# ELEMENTARY PEDAGOGY AND INSTRUCTIONAL TECHNOLOGY: ACTION RESEARCH ON INSTRUCTIONAL PRACTICES WITH TECHNOLOGY INTEGRATION IN THE ELEMENTARY CLASSROOM

by

**Marc E. Thornton**

Bachelor of Arts, University of Pittsburgh, 1996

Master of Education, California University of Pennsylvania, 1998

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This dissertation was presented

by

Marc E. Thornton

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and approved by

Dr. Jennifer Russell, Associate Professor, School of Education

Dr. Katherine Curran, Coordinator of Academic Technology and Instructional Services, North Allegheny School District

Dissertation Advisor: Dr. Cynthia Tananis, Associate Professor, Administrative and Policy Studies

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Marc E. Thornton, Ed.D.

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Technology advancements have played a major role in twenty-first century teaching and learning, and equipping teachers and students with technological devices has been a topic of debate in our schools. On the one hand, some educators believed technology integration has been necessary for instruction because we have prepared children for a digital society that has been continuously developing (ISTE, 2007). Conversely, there have been other educators who viewed technology as a distraction that has decreased social interactions among children (Courville, 2011).

With these differences of opinion, this study focused on the positives of technology integration and its impact on pedagogical experimentation in the elementary classroom. Teachers in this study varied from high to middle-level users of technology as indicated by the Substitution, Augmentation, Modification, and Redefinition (SAMR) model popularized by Dr. Ruben R. Puentedura (Puentedura, 2013). These teachers were selected because they were either viewed as a teacher leader with technology or an individual who expressed a desire to learn more about technology integration.

Participants took a self-assessment to determine their level on the SAMR model, which determined how each teacher perceived their current use of technology in the classroom. Additionally, a needs assessment was administered to establish each teacher's customized professional learning needs. The results of the needs assessment were used to determine the types of technology professional learning activities that were offered for the middle-level users.

Using a SAMR rubric, I conducted observations of technology practices in each of the participants' classrooms prior to the customized learning. These observations were used as a baseline to compare the level of use in a follow-up lesson after the customized professional learning was delivered.

This inquiry supported the idea that teachers have benefited from customized learning experiences with technology integration through a "community of practice" (Wenger, 2004). By abandoning prefabricated professional development practices, a community of practice allowed for a more personalized approach to professional learning that benefited teachers' proficiency with technology. The middle-level users demonstrated an increase in technology proficiency and advanced on the SAMR model, as their follow-up lessons included activities that were inconceivable without the use of technology.

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# 1.0 INTRODUCTION

Nearly all aspects of society have been influenced by technology, and educational systems have been no exception. A classroom teacher's awareness of technology's influence on teaching and learning has been essential as today's students have become twenty-first century explorers of knowledge (Blair, 2012). Due to this shift in education, this action research sought to investigate the pedagogical changes in the instructional practices of elementary teachers when integrating technology into instruction while operating as a learning community of practice.

## 1.1 STATEMENT OF THE PROBLEM

As an elementary school principal, I have witnessed technology's influence on teaching and learning, and through conversations with elementary classroom teachers, this has been difficult to promote at Oak Elementary School. Teachers in this setting have wanted to know how changing their instruction would redefine student learning and achievement. They have also shared concerns related to student-to-student interaction and engagement. To provide guidance with redefining instruction using technology, the Substitution, Augmentation, Modification, and Redefinition (SAMR) tool has been used as a model in the inquiry setting, offering teachers opportunities to demonstrate the differences between how technology has enhanced instruction and the way in which it has transformed learning (Dunn, 2013). This model was developed by

Dr. Ruben Puentedura, and while it is not evidence based, it has outlined various levels of how technology is integrated into instruction, beginning at the most basic level (i.e. substitution). This level illustrates how technology can be used as a substitute for another tool but with no improvement (Heggart, 2015). Yet, the model finishes at the redefinition level where technology is used in a way that the learning experience is inconceivable without the use of technology. Descriptors for each level can be found in Appendix D.

Although the school board approved a 1:1 technology initiative in the school district, there was more focus at the secondary level at the time the study was conducted. The implementation in the elementary schools moved at a slower pace. Moreover, the Information Technology (IT) department has historically blocked websites and applications (apps), and until the 2015 – 2016 school year, blocked the use of staff members' personal devices on the district's wireless network. Because teachers did not have the equipment or use of their own devices, there was no value in making attempts to change the way they were teaching. These types of limitations have contributed to the way teachers have viewed technology integration at the elementary level. As asserted by Williams (2005), innovative challenges are precarious activities, and these are issues that people have often wished to avoid. Yet, addressing these challenges was instrumental in this investigation to understand why teachers hesitated with pedagogical experimentation and technology integration.

## 1.2 PURPOSE

Today's students rely on technology skills to thrive in the future. Such technology skills include digital literacy, inventive thinking, effective communication, teamwork, and the ability to create

high-quality projects (Firmin & Genesi, 2013). To ensure these skills are practiced in the classroom, teachers who have embraced technology need to bring new pedagogies into instruction. According to the International Society for Technology in Education (ISTE) standards, students should have meaningful experiences with technology that have included: (a) creativity and innovation, (b) communication and collaboration, (c) research and information fluency, (d) critical thinking, problem solving, and decision making, (e) digital citizenship, and (f) technology operations and concepts (ISTE, 2007). These standards of practice have resulted in changes to traditional classroom pedagogy. However, some teachers at Oak Elementary have been hesitant to make these adjustments in their practice. This hesitation has set the purpose for this investigation. Classroom observations and conversations with staff members have purported the concerns that some of the school's teachers have varying interests and views on technology's purpose in the elementary classroom. Some of the teachers have been early adopters of technology integration. While there have been others who hesitated and even resisted using technology in the classroom. This created an uneven capacity and access for the students at Oak Elementary. However, for the successful attempts that have been made, children in this elementary school have produced multimedia presentations, green screen projects, and digital movies, in lieu of creating the paper and pencil products of the past.

## 1.3 INQUIRY QUESTIONS

Classroom instruction in a digital society has ignited the need for new approaches in education that have used advancements in technology. These advancements have helped to prepare students for emergent challenges and demands in a changing world (Blair, 2012). However,

technology on its own could not ensure that effective student learning outcomes have been achieved (Firmin & Genesi, 2013). Instead, it has been technology's purpose in the classroom, established by teachers and school leaders, that has led the way.

Using action research through a community of practice, this study sought to inform and improve teachers' practices with integrating technology in the elementary classroom. Action research is a method in which practitioners attempt to solve a site-based problem (McEwan & McEwan, 2003). As this type of research approach is user-driven, it was well connected with a community of practice. According to Wenger, "communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger, 1998, p 1). As the principal investigator and elementary principal within this community of practice, I requested the participation of five elementary teachers and a technology coach. The technology coach assisted in delivering professional learning, and the following research questions have helped guide this inquiry to examine the pedagogical changes in the practices of these teacher participants throughout the action research process.

