaching practices and provide individualized, student centered instruction. Students need to be able to show proficiency in standards using multiple pathways. In order to implement these initiatives, teachers need to be able to provide access to technology in the classroom. According to Carver (2016), benefits of a technology initiative included an increase in instructional differentiation, an increase in exposure to more current curriculum, and an increase in student opportunity to use critical thinking skills in research and evaluation.

The data collected from the research study, provided a better understanding of the technology initiatives and technology integration in grades four and five in schools in Maine, as well as the funding for those initiatives.

The Approach of the Investigation

This research was limited to schools in the state of Maine. Google surveys were emailed to 211 schools. The emails were sent to either technology personnel or principals of schools in Maine that included grades four and five. Email addresses were accessible through the Maine Department of Education contact search website and other necessary email addresses were accessible on individual school websites. Once data was collected from technology directors and principals, a second google survey was emailed to 341 teachers of the initial participating schools, to obtain data regarding the integration of technology in the classroom. It was important to have the perspective of classroom teachers to substantiate the data, and provide an understanding of how a technology initiative is implemented into the curriculum in the classroom.

The goal of my research was to collect data regarding technology initiatives, funding, and technology integration in grades four and five in the state of Maine. It was important to collect reliable data, and provide that data to school leaders to better understand the options for a long term technology plan to integrate devices in grades four and five in elementary schools.

After data collection and review, I created charts of device allocation and

funding, and finally of teacher classroom technology integration techniques. This was a successful study if it provides evidence to encourage school leaders in Maine to create a technology plan that incorporates a future one-to-one technology initiative in grades four and five.

The Methods of Inquiry

The method in which this research study was conducted was a mixed methods approach. I used a quantitative cross sectional survey sent to technology personnel and principals in schools in Maine, that included grades four and five, to collect information about the technology provided to students, as well as how it was being funded. I used a qualitative cross sectional to further collect data in those schools. After the initial survey, I included the schools that participated and sent an additional survey to the fourth and fifth grade teachers in those schools to collect data about how technology was being integrated in those grades, and how teachers felt about the integration. The quantitative data will provide specific numerical data regarding the technology initiatives in schools in Maine in grades four and five and how they were funded. The qualitative data will help better understand how teachers integrated the technology in the classroom and how they feel about the benefits of the integration.

Research Methods

Setting

The setting of this research study consisted of schools in Maine that represented grades

four and five. According to the United States Census Bureau, the population of the state of Maine in 2016 was 1,331,479. The median household income was $49, 331, the percent of people living in poverty was 12.5%, and 91.6% of the population of Maine was a high school graduate, or a graduate of higher education. It was interesting that in the United States, there was only 86.7% of the population that had graduated high school, or attained a higher education. The percentage of people living in poverty in Maine was only 0.1% less that the national average.

According to the National Center for Educational Statistics, the elementary schools in MSAD#1 enrolled 516 students. Thirty percent of those students participated in free and reduced lunch and approximately 150 of students were in grades four and five.

Sampling the Participants

The sampling of participants for this research study consisted of two phases of sampling for data collection. In phase one, subjects of this research study included district level technology personnel and principals of elementary schools in Maine that included grades four and five. A second phase of this research included teachers in grades four and five of the schools that responded in phase one.

In order to compile a list of participants for the mixed method research study, I used the publicly available Maine Department of Education contact search website to search for schools that include grades four and five. I also used the same website to obtain the email addresses of technology personnel and principals of the schools . When necessary, I visited the school websites to find email addresses. The initial quantitative survey (Appendix A) was sent to

technology directors and principals and then from that data, the second qualitative survey (Appendix B) was sent to fourth and fifth grade teachers.

I considered reliability and validity when creating the quantitative and qualitative google surveys. In order for the surveys to be reliable, the data was analyzed for understanding to provide consistent data. The questions were clear and concise. The instruments were valid if they measured exactly what was intended. The surveys included specific questions to obtain data to discover the scope of technology initiatives in the state of Maine in grades four and five. I was able to obtain a sample from a sufficient amount schools in order to have valid information without bias. My surveys were cross sectional and allowed me to examine data from one point in time.

According to Creswell (2015), there were specific forms of consent necessary for this research project. I obtained consent from my school district, and consent from the participants of the google surveys. They were all over the age of eighteen. In both phases of the research, I sent the invitation to participate in the google survey by email, and by clicking into the survey, participants acknowledged informed consent. In order to conduct the research, I considered necessary protection and I obtained permission from the Institutional Review Board at the University of Maine at Farmington.

Description of Methodology

For this mixed methods research study, I collected both qualitative data and quantitative

data using two cross sectional google surveys. The basis behind this mixed methods approach was to obtain quantitative data establishing initiatives specifically in grades four and five and how those initiatives were funded. The data of the second google survey substantiated the benefits of the initiative with qualitative data obtained from teachers using the devices with students in the classroom. For the first quantitative google survey, email addresses of technology personnel and principals of schools that house grades four and five were obtained from the state of Maine Department of Education contact search website. Surveys that consisted of 23 questions were emailed to 211 schools in Maine. (Appendix A) There was a 28% response rate with 58 schools responding the the survey. The second google survey, that consisted of 17 questions was emailed to 321 teachers that were employed in grades four and five in the initial 58 responding schools. There was a 14% response rate with 44 teachers responding to the survey.

Operational Measures

In order to conduct this mixed methods research study to answer the three research questions, I developed a quantitative survey instrument (Appendix A) and a qualitative survey instrument (Appendix B). According to Creswell (2015), in quantitative data collection, you can use a survey instrument to collect and then document the data. Some studies contain characteristics of both quantitative and qualitative research. In my research study, the quantitative survey provided the data documenting devices provided in schools in grades four and five. In this survey, devices were defined as 1:1 laptops, 1:1 iPads, a portable laptop cart, a

portable iPad cart, or a computer lab. This survey study also will provide data to document funding options obtained to finance devices in grade four and five. Funding options in the survey are described as eRate, district funds, state funds, grants, private donations, parent volunteer groups, and other funding obtained to finance the technology initiative. The qualitative survey will explore the teachers' perceptions of the integration of technology in the classroom. According to Creswell (2015), qualitative research explores common experiences of individuals to develop a theory. In order to collect data to explore the use of technology in the classroom, teachers will be asked to express their opinion about which programs students use the most, what the most important ways are that technology is used in the classroom, and how technology is used in the classroom to teach the curriculum.

Having both the quantitative and qualitative data will provide information to help school leaders decide if there is an equitable plan for students in grades four and five and how they would approach creating a long term plan to address the concerns of financing and teacher implementation in the classroom.