Q1. What are selected elementary teachers' (high and middle-level users) perceptions, attitudes, and instructional techniques related to technology use in the classroom?

Q2. How can a team of teachers and an elementary principal who are leaders in technology integration provide professional learning for colleagues to improve instruction with technology through a community of practice?

Q3. How does customized professional learning in a community of practice affect successful integration of technology in the elementary classroom?

This inquiry sought to examine the differences in the way teachers have viewed the outcomes for teaching and learning when technology has been introduced in instruction. It has

also sought to determine if these practices could change when supported through customized professional learning through a community of practice with exposure to successful technology integration in the elementary classroom. Technology could be used to supplement student learning as the best medium to support instruction. However, this shift in teaching has required changes in a school, necessitating the entire school community of students, parents, teachers, and administrators to accept that technology has been a part of everyday school life.

# 2.0 REVIEW OF LITERATURE

Technology integration involves the use of technology tools inside the classroom to allow students to apply computer and technology skills to learning and problem solving (ISTE, 2007). The integration of educational technology also encompasses the idea that classroom teachers use it to introduce, reinforce, extend, enrich, assess, and remediate student mastery of curricular targets (Hamilton, 2007). However, integrating technology not only involves the acquisition of computer skills, but it also engages learners in a process in which they try, fail, access, evaluate, analyze and apply meaningful tasks. It promotes problem solving and higher order thinking skills. Technology can be used to supplement student learning as the best medium to support the learning goal.

As outlined in ISTE standards, the ability to receive and make use of digital information has become an expectation for teachers and students, redefining classroom instruction. Today's teachers have the responsibility of preparing students to use multiple forms of technology to access information and to make meaningful use of it. Firmin and Genesi (2013) have suggested that purposeful uses of technology have required teachers and students to use technology correctly and efficiently for real-world experiences. Unfortunately, K-12 public schools have been among the last institutions to accept this pedagogical change (Kilfoye, 2013), but with the world at their fingertips, today's students have needed educators to re-envision the role of technology in the

classroom (Blair, 2012). This has presented a challenge for teachers to embrace technological literacy and incorporate technology into their pedagogical practice.

While school districts have spent thousands of dollars adding electronic devices into the learning environment, these tools have often been underutilized as administrators have rushed to purchase new technologies to place in classrooms. Yet, this technology has rarely done more than substitute new technologies for old tools (Martinez, 2011). When observing and evaluating teachers, administrators have witnessed technology integrated into instruction. They have also witnessed an increase in student technology use and less teacher technology use when there has been an emphasis on individual student work and student-centered teacher roles (Bielefeldt, 2012). Nonetheless, these observations have typically been presented during an over-staged lesson, a presentation developed as a demonstration, specifically for the classroom observation.

Educators prepare children for a world in which learners need to use multiple forms of technology to access information and to make meaningful use of it. These experiences have represented a new kind of space for learning that has connected the traditional classroom to opportunities beyond the classroom walls. Kilfoye (2013) reported, "As Dewey pointed out in 1899 in *The School and Society*, the great waste of public education is that the student has little chance to use what he learns inside the classroom on the outside" (p. 54). The more we limit student access to resources available from cyberspace, the more we disregard the depth and relevance of education that can be linked to the world outside of the classroom (Kilfoye, 2013). Education's role has been to keep up with society's advances, whether in technology or in any other field (Samra, 2013). Schools have been expected to create environments where students could learn the skills and behaviors required to succeed in a technology-driven world. Rahimi's (2014) pedagogy-driven framework has offered an example of this, describing a shift from a

passive (teacher use of technology) to an interactive engagement learning process (student use of technology) where students have been at the center of their own learning. In this scenario, teachers and administrators have created environments that have allowed students to interact with technology for a student-centered focus connected to real-world problems.

Schools have already made attempts to affiliate themselves with life outside of the school walls, creating environments where students could learn through the community, and thereby, provoking each student's desire to learn by relating everything that has gone on inside the school to prepare them for the real world. With this in mind, real life contexts could be presented through the use of technology, making the classroom come alive. As students have been challenged to take ownership and responsibility of their learning through this medium, they could find themselves becoming more engaged in the learning process. Moreover, as students have sought to access more information through technology, they could deepen their knowledge to meet their own personal needs and interests.

Teachers who have embraced technology skills have brought new pedagogies into instruction and have recognized that digital literacy has been important for the twenty-first century workplace. Yet, some schools have feared the technological world that has awaited students, treating it as something beyond the boundaries of the school's firewalls (Kilfoye, 2013). Only basic and controlled use of technology has seemed to be on par with the mission of some schools. Interactive whiteboards, computer labs, and classroom clickers (e.g. ActiVotes) have become the most ubiquitous technology in classrooms. Very few, if any, students would use such technologies in the workplace. Kilfoye's (2013) examination of technology integration noted a significant point about schools that have continued to install interactive whiteboards. They have simply mimicked the same instructor-led teaching that has been around classrooms

for centuries, and computer labs have resembled the assigned seating and top-down approaches of the past (Kilfoye, 2013). Thus, many schools have continued to prohibit students from using smartphones, iPads, and other mobile devices in classrooms, and these examples have reflected what has been observed in some of the classrooms at Oak Elementary School.

## 2.1 TECHNOLOGY IN OTHER SCHOOLS

Several school districts in western Pennsylvania have made advancements with technology to enhance teaching and learning. The Information Technology (IT) departments in these districts have provided and supported utilization of technology resources that have enhanced the teaching and learning process.

Four years ago, I had the opportunity to visit a school that was of similar size, academic performance, and socioeconomic status as Oak Elementary. The students in the classroom were part of a 1:1 iPad initiative. I observed students interacting with technology both independently and with teacher assistance during a math class. Students requiring the support of a classroom aide were also observed interacting with technology during instruction. I witnessed students watching videos on their iPad that were pre-recorded by their teachers. They could pause the videos and replay them in the event they misunderstood a math concept. Students kept notes and assignments in an online portfolio, using an application (app) on the iPad called Notability. This app allowed the students to organize teacher presentations and notes. When I interviewed the two teachers after their instruction, they mentioned that the initial set up and organization of learning activities was an arduous task. However, the students always benefited, as they could

access these lessons from home and at school. For these students, learning could occur at any time and in any place.

According to an article in the Pittsburgh Business Times, in 2014, South Fayette School District was named to the Digital Promise League of Innovative Schools, a national coalition of 57 school districts in 27 states that was authorized by Congress in 2008 to spur innovation in education (Coyne, 2015). The district's superintendent stated that innovation and technology have always been present in South Fayette, but in the past five years, there has been a shift to extend and embed these concepts throughout the district's curriculum (Coyne, 2015). South Fayette's reports of technology integration provided a glimpse of the opportunities for interactive participation in and outside of the classroom. This district's technology vision could be considered a model in raising student motivation, leading to a more efficient teaching and learning environment.

Schools have always been complicated systems. A school leader's understanding of the mechanisms for systemic reform to fully implement pedagogical changes for a transformation to occur has required experience, communication, people skills, and patience. Within the broader framework of this inquiry, the ideology and discourse surrounding technology integration has centered on the way in which educators and school communities have contextualized meaningful technological experiences for young learners. Hence, when teachers at Oak Elementary have spoken of technology, meaning and style of their discourse has often been influenced by their own educational experiences and background with and without these resources. Teachers' ideologies have influenced the way their social attitudes have been expressed in these discourse structures. Conversely, the same ideology may have influenced the way new and veteran teachers have constructed themselves as participants in these conversations.

Teachers who have possessed a negative ideology about technology may have adversely affected the contextual benefit of technology-focused professional learning. Negative impressions may have influenced mechanisms of politeness that were expressed in threatening, uncomfortable discourse between new and veteran teaching staff. Hence, teachers' ideologies could affect the production and interpretation of technology professional discourse. As witnessed in Oak Elementary, this could occur indirectly through biased statements made in social situations. For example, differences in opinion about technology integration have frequently surfaced during grade level meetings at Oak Elementary. New teachers at Oak have pushed for technology use, while veteran teaching staff members have argued against it. As taxpayers in the district, some teachers in the building have taken a stance to argue against spending tax dollars on this initiative. They have been advocates for being innovative without possessing or utilizing technological resources.

Technology and media may not have a significant effect on learner achievement unless its use has been accompanied by a pedagogical shift or strategy (Firmin & Genesi, 2013). Some teachers have expressed reluctance to technology integration and have not wanted to embrace a new piece of equipment or software until they have seen a need for it. Moreover, many educators have still wondered how technology has been used in classrooms, questioning its necessity or effectiveness (Firmin & Genesi, 2013). Nonetheless, technology has had the power to enhance and transform education in today's classroom.

## 2.2 INTERNAL AND EXTERNAL BARRIERS

Barriers have existed at the forefront of technology integration. These barriers have been due to the technological protections that have been in place through laws and policies. This rationale has offered a mixed message (i.e. protection of students using technology v. barrier to educational opportunities) to educators. The issue at hand has been maintaining a safe and secure technological environment for children, while offering technology-based learning activities. Of course, schools have had valid reasons for maintaining a safe and secure technological environment for students. Cyberbullying, sexting, Internet pornography, and hate speech have been just a few reasons for safety concerns, but when did concern for protection of students become a major barrier to effective teaching and learning (Kilfoye, 2013)? How could forward-thinking, progressive, educational administrators improve access to the Internet, while adhering to federal law and public expectations about Internet safety in schools?

Internal and external barriers may have also limited teachers' efforts with technology. For example, an external barrier may have included helping teachers acquire the technical skills needed to operate technological equipment and software (e.g. computer, iPad, websites, and apps). Because of this, computers and iPads have often provided a basic add-on activity or game in classrooms. There have also been low-level technological versions of the workbook approaches that have already been apparent in the classroom. Some of these choices in activities may have stemmed from personal fears (e.g. what would I do if the technology failed and I could not proceed? How would I gain the confidence I needed?). Teachers' proficiency with computers has been found to be one of the most significant factors affecting technology integration (Inan & Lowther, 2014).

To overcome equipment barriers, some districts have taken steps to work around this problem. For example, Bring Your Own Device (BYOD) and leasing programs have been introduced in schools. BYOD programs have provided opportunities for students to use their own devices in class. Some districts have found this to be a viable option because students were already familiar with their own device, and districts saved on the cost. Consequently, there have been other factors to consider. Classrooms have needed a reliable wireless Internet connection, and supporting different types of devices has required basic knowledge to use multiple devices, including troubleshooting.

Leasing programs have also been desirable options for districts. Like BYOD, they have required a certain level of infrastructure in schools. However, this type of program has provided students an opportunity to lease a device from the school at a lower cost than purchasing one. Yet, the initial expenditure of purchasing devices could be costly for districts, and there has been potential for equipment abuse as students do not necessarily take care of the device as if it were their own. Leasing contracts could help to ensure students and parents assume responsibility for the leased equipment. Ultimately, this has granted students access to technology, as opposed to a district adopting a 1:1 model of purchasing devices.

## 2.3 COMMUNITIES OF PRACTICE

As defined by Wenger (2004), communities of practice are groups of people who share a concern or a passion for something they do, and through regular interaction, learn to do it better (p. 1). Although they may differ in size, life span, and location, common elements of communities of practice include: practice, people, and capabilities (Saint-Onge & Wallace, 2003). Communities

of practice allow learners to have easy access to those who are experts in a field where they may be considered the most significant, tangible example of knowledge management in an organization (Saint-Onge & Wallace, 2003). Still, there have been negative consequences to establishing communities of practice as they may lead to groups hoarding knowledge, forming cliques and group exclusivity (Wenger, McDermott & Snyder, 2002).

In a community of practice, learning has been more of a relational property of individuals, instead of an individual property. Relational property has offered opportunities for individuals to participate in shared practices. An educational setting like Oak Elementary has provided for such opportunities among teachers. According to Lave and Wenger (1991), knowledge and learning have been embedded in cultural practices where a community of practitioners [teachers] who have shared practices may have examined knowledge. Brown and Duguid (1991) suggested that some knowledge has tended to only reside with certain people, regardless of the pressure to distribute it in a better fashion. For example, at Oak Elementary there has been high value in collaborating with the school's technology coach to distribute his knowledge on using apps on the iPads. This could be of high value to teachers to integrate technology in the classroom. However, it has been difficult to distribute this knowledge to some groups of teachers. Moreover, disconnected groups of teachers within the school building have often shared practices, but these practices have not been enough or as frequent to specify where or with whom the knowledge resided. These disconnected groups may have shared a practice or set of practices, but if the groups were not in contact or only operated in isolation, the meanings of the practices were not of high value.

There have been issues with the context of the individualistic perspective on integrating technology in instruction. For example, on an individual level, a teacher may have appeared to

know a skill for using an app, but then failed to apply that knowledge in a context different from the one in which they learned to use it (e.g. professional learning). In addition, both the veteran teacher and the new teacher have shared opportunities to participate in professional learning opportunities for their respective grade levels. In this setting, they have identified more and more with these types of practices. Therefore, school administrators had to assist teachers with supportive authentic learning contexts in which they could perform the desired tasks with technology.