Data Collection

According to Creswell (2015), I needed to complete five steps of data collection. I determined the potential participants of my research study by using the Maine Department of Education website and school websites. I determined my unit of analysis to be multiple levels consisting of school districts and individual teachers in those school districts. I obtained a sample of data obtained from surveys in my target population of participants. I surveyed the largest

possible sample size based on obtaining the email addresses of elementary schools in the state of Maine.

I obtained the necessary consents needed from MSAD#1, the participants of my study, and the IRB of the University of Maine at Farmington. I submitted a proposal to the IRB and I could not conduct the research until I received approval from the board. According to Creswell (2015), obtaining these consents are part of ethical practices in research.

In order to collect the quantitative and qualitative data, I developed concise questions in my cross sectional quantitative and qualitative surveys in order to ensure reliability. Each question needed to be clear and understandable to ensure the validity of the data. The validity of the surveys was determined when the data collected answered the research questions. I administered the surveys online in February and March of 2018.

At the close of the study, I compiled the data and analyzed the information to answer the three research questions in this study. Are schools in Maine providing one to one technology in grades four and five and if so, what devices were provided to students? How were schools in Maine funding technology in grades four and five? In schools in Maine, how were fourth and fifth grade teachers integrating technology in the classroom? The data collected provided an excellent sample of schools and classroom teachers, and the implementation of technology in grades four and five in Maine.

Data Analysis

From the data collected, I analyzed the information to create a chart showing the quantitative data and I created a chart incorporating the qualitative data in order to substantiate how the devices were used in the classroom. This data was currently unavailable in the state of Maine and provided encouraging data to help school administrators set up future technology plans and the possible dedication of funding.

Expected Findings

Based on the literature review, I expected to find that schools in the state of Maine were considering, or had designated funds to provide grades four and five technology devices. The research provided evidence that a technology initiative improves student academic achievement and increases student motivation and engagement. I expected to find that teachers in grades four and five were utilizing the devices to provide individualized instruction to students. With state initiatives requiring teachers to provide individualized instruction, I expected teachers to be using technology in the classroom to create a student centered approach to learning. I expected the data to be beneficial to school administrators to help establish an equitable plan for students in grades four and five to provide more consistency across the state of Maine in the integration of technology in grades four and five.

Issues and Weaknesses

When data is based on a google survey, the potential weakness is that the researcher has to rely on the participation of professionals that are already overworked and have little time to spend completing a survey. According to Creswell (2015), a loss or lack of participants, small

and sample sizes are weaknesses in data collection and analysis. It was my hope that these professionals would have taken the time to fill out the survey to provide data other districts in Maine and help make an informed decision to designate budget dollars to technology initiatives in grades four and five.

According to Creswell (2015), qualitative research is "interpretive research". When I analyzed the data, I brought only my perspective to the open ended questions on the qualitative survey. This was a potential weakness of the research study.

Results

Critical thinking, creativity, collaboration, and communication are 21st Century skills that all students need to develop through education. A one-to-one technology initiative provides teachers the opportunity to embrace these skills, and create immeasurable opportunity for learning. Researchers have shown that technology initiatives increase test scores and student engagement in learning Oluwatumbi (2015). The purpose of this research study was to examine the scale of technology initiatives, funding options, and the implementation of technology in the classroom in grades four and five in schools in the state of Maine. This study sought to answer the following three research questions:

- Are schools in Maine providing one-to-one technology in grades four and five and if so, what devices were provided to students?

- How were schools in Maine funding technology in grades four and five?
- In schools in Maine, how were fourth and fifth grade teachers integrating technology in the classroom?

In order to explore if schools were providing one-to-one technology in grades four and five and how those technology initiatives were funded, the research study was conducted through a mixed methods sequential approach. First was a quantitative survey (Appendix A). The survey was emailed to 211 technology personnel and principals in schools in Maine that house fourth and fifth grade. Data collected represents fifty-eight schools that responded to the quantitative survey. To better understand the benefit of the technology initiatives, and explore how teachers in grades four and five were integrating the technology, the research was conducted through a second qualitative survey (Appendix B). The qualitative survey was emailed to 321 teachers that were employed in the fifty-eight schools that responded to the first survey. Data collected represented forty-four teachers that responded to the qualitative survey.

Research Question 1

Participants

The first research question in this research study was: Are schools in Maine providing one-to-one technology in grades four and five and if so, what devices are provided to them? In order to answer this research question, the researcher created a quantitative google survey. Technology personnel, or principals participated in the survey from fifty-eight, of 211 schools in

Maine that house grades four and five. Technology personnel included an eclectic array of school

employees. The responses included the following technology titles: IT Assistants, Technology & Curriculum Integrators, Technology Systems Support Personnel, Teacher and Technology Coordinators, Director of Curriculum, Instruction, and Assessment, Technology Coach, Data Specialist, Technology Integrator, Computer Tech, and also included teachers that were listed as also Technology Coordinators. It was interesting that there was such a difference in titles for IT personnel in schools in Maine. Schools without full time technology staff, found creative ways to provide the necessary IT personnel. When asked in the survey to describe their role regarding technology in grades four and five, several responses indicated that teachers were providing dual roles in schools. An example is, "I teach 5th to 8th grade Math, Science, and Health. I also purchase, maintain, and refurbish school technology, such as laptops, desktops, iPads, etc." Another response suggested a dual role, "I am a teacher and handle all the technology/hardware." There were several full time technology staff members that responded to the survey. They were responsible for budgeting, programming, technology leadership, purchasing, teacher training, student support, and classroom integration.

The 2010 United States Census found Maine to be "the most rural state" in the nation. The data collected helped the researcher understand that 41.4% of the participating schools had a student population of under 500 students. According to the survey, 65.5% of schools that participated described their setting as rural (Figure 1).

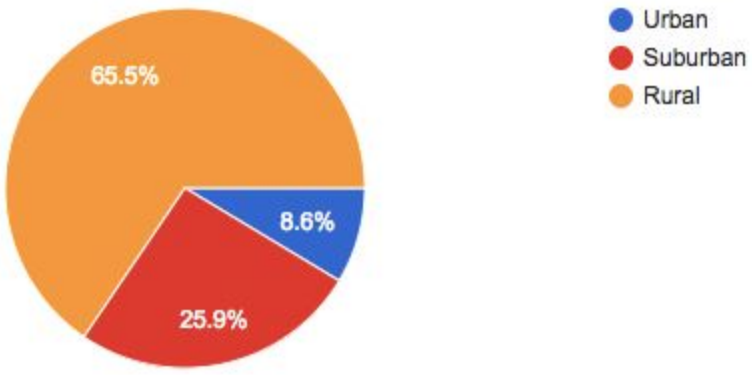

Figure 1. Setting of Responding Schools.

Technology Initiatives in Grades Four and Five

Technology personnel and principals of Maine schools that responded to the survey overwhelmingly confirmed that grades four and five provided one-to-one devices to students. The researcher found that 79.3%, of participating schools provided one-to-one devices in grade four, with the next number at 12.1% having provided one-to-four devices to students in grade four (Figure 2). In grade five, the percentage increased to 82.5% of schools that provided one-to-one devices to students, and 10.5% of schools provided one-to-four devices to students (Figure 3).