Lave and Wenger (1991) have also described a community of practice as a process of knowledge generation, application, and reproduction (p. 290). Communities of practice have been groups where there has been a constant process of peripheral participation. In some instances, there have been learners who have entered a community and gradually took up its practices where teacher learners must have had access to experts who use instructional technology. There must also have been those who perceived themselves to be members or aspired to be members in a community where expert practices were central.

## 2.4 CONCLUSION

The future of technology integration in schools should not be ignored. Virtually all aspects of society have changed by information technologies and will cause society to continue to change. Research should proceed with the notion that technology is and will continue to be a growing element within schools.

Successfully weaving instructional technology into the fabric of any district has not been an easy task. It has gone beyond purchasing and installing infrastructure, devices, and software.

It has also gone beyond security, professional learning, and curriculum changes. Although these areas have been important to consider, it has all come back to the district recognizing the significance of these areas, but also improving its deficiencies to assert a vision for technology use by teachers and students.

Many teachers and administrators believe that student academic engagement and learning could improve through the integration of technology. However, professional learning and a strong commitment to a school's learning goals are also part of this process. Customized, professional learning in this area has provided teachers the opportunity to learn, understand, and model sound pedagogical practices, as well as innovative computer technology integration models (Bebell & O'Dwyer, 2010).

# 3.0 APPLIED INQUIRY PLAN

The setting for this inquiry was Oak Elementary School, a pseudonym used for the actual elementary school to uphold its anonymity in the study. It is a public elementary school situated in a suburban community in western Pennsylvania. At the time of this study, approximately 45,000 people resided in the district's community. It retained a solid and growing tax base to help maintain economic stability, new businesses, transferees, and housing developments that have helped to maintain a steady and diverse racial and socioeconomic enrollment in the district's schools.

## 3.1 INQUIRY SETTING

Oak Elementary School was one of seven elementary buildings within the district and was opened in 1992. The school contained 50 classrooms and incorporated modern conveniences, including a computer lab. At the time of the study, there were 31 grade level teachers from kindergarten through fifth grade, accommodating an enrollment of 844 students. Each grade level had its own wing and teaching area, which created a sense of a strong learning community.

In 2015, the school's renovations included new technology infrastructure, which encompassed the installation of whiteboards, interactive projectors, and Wi-Fi for mobile devices. With this addition of updated technological infrastructure and equipment, several

teachers expressed an interest in customized professional learning opportunities to increase their use of technology during instruction.

## 3.2 STAKEHOLDERS

The school board of directors in this community has voted to approve a 1:1 technology initiative for students in sixth, ninth, and tenth grade, and efforts to improve instruction with technology were being made at all grade levels throughout the district over the next few years. At the time of the study, teachers at the elementary level were beginning to recognize how their efforts with technology integration supported students' transition to sixth grade in the middle schools.

Although multiple teachers have expressed interest in professional learning to increase their technology skills, there were still skeptics among the teaching staff at Oak Elementary. At a professional learning experience in the fall of 2016, one of the sessions focused on integrating the use of iPads in instruction, and a teacher commented that she could still teach a mean lesson with chalk, while another stated that she did not want her students staring at an iPad screen all day. Such comments represented the way in which some teachers at Oak Elementary viewed technology's role in the classroom and helped to answer Research Question 1: What are selected teachers' perceptions, attitudes, and instructional techniques related to technology use in the classroom? If teachers in this setting were to be successful with engaging students in the digital age, they needed to consider making changes to instructional delivery and plan for instruction differently to offer student-centered activities that involved technological experiences.

## 3.3 INQUIRY APPROACH

As discussed in Chapter 1, the purpose of this inquiry was to explore the integration of technology in the elementary classroom through action research within a community of practice. The qualitative data obtained from the customized professional learning and classroom observations was used to address Research Question 3: How does customized professional learning in a community of practice affect successful integration of technology in the elementary classroom? To accomplish this, the study made use of establishing a community of practice as a conceptual framework. This framework suggested that participants [teachers] needed to be members of a learning community where teaching practices with technology were shared between teachers. This community of practice shared tools they were using, in addition to a social institution [school] in which the learning occurred (Doak, 2009). These tools came in various forms of educational technology (e.g. iPads, apps, and interactive software). In this community of practice, individuals were active participants where new understanding and reasoning occurred. This framework guided Research Question 2: How can a team of teachers and an elementary principal who are leaders in technology integration provide professional learning for colleagues to improve instruction with technology through a community of practice? Thus, sharing ideas in a community of practice implied that the learners experienced something together, and the learning that occurred was divided and distributed between the participants in the learning community (Doak, 2009).

The individuals in this community of practice used knowledge and technological skills by thinking critically. They applied knowledge to new situations, analyzed information, comprehended new ideas, communicated, collaborated, and problem solved (Honey, Mandinach,

& McMillan, 2003). This framework supported the skills needed by teachers and twenty-first century learners.

Methods in this inquiry included an introductory presentation and activity about the SAMR model, which is found in Appendix E. In addition, classroom observations were conducted for the five participating teachers, and a rating was assigned to each teacher using a SAMR rubric, located in Appendix D. This rubric was also used as a self-assessment tool for the participants. For the middle-level users of technology, observations were conducted before and after the customized professional learning experiences to measure growth along the SAMR rubric. For the high-level users, only one observation was conducted. The purpose was to establish the high-level users' ability to use technology at the Modification or Redefinition level on the rubric.

Middle-level user participants were also asked about their professional learning needs. This needs assessment was driven by the participants' responses to the self-assessment. It was designed in this manner to produce results that gave focused meaning to the professional learning that followed. The framework for these discussions are in Appendix F.

This methodology offered a systematic way of talking with and listening to teachers, while data were collected through observations of lessons. Furthermore, this action research was connected to a community of practice as it offered a means for participants to get involved in customized professional learning to share their perception of technology as it related to instructional practices.

Collecting multiple forms of qualitative data provided immediate and first hand feedback from teachers before, during, and after instructional delivery. Moreover, it offered an opportunity to express the specific types of professional learning they would benefit from the

most. Gathering data that illustrated how teachers have balanced technology integration with content was prudent to have a better understanding of their perceptions, attitudes, and instructional techniques with educational technology.

The qualitative data collection helped to gain insight into the technology integration practices of the elementary teachers at Oak Elementary. The sample of teachers provided an in-depth exploration of the data. Analysis searched for patterns that led to the development of improved professional learning opportunities through a community of practice that focused on technology use in the elementary classroom. There was no predefined outcome for this inquiry, as the open-ended protocols in the SAMR self-assessment helped to develop a needs assessment through discussion. The qualitative data were analyzed using an inductive approach to generate new meaning from what emerged from the data. Analysis looked for relationships and themes as they pertained to technology integration and professional learning in a community of practice.