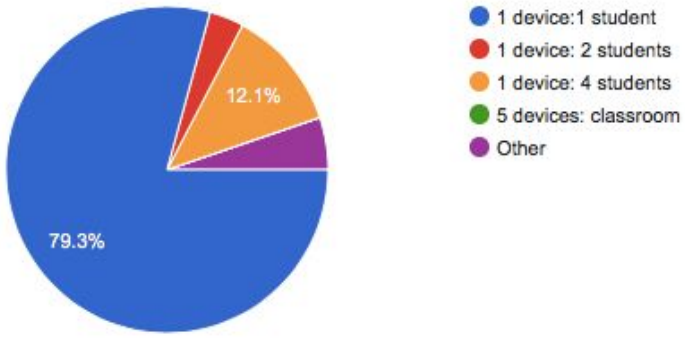

Figure 2. Grade Four Device Ratio to Students.

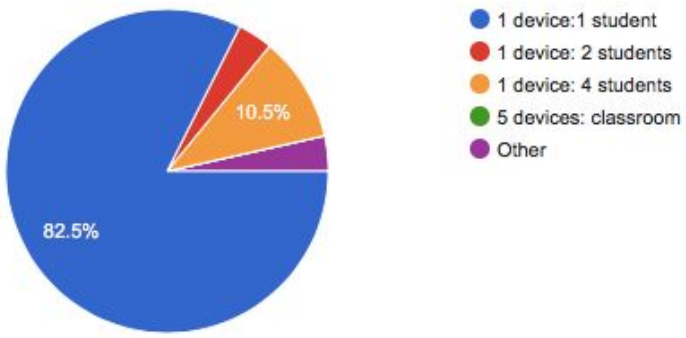

Figure 3. Grade Five Device Ratio to Students.

The researcher also collected data that in grade four, 56.9% of schools that responded to the survey provided one-to-one laptops to students, 17.2% provided one-to-one tablets, 19% provided portable laptop carts, 12.1% provided a portable tablet cart, and 8.6% provided a stationary computer lab (Figure 4). In grade five, 67.2 % of responding schools provided one-to-one laptops, 10.3% provided one-to-one tablets, 17.2% provided a portable laptop cart, 12.1 % provided a portable tablet cart, and 8.6% provided a stationary computer lab (Figure 5).

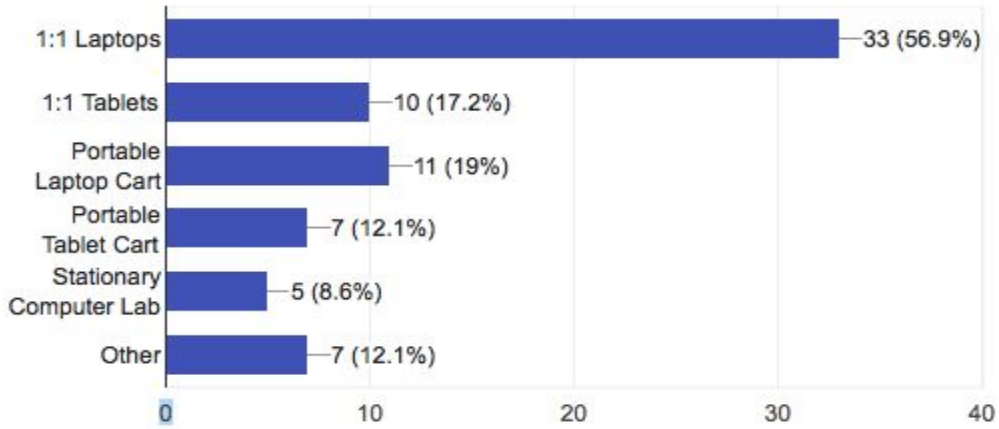

Figure 4. Grade Four Devices Provided to Students.

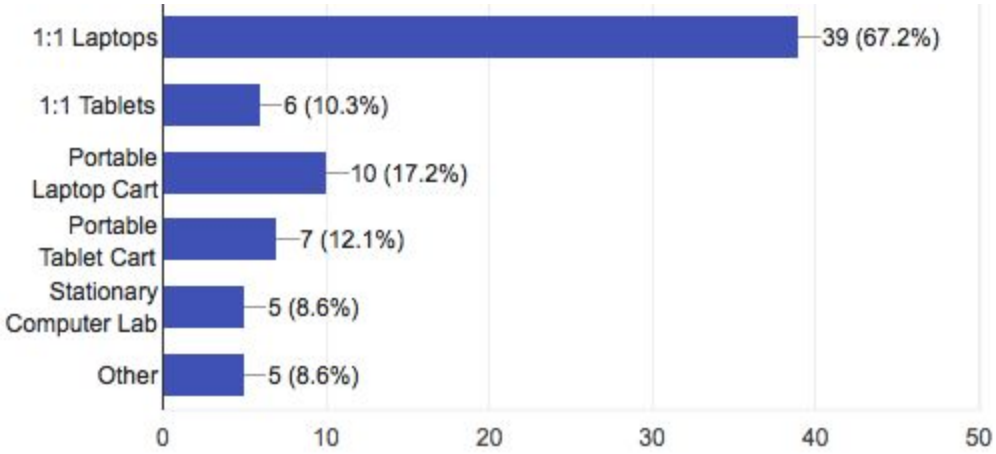

Figure 5. Grade Five Devices Provided to Students

Technology initiatives in grades four and five are being provided to students. The researcher found that 86.9 % of students had access to technology all day and 8.9% of students had access to technology a few times a week. Teachers have the opportunity to individualize instruction. It was noted that 80.7% of students use technology every day in the classroom, and 14% of students use technology a few times a week. According to one participant, " It really

depends on the teacher. It ranges from everyday to a few times a week. Once a week might even describe some teachers." According to another participant, "MOST teachers use them every day, some a few times a week." The researcher found that 62.1% of technology personnel or principals find that they have enough technology devices to meet the needs of students.

Research Question 2

Funding

The second research question in this research study was: How were schools in Maine funding technology in grades four and five? The researcher discovered an overwhelming 96.5% of schools that responded to the survey fund their devices with district funds. Other ways responding schools were obtaining funding for technology were eRate or state funds, grants, private donations and parent volunteer groups (Figure 6).