Table 1: Alignment of Inquiry Questions, Evidence, and Methods

| Research Activity | Stage | Timeline | Evidence | Data Collection | Research Questions |
|---|---|---|---|---|---|
| Identified three (3) teachers who integrated technology into instruction (technology leaders)<br>Identified two (2) teachers who have had an interest in beginning to integrate technology into instruction<br>Introduction to SAMR<br>Self-rating activity/instruction<br>Baseline observation of "robust lesson" w/technology integration using SAMR rubric<br>Teacher completion of needs assessment/discussion for technology integration | Knowledge of current status with technology | December 2016 | Placement on SAMR Model based on self-rating<br>Identification of professional learning needs of teachers | Inventory/self-assessment<br>Identification of SAMR placement of teachers using technology<br>Identification of how participants have been using technology<br>Needs assessment/discussion<br>Observation rubric using SAMR | What were selected elementary teachers' (high and middle-level users) perceptions, attitudes, and instructional techniques related to technology use in the classroom? |
| Researcher and participants reviewed data to produce an intervention plan based on findings from self-rating tool, baseline observation, and needs assessment/discussion<br>Collected materials needed for professional development | Data collection with the identified three (3) high-level use teachers<br>Intervention and data collection with the identified two (2) middle-level use teachers | January 2017<br><br>February 2017 | Teachers set a professional goal based on placement on the SAMR Model<br>Teachers attended professional learning activities within the school building | Field notes<br>Researcher's own learning<br>Learning of participants – specified technology strategies to be employed<br>Established Community of Practice (CoP) | How can a team of teachers and an elementary principal who are leaders in technology integration provide professional learning for colleagues to improve instruction with technology through a community of practice? |

Table 1 (continued)

| | | | | | |
|---|---|---|---|---|---|
| Scheduled technology professional learning activities<br><br>Self-rating activity/instruction<br>Observed "robust lesson" w/technology integration using SAMR rubric<br>Teacher completion of needs assessment/discussion for technology integration | Knowing results status of all five (5) teachers | March 2017 | Teachers instructed lessons with technology using specified activities<br>Placement on SAMR Model based on self-rating | Field notes<br>Researcher's own learning<br>Learning of others<br>Community of Practice (CoP)<br>Inventory/self-assessment<br>Observation rubric using SAMR<br>Identification of next steps and professional responsibility | How does customized professional learning in a community of practice affect successful integration of technology in the elementary classroom? |

# 4.0 DATA ANALYSIS

The purpose of this inquiry was to explore the integration of technology in the elementary classroom. Inductive reasoning guided the analytical process. I found multiple themes that resulted in a specific picture about a community of practice and professional learning. Teachers recruited for this study ranged from high to middle-level users of technology as indicated by the SAMR model (Puentedura, 2013). I selected five teachers as participants, the assessment revealed them as being leaders in technology use or as someone with a desire to educate themselves on technology integration.

These teachers completed a self-assessment survey to find their user level on the SAMR model. This model showed the way in which the participant understood their present use of technology in the classroom setting. Following the survey, another needs assessment established the teacher's needs regarding training on the best way to focus on technology integration. The results of these two assessments showed the available professional learning activities for mid-level users. Those with higher levels of technology use provided the mid-level users with the training.

Prior to the training, I observed how technology practices occurred in each of the participants' classrooms. I then used these observations as a baseline for comparing the level of technology use before and after the professional learning training. I used the results of these

observations to see if the customized training improved the inclusion of technology use in the classroom setting.

The following research questions and subsequent results guided this inquiry to examine pedagogical changes in the practices of elementary teachers integrating technology.

Q1. What are selected elementary teachers' (high and middle-level users) perceptions, attitudes, and instructional techniques related to technology use in the classroom?

As previously noted, I observed some teachers' perceptions about technology use in the classroom at a professional learning experience in the fall of 2016. During one of the sessions, which focused on the integration of iPads into instruction, a teacher commented she could still "teach a mean lesson with chalk". Yet another teacher stated she did not want her students staring at an iPad screen all day. Such comments presented some potential reluctance to using technology in classroom. To examine if these perceptions persisted with other teachers, participants completed the self-assessment, and I observed them to provide insight into how they perceived themselves and participated in professional learning to integrate and use technology in the classroom. These responses revealed how often participants worked together with teachers to share information about technology, if they would participate in professional learning, what technology is most beneficial, and what resources are necessary. Tables 2 and 3 provide summaries of the information from the first and second observations and self-ratings of participants.

Table 2: First Participant Observation and Self-Rating Information

| Teacher Participant | Type of User | Date Participated in SAMR Introduction | Date of Self-Rating Activity #1 | Participant Self-Rating #1 | Date of Principal Investigator Observation #1 | Principal Investigator Baseline Observation Rating | Participant Needs Assessment #1 | Intervention Plan | Reasoning & Materials for Professional Development |
|---|---|---|---|---|---|---|---|---|---|
| Participant 1 | High Level | 1/17/2017 | 1/17/2017 | Redefinition | 1/19/2017 | Redefinition | N/A - Participant will assist with professional learning instruction | Co-Instructor for Explain Everything application on the iPad | Co-Instructor for Explain Everything application on the iPad |
| Participant 2 | High Level | 1/17/2017 | 1/17/2017 | Redefinition | 1/19/2017 | Modification | N/A - Participant will assist with professional learning instruction | Co-Instructor for Book Creator application on the iPad | Co-Instructor for Book Creator application on the iPad |
| Participant 3 | High Level | 1/17/2017 | 1/17/2017 | Modification | 1/20/2017 | Modification | N/A - Participant will assist with professional learning instruction | Co-Instructor for Explain Everything application on the iPad | Co-Instructor for Explain Everything application on the iPad |

Table 2 (continued)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Participant 4 | Mid-Level | 1/17/2017 | 1/17/2017 | Substitution | 1/25/2017 | Substitution | Participant requested professional learning using the Book Creator application on the iPad | The plan was for this teacher to learn how to use the Book Creator application on the iPad to provide students with the tools and canvas to create their own eBook and demonstrate their learning in English Language Arts. | An iPad, wireless network, and a student's writing sample from English and Language Arts was needed for this professional learning activity. |
| Participant 5 | Mid-Level | 1/17/2017 | 1/17/2017 | Augmentation | 1/26/2017 | Substitution | Participant requested professional learning using the Explain Everything application on the iPad | The plan was for this teacher to learn how to use the Explain Everything application on the iPad. | An iPad, wireless network, and a sample of student math problem solving was needed for this professional learning activity. |

Table 3: Second Participant Observation and Self-Rating Information

| Teacher Participant | Type of User | Date of Professional Learning | Date of Principal Investigator Observation #2 | Principal Investigator Observation Rating #2 | Date of Self-Rating Activity #2 | Participant Self-Rating #2 | Participant Needs Assessment #2 |
|---|---|---|---|---|---|---|---|
| Participant 1 | High Level | Co-Instructor for Explain Everything application on the iPad | N/A | N/A | 2/15/2017 | Redefinition | SAMR Presentation Follow-up Activity |
| Participant 2 | High Level | Co-Instructor for Book Creator application on the iPad | N/A | N/A | 2/16/2017 | Redefinition | SAMR Presentation Follow-up Activity |
| Participant 3 | High Level | Co-Instructor for Explain Everything application on the iPad | N/A | N/A | 2/16/2017 | Redefinition | SAMR Presentation Follow-up Activity |
| Participant 4 | Mid-Level | 2/6/2017 | 2/15/2017 | Redefinition | 2/15/2017 | Modification | SAMR Presentation Follow-up Activity |
| Participant 5 | Mid-Level | 2/9/2017 | 2/16/2017 | Redefinition | 2/16/2017 | Modification | SAMR Presentation Follow-up Activity |

The following section provides a narrative discussion of the results summarized in Tables 2 and 3. In the SAMR model, this framework allows teachers to reflect on how well they incorporate technology into their teaching practices and determine whether it influences the way in which students learn. I completed initial observations with the high-level users in order to confirm their capability to use technology during instruction. My observations confirmed this ability with the three high level users. Their self-ratings and my observations showed ratings for redefinition and modification, or both. Redefinition indicated if the technology used in a lesson allowed for the creation of new tasks not possible without the technology. Modification indicated if the technology allowed for major redesign of a certain task.

For the first participant, we both identified the lesson as redefinition. The participant taught students using the Mirroring360 app, which enabled screen sharing on an iPad. The teacher taught and explained to students how to use the Explain Everything app, which allowed for the creation of classroom video projects, demonstrating a proficiency in its use. The lesson required the use of the app, as students solved multiple problems and worked together using the interactive whiteboard tool to problem solve and share information. This lesson would not have been possible without the use of the apps and technology. The use of this level of technology indicated proficiency and comfortability in using technology in the classroom.

I observed the second participant teaching students how to write a narrative. During the lesson, students moved around to different centers. Students learned to use the Book Creator app to write their narratives, a Nearpod app to learn about and practice inferencing, and Quizizz, an interactive app for multiplayer classroom quizzes, to show their understanding of the concepts. While the students worked with the school's technology coach, the teacher also demonstrated knowledge proficiency by assisting in the lessons. One example was with a participant showing

the students how to use and not use an iPad during the Nearpod lesson. The second participant rated the lesson as redefinition, while I rated it as modification. I gave the modification rating because technology was useful, but unnecessary for the lesson. However, the use of technology enhanced the message of the stories, and pointed to the participant's comfort level in using technology as part of the lesson.

Participant three demonstrated proficiency with technology during a lesson on making bar graphs. The participant integrated technology into the lesson by using a projector and whiteboard during the lesson. The participant demonstrated how to use the software and aided students during the lesson. When students started using iPads to use the Explain Everything app, the participant showed them how to record their voices on the app and take photos of their problems. The participant was able to move around the classroom and help students as needed with the app. This demonstrated their ease of use with the technology in the classroom.

For the middle-level users, I rated them at substitution, while they rated themselves at substitution or augmentation. In the SAMR model, augmentation showed how technology could be a direct substitute in a lesson, which resulted in improvement. Substitution has only indicated if the technology acted as a direct substitute in the lesson, but no functional change occurred. These ratings have indicated how users understood their level of use and comfort in incorporating technology in the classroom.

Participant four rated him/herself at substitution, indicating a functional use of technology. The lesson involved a writing activity having students submit work electronically in order to prepare them for future work. The participant provided some direction to students on how to upload photos and make modifications using the iPad and app. While the participant monitored activities, students had difficulties, and the participant only provided some assistance.

I also rated the lesson as substitution because while students used technology, it was unnecessary for the lesson. Some students indicated a preference for simply using paper and pencil. While the use of technology indicated the participant's interest in incorporating technology in the classroom, its use during the lesson indicated a lack of knowledge on how to best implement it.

For participant five, he/she rated the lesson as augmentation, while I rated it as substitution. This was a math lesson where the students used iPads to work through the lesson. The participant used the Explain Everything app to help model the example, and the participant showed students how to use the app for their homework. However, students showed difficulty in using the app, which caused issues for completing the activity. I rated the activity as substitution because students could have just shared their thoughts without the use of technology. The use of the technology indicated the participant's willingness to integrate the technology into the classroom setting. However, the difficulty in using the app during the lesson indicated less ease of use and understanding of the way in which to incorporate the technology into the classroom.

The initial set of observations showed it was not the first time students had used the Book Creator application on the iPad. All three high-level teachers noted technology as regularly integrated into the classroom, again indicating a level of comfort in using it in the classroom setting. For the middle-level users, they incorporated technology into the classroom, but there was difficulty in using the apps. During the second set of observations, for participant four, they relied on the school's technology coach for support. For participant five, there was difficulty in adjusting the iPad settings for their use in class, but they worked with other teachers to make changes. These observations indicated that while the middle-level users had some difficulties in using technology, they showed a willingness to learn and adapt to its use in the classroom. Overall, the willingness to teach on the part of high-level users and to learn by middle-level users

indicated positive attitudes about using, integrating, and improving use of technology in the classroom setting.

Q2. How can a team of teachers and an elementary principal who are leaders in technology integration provide professional learning for colleagues to improve instruction with technology through a community of practice?

A community of practice describes how a group of individuals shares a certain goal or knowledge about a topic and regularly interacts to improve that knowledge or reach that goal. In this case, the participants shared relational property, which means they had several opportunities to share and integrate knowledge about technology use in the classroom. Participants experienced sharing of ideas in their community of practice. They shared knowledge and information among the different participants improving technology integration in the classroom in the process.

In this inquiry setting, this community of practice shared knowledge about apps on classroom iPads and relied on the school's technology coach to help integrate technology during lessons. While they shared information and technology between different classrooms, prior to the needs assessment they had difficulty in pinpointing who has the highest level of knowledge and developing formal practices for sharing technology. Participants demonstrated disconnect between carrying out shared practices, as some participants operated alone. A participant initially incorporated his or her own perspective on when to use or not to use technology in a lesson. This implied a failure to incorporate the professional knowledge available about how and when to use an app in the classroom. However, opportunities existed to share information and participate in learning opportunities to improve knowledge and to develop shared practices.

All five participants showed positive attitudes in sharing and learning how to incorporate technology into the classroom. All three high-level users, acted as instructors for the identified middle-level users during the customized professional learning experience. Participants one and three did this by agreeing to provide instruction on the Explain Everything application on the iPad. While, participant two agreed to provide co-instruction on the Book Creator app on the iPad. In response, the two middle-level users showed their willingness to learn and actively participate in the community of practice by asking for specific instruction on different apps. Their goal was to improve their lessons for students.