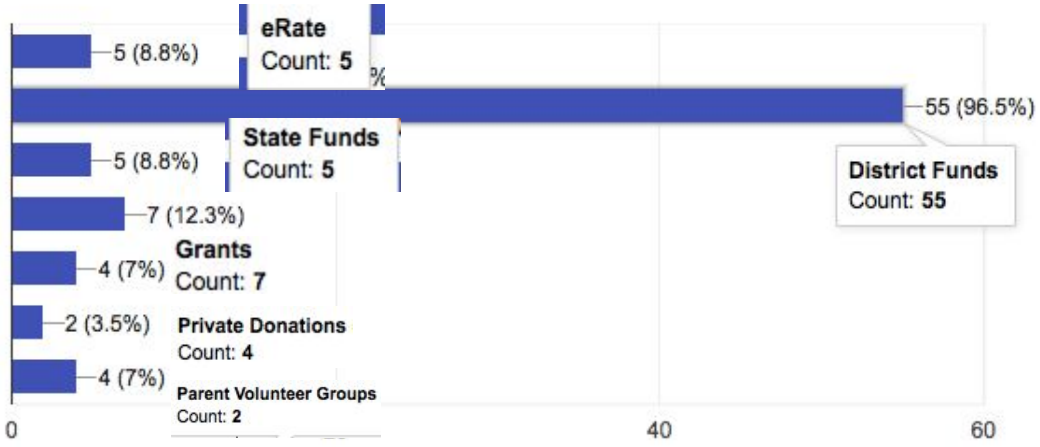

Figure 6. Funding for Technology Devices.

One responder said, “They are left over from middle school and teacher upgrades”. Some schools purchase the laptops when there is an eRate upgrade and these are passed down to lower grades. These buyouts are funded with district budgeted funds. Few schools were using a new idea called BYOD, or Bring Your Own Device to school. Three responding schools answered that they allowed students to bring their own device to school. There were an overwhelming amount of schools that responded that were providing technology devices in grades four and five. When asked if their district had plans to increase the amount of technology in grades four and five, 59.6% responded that no, they did not plan to increase technology available in grades four and five due to the fact that they felt they had sufficient technology available to students.

Participant Concerns

The researcher explored what other comments that technology personnel and school principals might have in relation to technology initiatives, implementation, and integration. One responder said, “Technology changes so fast, that it is hard to keep up.” Another said, “Teachers do request more time for training and preparing to teach with technology. Even though a system has 1:1, this does not mean that everyone is capable or feels competent in using the technology well.” Schools are providing technology initiatives in grades four and five and another responder said,

> The 1:1 initiative in grades 4 and 5 allow teachers to prepare students for the demands of middle school. Many programs are introduced or piloted at these two grade levels. Introduction to technology skills and learning with technology is the perfect fit for this grade span.

The researcher learned that districts are using technology to achieve individual goals and support student needs. With the state of Maine's push to provide a proficiency based learning program for all students, one responder said, "We are 1:1 with student laptops. Our primary focus has been on math and reading instruction. Students are able to progress at a much more individualized rate with the devices."

Research Question 3

The third research question was: In schools in Maine, how were fourth and fifth grade teachers integrating technology in the classroom? In order to best collect data to answer this research question, the researcher conducted a second qualitative google survey. The survey consisted of seventeen questions and was emailed to 321 teachers that were employed in fourth and fifth grade classrooms in schools that responded to the first google survey.

Participants

Forty-four teachers from Maine responded to the google survey. Out of the forty-four responders, 60% taught in schools that were rural, 36.6% taught in schools that were suburban, and 4.4% taught in schools that were considered urban, with the largest populations (Figure 7).

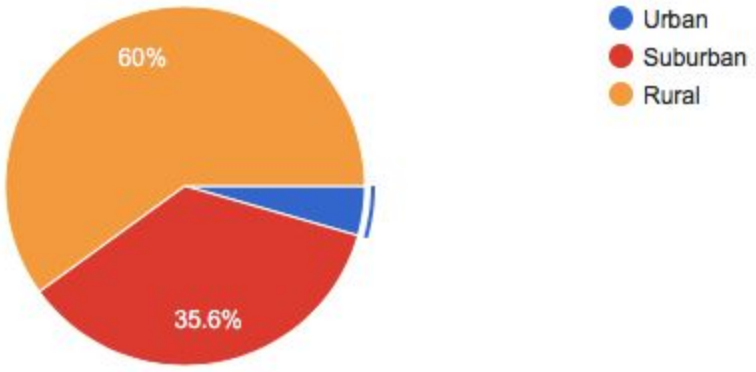

Figure 7. Setting of Responding Teachers.

Out of the teachers that were surveyed, there was almost an even split in responders, with 57.8% teaching grade four, and 55.6% teaching grade five.

Device Availability in Grades Four and Five

When asked what devices that students were using in the classroom, teachers responded that 53.3% of students were using one-to-one laptops in their classrooms. Students were also using one-to-one tablets, portable laptops carts, portable tablet carts, and stationary computer labs (Figure 8).

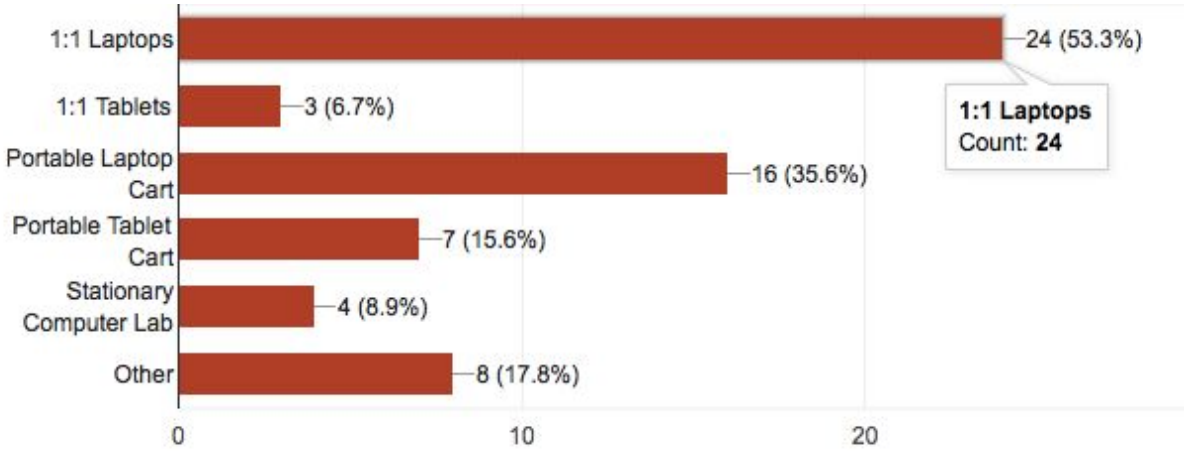

Figure 8. Student Devices in the Classroom in Grades four and Five.

Other responses included two classrooms that offered a one-to-five classroom device allocation and a classroom that offered a one-to-six classroom allocation. Teachers were being creative and also using iPods and Kindles in their classrooms to access technology. One teacher also allowed students to use the classroom smartboard to have access to technology. Based on the high percentage of fourth and fifth grade classroom that have access to devices, 62.2% of responders said that students had access to technology devices for the entire school day. Also, 80% of fourth and fifth grade teachers felt that their students had enough access to technology during the school day. When asked how often students use technology in the classroom, 62.2% of teachers said that their students use technology every day. Other responses included a few times a week and once a week (Figure 9).

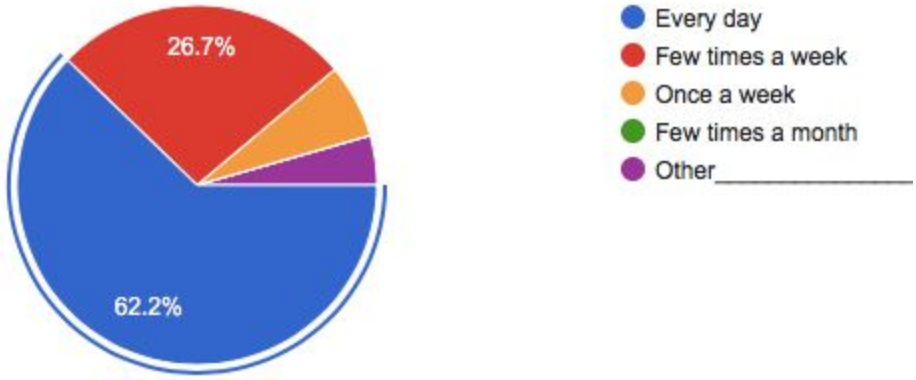

Figure 9. Student Technology Use in the Classroom.

One teacher said, “Students use technology a few times a week, but it’s due to lack of

availability. Otherwise they would use it more often." When asked about student engagement when students are using technology in the classroom, 82.2% of teachers that responded to the survey indicated that students are more engaged when using technology. A small percentage, 6.7% felt students were less engaged, and 11.1% of teachers felt that using technology in the classroom does not affect student engagement. One teacher commented, "Some students feel that since teacher is not "teaching" they are on their own and do not put in their best effort."

Technology integration

The state of Maine adopted the Common Core Educational Standards in 2011 and they were implemented in schools in the 2013-2014 school year. These standards emphasized problem

solving, collaboration, critical thinking and communication. Maine has also initiated the philosophy of proficiency-based education and the proficiency-based diploma. The Department of Education is still working on the language of the proficiency based diploma, and is still working on providing guidance to schools to successfully implement a proficiency based education system. In order to meet the needs of teachers in the classroom to provide an individualized mastery program for students, technology can play an important role. According to the responding fourth and fifth grade teachers, a high percentage of students were using technology in the classroom for word processing, research, academic games, academic and learning videos (Figure 10).

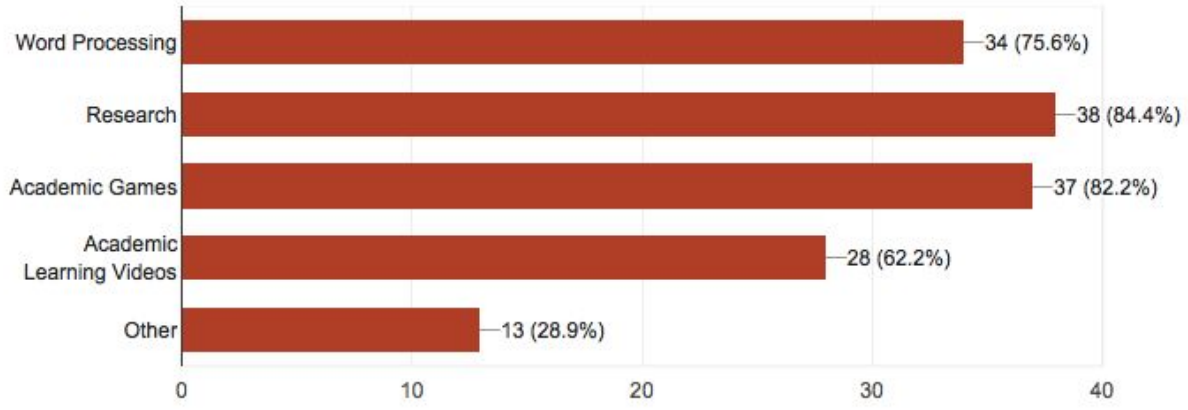

Figure 10. Student Technology Integration in Fourth and Fifth Grade.

Responding teachers stated that there were many other ways that they were using technology with their students in the classroom. Some of the programs being used in grades four and five that teachers listed were: Frontrow, IXL for math and ELA, Reading A to Z, Science A to Z, Google Earth, Imagine Learning, Read 180, Dreambox, Raz Kids, Epic, Stop Motion, Peardeck, Stemscopes, Spelling City, Reading Street, Mobymax, Google Classroom, Google Slides, IMovie, Maine MEA portal state tests, Xtramath, Kahoot, Sumdog, ConnectED, and Khan Academy. Teachers were using many programs in the classroom to help individualize instruction to their students.

The researcher asked teachers in grades four and five how they used technology to teach the curriculum in their classroom. Teachers overwhelming provided multiple ways that they used technology to introduce curriculum, individualize instruction, reinforce lessons, and support their students learning. One teacher said,

> I regularly search online for lesson plans and activities related to the curriculum. I regularly find articles for students to read across the curriculum at readworks.org. We use Stemscopes for Science, and I access the lesson plans, handouts, and videos through their site. I sometimes assign students to use certain sites for research; i.e. bensguide.gpo.gov.gov, ducksters.com, etc. We use kahoots regularly to reinforce concepts in all subjects. Both students and I have created them, and I also have located and used some created by others.

This quote was representative in how teachers used the internet to enhance the curriculum. Another teacher said, "I use it to support and enhance the curriculum." Many teachers explained ways they use technology to individualize instruction. One teacher said, "I use it to teach both science and social studies. Students access their books and other resources online. I provide videos and other supplemental items to students by using computer, smartboards, videos, songs, links to sites, etc." Exact words that were used by responding teachers to describe integration of technology were: teach, enhance, support, individualize, engage, model, understand, introduce, supplement, map, assess, coordinate, integrate, incorporate, produce, provide, explain, create, link, organize, accompany, practice, document, research, and backup lessons. Teachers are using technology in the classroom. They are using it for development of lessons, enhancement of lessons, and individualization of lessons. Equitable access of technology for students in the state of Maine in grades four and five should be a concern for administrators.

Issues with Implementation of Technology Initiatives

When funding technology initiatives, administrators need to consider all aspects of a successful technology initiative. A successful technology initiative begins with funding provided for a solid infrastructure that supports access for students. It is a frustrating situation when

access online is slow, and students spend time waiting for access to their programming. Other aspects of a successful technology initiative includes available technology leadership, which would include support and professional development for all teachers. Teachers are in different places with their comfort levels when using technology in their classrooms. According to technology personnel and principals, it depended on the teacher whether or not students were accessing technology regularly in the classroom. When asked if they were provided opportunity for professional development regarding using technology in their classrooms, 59.1% of teachers said, yes (Figure 11).