Participant four specifically asked for instruction on how to use the Book Creator app on the iPad. The plan was for this teacher to learn how to use the Book Creator application on the iPad and then translate experience in the follow-up lesson. This instruction would help the participant to provide students with the tools and canvas to create their own eBook and demonstrate their learning in English Language Arts. With Book Creator, students were able to select images, insert text, and choose backgrounds for assembling books in a variety of formats. Once finished, students could open their final products in iBooks and Google Play Books. They could share them online and send them over email to teachers, family members, and their peers.

Participant five requested training on how to use the Explain Everything application on the iPad. Their goal in learning how to better use the app in the classroom setting was to learn how to use this application to do screen casting. This has been an interactive whiteboard tool, and offered real-time collaboration, allowing students to animate, record, annotate, collaborate, and explore ideas in mathematics. The application provided the teachers and students the opportunity to share thinking, reflect upon knowledge building, and assess problem-solving strategies. Overall, the needs assessment showed the acknowledgement of deficits and sharing

of information in the community of practice. Having members willing to teach and those willing to learn from them provided the opportunity to improve technology integration and use in the classroom.

Q3. How does customized professional learning in a community of practice affect successful integration of technology in the elementary classroom?

To answer this research question, I used a community of practice as a conceptual framework. This framework suggested customized professional learning in a community of practice, which influenced integration of technology in the classroom setting. In this setting, participants shared technology, including apps on district-issued iPads. Participants actively engaged with one another to share and incorporate knowledge between the different user levels during a 45-minute working session each week. The discussions and hands-on experiences acted as the interventions leading up to the follow-up robust lesson. Though, it was noticed that middle-level users in the community of practice would frequently seek out high-level users during their scheduled planning time to consult about their technology planning. When asked about this, the middle-level users commented they either looking for clarification or wanted to seek input on a new idea. Keeping in mind that members of this community of practice were volunteers, all observed interactions were positive.

Participants four and five agreed to participate in customized professional learning activities. Participant four originally taught a lesson using the Book Creator app, but the lesson did not incorporate the actual potential of the technology in the lesson. I rated the first lesson as being in the substitution stage. To improve, they agreed to learn how to use the app and teach students how to create and display their final book products. The required materials for their professional learning opportunity included an iPad, wireless network, and a writing sample from

English and Language Arts. During the post training, observation improvements occurred. Similar to the initial observed lesson, the participant distributed iPads to students, and the students entered their creative writing pieces into the app. The participant helped students to use the features of the app and dealt with any user issues. The lesson was successful in helping the students navigate the app, design their story products, and share their finished products with peers, family members, and those with Internet access. The professional training provided participant four with the requisite knowledge to better integrate the technology into the lesson and aid students. The new lesson received a redefinition rating because the class shared their product outside of the classroom. This result was not possible without the use of technology.

Participant five's initial observation resulted in a substitution rating, and the participant requested professional learning with the Explain Everything app on the iPad. Their training involved an iPad, wireless network, and a sample of student math problem solving. In the initial activity, students received an introduction to the app and lesson, but the lesson did not properly integrate the technology. Following the training, participant five then split students into three groups. This lesson also integrated help from the community of practice. The technology coach participated in the lesson to support the students in one group, while the teacher of the gifted students aided in supporting another group. Each student received an iPad and learned to record their voices for the math word problems. They learned to navigate the app by taking photos and building strategies to solve the math word problems. Students worked separately in groups to complete their work, but they interacted with other students when necessary to problem solve. The students shared their work with parents through the web and through the Seesaw app. The new lesson moved from a substitution to a redefinition rating, as they shared this lesson beyond

the classroom. The results of the lesson and student work were inconceivable without the use of technology.

The results of the customized professional learning included the middle-level users of technology improving their rating on the SAMR model. These improvements occurred through the integration and sharing of skills and knowledge through the community of practice. The customized learning opportunities also revealed who needed further support and training. Further needs and discussion following teacher training revealed certain process problems that required improvement. For participant four, observations about the difficulties in starting a new book in the Book Creator app revealed the need for relying on the support of the school's technology coach. Participant five noted there was difficulty signing out the iPads for the follow-up classroom observation. There were two iPad carts in the building with 31 classroom teachers (kindergarten through fifth grade), competing to use them for instruction. To make these arrangements, other teachers modified their lesson activities. The overall assessment revealed the necessity for ongoing training and follow-up based on the SAMR model. These results showed that the professional training and learning opportunities helped to improve the successful integration of technology in the classroom.

# 5.0 DISCUSSIONS AND CONCLUSIONS

The results supported the use of a community of practice to introduce and carry out customized learning experiences to improve technology use in the classroom. I learned that having a community of practice helped the teachers to ignore preconceived ideas about professional development practices and to create personalized learning approaches. These results brought together the teachers' different backgrounds and skill sets with technology use. They improved the professional capabilities of the middle-level users and those of the higher-level users who trained them. Those with the middle-level skills improved their proficiency levels and advanced according to the SAMR model. These improvements showed during the follow-up lessons, as the teachers would not have been able to instruct lessons without technology.

## 5.1 DISCUSSION

As elementary teachers have continued to face many challenges, they have met with adjusting their instructional approaches to integrate educational technology, including the expectation of student growth and achievement. Overall, findings from this inquiry supported the development of a community of practice within school buildings to offer more customized experiences for professional learning. Exploring the integration of educational technology has been receiving attention. In fact, observation and evaluation tools have embedded their use in those tools used

by building principals. Yet, there has been little attention given to how teachers climbed the SAMR model to have students engage in learning activities where the learning process or product was inconceivable without the use of technology. Many teachers' lessons have continued to fall at a lower level on the SAMR model, as they have only introduced technology into doing the same type of activity that could be accomplished with a piece of paper and a pencil. The technology did not, yet, improve the lesson.

## 5.2 CONCLUSIONS

Given the results of the inquiry, I believe the future of technology integration into schools must continue. These results reiterated the point that society continues to move forward by incorporating technology and information into learning practices. Teachers' proficiency showed as a factor in improving the integration (Inan & Lowther, 2014). Similar inquiries should take place to improve knowledge about levels of technology use and integration into elementary school classrooms. Such knowledge is requisite, which the results reiterated. This is because integrating instructional technology into the classroom setting is difficult. It is especially difficult if the teacher lacks the knowledge to integrate it, or the person to ask for help from to complete the integration.