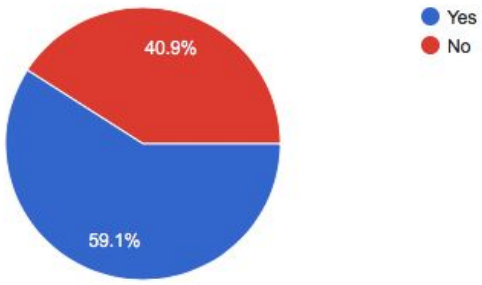

Figure 11. Teachers Thoughts on if Professional Development is Provided in the Classroom.

The researcher discovered that teachers in grades four and five had concerns regarding technology initiatives in their classrooms. One of the concerns that was expressed was that the age of the technology needs to be consistently addressed. One teacher said, “Our computers are

quite old, and the battery life is not good." If districts are passing down devices to lower grades that have been used for four years at another level, it would be frustrating for students to use devices that don't hold a charge, or that have slow access that takes too much time to actually enhance or supplement their educational experience.

Another concern was that the wi-fi infrastructure did not consistently support access to programming. One teacher said, "It is challenging when you plan a lesson using technology then the technology fails due to internet failures". In addition this teacher said, "My school has quite a bit of technology, but not enough access points to always handle the bandwidth". This teacher also had concerns, "In an old school, our technology regularly cuts out, stops working, or won't stream when a lesson has been planned, meaning you always have to account for a back up plan and spend time organizing both". These concerns create frustrating feelings, and if it happens often, teachers will give up easily and leave the technology on the shelf. It is very difficult to have many pairs of eyes on a teacher waiting for a lesson to work on technology and when it does not work, many elementary buildings do not have full time technology personnel to promptly fix the issues.

Another big underlying issue was that students were accessing technology in abundance and according to some teachers, it is not healthy for students to have too much screen time. One teacher worried, "That we are beginning to use and rely on it too frequently...we do need to find a balance". Another teachers says, "I do not believe that technology should be overused. It's isolating, mesmerizing, and addicting". Also said by a teacher, "Students want to use them ALL

the time, which is not healthy". Another teacher felt there there were areas in curriculum that were harmed by too much use of technology. They said, "I feel like kids don't have the same handwriting skills like they have had in the past. Physically writing is important in brain development. Sometimes I feel like we can be too dependent on technology". Individualized instruction was a component of how teachers used technology in their classrooms. This teacher felt that students can't independently direct their own learning. They said,

> My biggest concern is the thought some people have that students can direct their own learning at their own pace using online lessons. I have attempted this on several occasions and it doesn't appear to work as well in practice as it sounds in theory. In my experience, kids want to engage with other students and the teacher in their learning. Another concern I have is that many kids are using too much technology at home, so are we perpetuating the habit of teaching kids to rely on devices to amuse and inform them?

With a successful technology initiative, there comes issues that need to be worked out as they occur in the classroom. Teachers need to be able to monitor technology use in the classroom. They need to be able to work with students and feel confident that students can use technology appropriately. One teacher expressed that her concern was, "Monitoring student use to make sure they are doing what they are suppose to". Another teacher agreed, " I wish I was able to see the screen of all my students at one time (via my own laptop) so I know they are on task while I am working with other students". This teacher said, "Students should be responsible and use the machine as intended. Not getting distracted by games and being off task". This teacher felt that if technology was integrated in an earlier grade, they would understand and have

the tools they need when they reach grade four and five. This teacher said their concerns included, “Watching that students are where they are suppose to be and not on sites they should not be on, the amount of time students feel they should play games instead of learning, and that students in the younger grades need to time to learn to type and use the technology in order for it to be a tool to teach with effectively”.

There are many things that students should not be exposed to online. It is definitely a challenge for technology personnel to provide a safe opportunity for students to use technology and to not be exposed to inappropriate content. This teacher said, “I need to know more about kid friendly browsers so that students are not exposed to inappropriate material when doing research” Another teacher worried about, “Students learning boundaries about appropriate ways to use it in school--temptation to "surf" and share documents to text, etc”.

Professional development was a concern for some teachers. One teacher said, “There is not enough professional development time to learn how to excite students with the use of technology”. One aspect of a successful technology initiative is the importance of providing ongoing professional development for classroom teachers. It is also important for teachers to have access to technology leadership to feel confident that they will have support with both hardware and software. A concern was, “ I wish we had more professional development - its minimal. We have am amazing amount of resources. It is difficult when the students use iPads that flash player doesn't work so many of the websites, simulations, and games don't work”. It would be important for teachers to feel they will get the support they need when something goes

wrong when using technology in the classroom.

Final Thoughts from Teachers

To make certain that teachers who responded to the google survey had all options to comment about changes to a technology initiative they would make in their classrooms, the final question in the google survey allowed them to tell the researcher anything else that they would like to put on their response. Many teachers responded positively about technology initiatives in grades four and five. Two teachers said, "1:1 devices would be ideal", and "I'd love to have 1:1 devices". Another teacher responded, "I think it is crucial in order for them to be prepared for middle school to subject them to as much technology practice as possible. It is the real world today that they will do most of their work and live most of their life through the use of technology". Another teacher felt that 1:1 technology leveled the playing field. She stated, "It is a great tool. One-to-one has totally changed their abilities and leveled it for all kids and made it easy to use as a tool vs. last year when they shared devices on carts".

Other teachers had some thoughts about increasing professional development. One teacher said, "I really think if I had more time and training to integrate technology, it would keep kids more engaged. Technology is engaging to the kids! One teacher was comfortable using technology every day, but she realizes that not all teachers share that sentiment. She stated, "Every teacher at my school uses the technology different and the amount of time they use it is different. I teach grades 5 - 8 and I am very comfortable using technology everyday". In order for

all teachers to feel comfortable with a technology initiative, there needs to be good technology leadership and consistent professional development for all teachers.

There were also some final concerns about too much technology being used in schools. How much screen time is healthy? With the global economy driving future jobs, we have to find the balance of the use of technology in the classroom. One teacher said, “The students are very engaged using technology, but it is also a distraction for many. We have to be careful and monitor it very closely”. One teacher would like to completely remove technology from the classroom. She stated, “Remove most of it to take students away from the addictions they are facing”.

The profession of teaching is constantly evolving. A technology initiative is a tool that allows teachers to individualize instruction, enhance learning, and engage students in their education. It has been established that there is an overwhelming amount of responding schools That have funded a technology initiative in grades four and five. Although teachers have concerns, they are on board with using that technology in the classroom to teach, enhance, and individualize instruction.

Discussion

The implications of this research study are primarily directed towards administrators that are creating budgets that will provide for best practices with students at all grade levels. The trends regarding the availability and type of device, the funding, and the role of technology in

grade four and five classrooms are evident in this research study. Results collected from participating school technology personnel and school principals indicate that a high percentage of schools are initiating one-to-one technology initiatives in grades four and five. More than half of the school administration that participated in the survey provide data that shows the one-to-one devices that are provided are laptops. In most cases, district funds are being appropriated to purchase the devices, and a high percentage of teachers are using the laptops every day in the classroom to teach and enhance the curriculum. Teachers are finding that students are more engaged when they have access to technology in their learning.

Technology Initiatives

The first research question asks if schools in Maine provide one-to-one technology in grades four and five, and if so, which devices are being provided? School officials that completed the survey provided data that shows that a high percentage of schools do begin a one-to-one technology program in grades four and five. One-to-one laptops are provided to more than half of the participants' students. Larkin (2012) discovered in a mixed method research study, that when given the choice, all the teachers in the research study would choose a one-to-one technology initiative for their classroom. Carver (2016) conducted a qualitative research study that involved interviewing graduate students that are teachers and the teachers that responded expressed their greatest concern is the lack of technology devices. In the state of Maine, the schools that responded to the google survey answered that they have sufficient technology one-to-one devices. The concern with that survey is the lack of technology that might

exist in the schools that neglected to respond to the survey.

Funding

When considering a one-to-one technology initiative at any grade level, school administrators need to consider how they are going to fund the initiative. According to data collected from school technology personnel and school principals that responded to the survey, schools are overwhelmingly covering the cost of the devices out of district operating funds. When school administrators are putting together budget requests, they take into consideration best practices for students. Oluwatumbi (2015) conducted a quantitative research study and collected data from achievement pretests and posttests after an eight week technology integration. The researcher discovered that there was a substantial increase in students' academic performance and technology integration had a positive effect. The researcher's finding profive evidence of best practices in education and this gives administrators evidence for budget requests. When schools consider funding for technology initiatives, it is important to consider additional funds for professional development and continuous hardware and software technical support. When funding is difficult to procure, Larkin (2012) provided data that a one-to-two technology initiative might be another, possibly better option in the classroom. Larkin (2012) provided data that a one-to-two technology initiative is a more collaborative approach in the classroom. Students demonstrated increased levels of classroom involvement, and an increase in collaborative social activity. This is an economically driven decision that would provide schools

with an alternative option to a one-to-one technology initiative.

Classroom Technology Integration

Teachers are integrating technology in their classrooms in Maine. A large percentage of teachers that responded to the google survey stated that students use technology in the classroom every day. Teachers overwhelming provided multiple ways that they used technology to introduce curriculum, individualize instruction, reinforce lessons, and support their students' learning. More than 80% of teachers felt their students were more engaged in their learning when using technology in the classroom. These findings agree with Carver (2016) who explored benefits of a technology initiative and teachers stated that benefits include an increase in student engagement and understanding. Another benefit of a technology initiative is the increase in the ability to provide instructional differentiation. Other teachers also cited a benefit of increased exposure to more current curriculum. Harris, Al-Bataineh, and Al-Bataineh, (2016) conducted a quantitative research study exploring the effect of 1:1 technology on student academic achievement and student motivation. The researchers found that the technology initiative did increase test scores in the beginning of the school year in a fourth grade classroom. When reporting, the teachers also cited the importance of professional development with a technology initiative. This agrees with...Martin and Carr, (2015) conducted a qualitative survey exploring teachers implementation of technology in the classroom. Martin and Carr reported that more than half of the teachers in their study used technology in the classroom everyday. Teachers expressed

a willingness to be trained to use technology and seek out resources for implementation. Teachers said they use technology to enhance lessons, introduce lessons, demonstrate concepts, and practice exercises. The researchers claimed that the research meant that schools must prioritize funding for technology to prepare students for the future.

In this research study, 59.1% of teachers expressed that they were provided with opportunity of professional development regarding technology. Carver, (2016) discovered that a cited barrier to a successful technology initiative is teacher knowledge and skill. Providing professional development is a key component of a successful technology initiative. Anthony, (2012) conducted a qualitative study that explored teachers experiences with a technology initiative when it was connected with a technology planning committee. Interviews were conducted and it was discovered that technology leadership, continuous improvement, teacher input, and professional development were all key components in a successful technology initiative.

Future Research

More research should be conducted in the future to encourage a better understanding of best educational practices in providing professional development for teachers so they can integrate technology successfully in their classrooms. Technology changes quickly and in order for teachers to stay on top of the latest opportunities, professional development is a key component of a successful technology initiative at any grade level. When conducting this research study, the researcher discovered that when integrating technology into fourth and fifth

grade classrooms, teachers have concerns about support and professional development. Teachers are ready and willing to support a technology initiative in their classroom, but in order to be successful they need a leadership team to guide the process.

Conclusion

Based on the findings of this research study, school administrators and school boards need to consider funding a one-to-one technology initiative in grades four and five. School personnel that responded to the google survey in this research study expressed that schools are using one-to-one laptops in grades four and five in Maine. Schools are funding these technology initiatives with district funds and teachers are using technology in their classrooms to teach, reinforce, enhance, and individualize instruction. Suhr, Hernandez, Grimes, and Warschauer, (2010) conducted a mixed methods research study that reinforces that a one-to-one technology initiative is what school administrators can consider best practices in education. According to the researchers, a one-to-one technology initiative significantly increased test scores in English Language Arts between grades three and five in elementary classrooms in California.

In order for students in Maine to be prepared in a global economy, schools should invest in technology. Research shows that with the integration of technology in the classroom, student academic achievement increases and student engagement in their learning increases. A one-to-one technology initiative allows teachers the opportunity to individualize instruction. Critical thinking, creativity, collaboration, and communication are 21st Century skills that all

students need to be exposed to in education. In order for students to have a fair and equitable chance in future career choices, schools should implement a one-to-one technology initiative in grades four and five.

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Appendix A:

You are invited to participate in a research project being conducted by Angela Bernier, a student in the graduate program at the University of Maine at Farmington. The purpose of the research is to explore technology initiatives and how they are funded in grades four and five in schools in Maine.

What Will You Be Asked to Do?

If you decide to participate, you will be asked to answer questions in the form of a google survey. You may be asked such questions as, the number of students in your district, and the ratio of devices to students in grades four and five.

Risks

The time and inconvenience of the 23 question survey may be a risk of participating in the study.

Benefits

There are no direct benefits to you from participating in the study. However, as a participant you may enjoy a copy of the results, if you request a copy in the google survey. Aside from this benefit to the participant, this research will help me learn more about technology initiatives, funding, and integration in grades four and five in schools in Maine.

Confidentiality

The documents and files from this study will all be kept on a hard drive in MSAD#1. Some data may be shared with survey participants, the Aroostook County Graduate Cohort, presented in public forum, or published in article form. All data from the study, including the participant key, will be kept for two years and then destroyed.

Voluntary

Participation is voluntary. If you choose to take part in this study, you may stop at any time. You may skip any questions you do not wish to answer.

I fully understand the purpose of this research and the procedures to be followed. I understand that my participation is voluntary, and that I may withdraw at any time without penalty. I also recognize that I may skip any questions in which I do not wish to respond. Results of this research will be shared in the form of one or more publications and verbal presentations. If you have any questions about this study, please contact me, Angela Bernier, at berniera@sad1.org. You may also reach the faculty advisor, Johanna Prince, on this study at johanna.prince@maine.edu. You may also contact the Chair of the IRB, Karol Maybury, at karol.maybury@maine.edu.

By clicking on the link to the following google survey, I assert that I fully understand the above and give my consent to serve as a subject in this research.

IT Director/Principal Questions for the Google Survey

1. Which school district is your employer? Please include full district name, as well as identifying school unit number, such as (RSU), (SAD), (CSD), (AOS), or other.
2. What is your position?
   - Principal
   - Technology Director or Technology Coordinator
   - Superintendent
   - Other
3. If you chose other for your position, please describe.
4. Describe your role regarding technology in grades four and five.
5. Do you consider your school urban, suburban, or rural?

6. What is the number of students in your district?
   - 0-500
   - 501-1000
   - >1,000

7. For grade 4 what is your ratio of devices to students?
   - 1 device: 1 student
   - 1 device: 2 students
   - 1 device: 4 students
   - 5 devices: classroom
   - Other

8. For grade 5 what is your ratio of devices to students?
   - 1 device: 1 student
   - 1 device: 2 students
   - 1 device: 4 students
   - 5 devices: classroom
   - Other
9. If you chose other ratio of devices to students in grades 4 or 5, please describe.

10. What does your school district provide for technology devices in grade four? Please check if you provide the following:

GRADE 4

- 1:1 Laptops
- 1:1 Tablets
- Portable Laptop Cart
- Portable Tablet Cart
- Stationary Computer Lab
- Other Please fill in _____

11. What does your school district provide for technology devices in grade five? Please check if you provide the following:

GRADE 5

1:1 Laptops
1:1 Ipads
Portable Laptop Cart
Portable Ipad Cart
Computer Lab
Other Please fill in _____

12. If you chose other for devices provided in grades 4 or 5, please describe.

13. How often do students have **access** to technology in grades four and five?

All day
Once a day
Few times a week
Once a Week
Other _____

14. If you chose other for access to technology, please explain.

15. About how often do grades four and five students use technology?

Every day
Few times a week
Once a week
Few times a month
Other_____

16. If you chose other for how often students use technology, please explain.

17. Do teachers request more technology devices to meet the needs of students?

Yes/No

18. How are devices funded in grades four and five? Check all that apply

eRate
District Funds
State Funds
Grants
Private Donations (donors choose)
Parent Volunteer Groups
Other

19. If you chose other for how devices are funded, please explain.

20. In grades four and five do you allow Bring Your Own Device (BYOD)?
Yes/No

21. Does your district have plans to increase the amount of technology available in grades four and five in the future?
Yes|No

22. In what grade does access begin for 1:1 technology?

23 Is there anything else that you can tell me about technology initiative, implementation, or integration in grades four and five in your district?

Appendix B:

You are invited to participate in a research project being conducted by Angela Bernier, a student in the graduate program at the University of Maine at Farmington. The purpose of the research is to explore technology integration in grades four and five in schools in Maine.

What Will You Be Asked to Do?

If you decide to participate, you will be asked to answer questions in the form of a google survey such as, what grades do you teach, and which technology devices do your students use in the classroom.

Risks

The time and inconvenience of this seventeen question survey may a risk of participating in the study.

Benefits

There are no direct benefits to you from participating in the study. However, as a participant you may enjoy a copy of the results, if you request a copy in the google survey. Aside from this benefit to the participant, this research will help me learn more about technology initiatives, funding, and integration in grades four and five in schools in Maine.

Confidentiality

The documents and files from this study will all be kept on a hard drive in MSAD#1. Some data may be shared with survey participants, the Aroostook County Graduate Cohort, presented in public forum, or published in article form. All data from the study, including the participant key, will be kept for two years and then destroyed.

Voluntary

Participation is voluntary. If you choose to take part in this study, you may stop at any time. You may skip any questions you do not wish to answer.

I fully understand the purpose of this research and the procedures to be followed. I understand that my participation is voluntary, and that I may withdraw at any time without penalty. I also recognize that I may skip any questions in which I do not wish to respond. Results of this research will be shared in the form of one or more publications and verbal presentations. If you have any questions about this study, please contact me, Angela Bernier, at berniera@sad1.org. You may also reach the faculty advisor, Johanna Prince, on this study at johanna.prince@maine.edu You may also contact the Chair of the IRB, Karol Maybury, at karol.maybury@maine.edu.

By completing the following google survey, I assert that I fully understand the above and give my consent to serve as a subject in this research.

Teacher survey 1:1 Technology, or any Technology Available to grades Four and Five

1. Which school district is your employer? Please include full district name, as well as identifying school unit number, such as (RSU), (SAD), (CSD), (AOS), or other.
2. Do you consider your school urban, suburban, or rural?
3. What grade(s)do you teach (select all that apply) 4 5
4. Which device(s) do your students use in the classroom?
   - 1:1 Laptops
   - 1:1 Tablets
   - Portable Laptop Cart
   - Portable Tablet Cart
   - Stationary Computer Lab
   - Other Please fill in _____

5. If you chose other for devices provided in your classroom, please describe.
6. Do your students have access 1:1 with a device for the entire school day?
7. Do your students have enough access to technology?
   Yes/No
8. How often do your students use technology?
   - Every day
   - Few times a week
   - Once a week
   - Few times a month
   - Other_____

9. If you chose other for how often your students use technology, please explain.
10. What do you observe about student engagement when students are using technology devices?
    - Students are more engaged when using technology.
    - Students are less engaged when using technology.
    - Technology does not affect student engagement.

11. What are the most important ways that you use technology in the classroom? Check all that apply.
    - Word Processing
    - Research
    - Academic Games
    - Academic Learning Videos
    - Other

12. If you chose other for important ways that you use technology in your classroom, please explain.

13. Which programs do your students use the most?

14. How do you use technology to teach the curriculum?

15. Are you provided opportunity for professional development using technology in your classroom?

16. What is your biggest complaint concerning technology?

17. Are there any changes you would make, or is there anything else you could tell me about technology in grades four and five at your school?