Communities of practice bring together groups of people who share a concern or a passion for their work. They integrate their work and passion by interacting regularly and sharing that information and knowledge (Wenger, 2004). Establishing communities of practice related to technology integration reduces the stress that comes with installing and managing devices and software (Wenger, 2004). Acknowledging and addressing deficiencies by users

helps to improve the use of technology by both students and teachers. In a community of practice, learning has been more of a relational property of individuals, instead of an individual property. Relational property has offered opportunities for individuals to participate in shared practices. An educational setting like Oak Elementary has provided for such opportunities among teachers. Lave and Wenger (1991) noted knowledge and learning as embedded in cultural practices where a community of practitioners shared practices and knowledge. As noted in the observations, teachers recognized the importance of technology use in students' academic engagement and learning. The integration of technology in the elementary classroom pointed to improvements in lessons and instruction as children move into different grades. These skills are critical to future performance, because students will continue to learn and have access to new technologies. Such skills also support Mishra and Koehler's (2006) framework for technological pedagogical content knowledge (TPACK) for technology integration in classrooms. TPACK attempts to identify the nature of knowledge required by teachers for technology integration in their teaching. The framework extends Shulman's idea of Pedagogical Content Knowledge (Shulman, 1986). A diagram for this framework is in Appendix G, and it illustrates how various kinds of teacher knowledge can be derived from the integration of technological, pedagogical, and content knowledge, emphasizing the types of pedagogies that foster twenty-first century competencies (ISTE, 2007). For technology integration to be effective, the relationship between the components in the framework need to be considered along with the unique contexts in which they are situated (Mishra & Koehler, 2006).

The results of the customized professional learning showed that the way to achieve successful integration of technology in the classroom and improving ease of use develops from commitment to professional learning and a strong commitment to the learning goals of a school.

This was important, as knowledge should be shared amongst teachers and students to avoid problems with instruction and teaching (Brown & Duguid, 1991). The customized professional learning in this area provided the teachers to recognize their deficits in technology use. The customized training from their community of practice peers helped them to learn, understand, and model sound pedagogical practices (Bebell & O'Dwyer, 2010).

# 6.0 RECOMMENDATIONS

The findings from this inquiry illustrated the growth of technology integration at Oak Elementary School through a community of practice. Although there was initial hesitation to take risks and introduce new technology into elementary instruction, the middle-level technology users have entrusted their high-level technology user colleagues to lead the way. The community of practice established at Oak Elementary proved successful means in recruiting interested teachers to explore technology's place in education.

## 6.1 CHALLENGES

It is important to note that improvement in technology integration is not without its challenges. As we worked to improve instruction with technology through customized professional learning, the participants involved in this study began to worry about whether they might be adding too much to the teachers' already full plates. They wondered if teachers would eliminate other instructional practices to make room for experimental pedagogical shifts in elementary instruction. Teachers appreciated the recognition for the many demands of their job, yet analyzing these data provided some insights as to how teachers might reasonably hope to adjust previously planned lessons to integrate technology. Although the participants in the study reported that planning lessons with technology did not necessarily require any more or less time

than a lesson without it, planning may take somewhat longer for the novice user. High-level users reported that planning a lesson that integrates technology like the Book Creator app may take approximately three hours. However, for a Nearpod lesson, it may take approximately one hour. Still, a lesson without technology may involve time to photocopy, create, and locate necessary resources.

This inquiry has made us cognizant of the fact that effective professional learning should match individual teacher needs, while utilizing an effective delivery method and available resources. Using a community of practice approach through customized learning helped to guard against predetermined professional development methods and strategies. Through assessing the needs of teachers, their expertise and deficiencies, and considering available resources, school leaders can deliver appropriate, customized professional learning. For the purposes of this inquiry, these methods successfully guided professional learning with technology integration through a community of practice.

## 6.2 FUTURE ACTION

For future action, teachers should understand how technology could enhance student learning in the classroom. This inquiry set out to demonstrate that technology showed effective use when integrated into the elementary classroom and allowed students to engage in learning activities that would be inconceivable without the use of technology. My suggestion for school leaders would not only be to look for opportunities to customize professional learning for teachers in technology integration, but to also consider how all forms of professional learning can be

customized to meet the needs of teachers. The community of practice approach motivated this group of teachers to learn as it incorporated a type of peer coach design in their learning.

The teacher participants in this study reported a high degree of satisfaction in the design and presentation of the professional learning. From this perspective, my observations and research confirmed that when given the opportunity to experience how technology could effectively fit in the classroom, teachers were encouraged to use these tools to climb the SAMR model and modify pedagogy. The only difficulty in this professional learning process is to ensure that teachers will continue to incorporate what they have learned in future instruction. Can this community of practice be sustained? Sustainable communities of practice can enhance the health of a school organization by creating favorable conditions for them to thrive. This may be addressed through regular interactions with members of the group and ongoing opportunities for customized professional learning.

For future inquiry, whether technology related or another school initiative, my goal is to make attempts at taking a similar peer coach approach through the establishment of communities of practice. As indicated in Chapter 2, a community of practice recognizes the knowledge management of individuals and offers opportunities for individuals to participate in shared practices. As an educational leader, I need to employ this as regular practice to capitalize on the capabilities of the resident experts within the school as they are the most significant examples of knowledge management in our organization (Saint-Onge & Wallace, 2003).

# 7.0 REFLECTION

Practitioners who engage in action research find it to be an empowering experience (Creighton, 2003). Conducting this research provided me the opportunity to explore teachers' perceptions of technology's role in the elementary classroom, and as I reflected on this experience, the most significant result was that this method resulted in a positive outcome for the participants within the community of practice, including my own learning. We were the main contributors to the work as well as the consumers of the findings.

Using action research through a community of practice helped me to become more of an effective school leader in technology as an elementary principal. Observing teachers learn, reflect, and improve their professional practice has been positive, which had a significant influence on instruction and student learning and engagement at Oak Elementary. Students created projects and shared their learning experiences outside of the classroom walls. These projects were previously inconceivable without the use of technology.

As a school leader who has planned various professional learning activities, I expected teachers to engage in experiences that were delivered to them in a whole group setting. These types of learning activities were often prefabricated presentations or experiences developed by another school administrator with the expectation that everyone participated. However, throughout this action research process, the benefit of customizing professional learning experiences led to positive outcomes. It proved to be beneficial to consider each teacher's

individualized needs within the community of practice, and as a member of this community, I needed to adjust my own thinking to remember that our plan was constantly evolving. The observations and discussions were the driving forces to design and customize the professional learning. The community of practice kept the work concise, which was appropriate so we would adhere to a plan that led directly to the type of learning the teacher-participants wanted to experience, which was to enhance their practice and to reach the Modification or Redefinition phase of the SAMR model. When considering the work put into the community of practice through action research, I would anticipate that applying a similar approach would enhance other types of professional learning in the school setting.

As indicated in my own learning in Chapter 5, there was great emphasis on controlling the design for professional learning. It was important to keep the professional learning simple to avoid lengthy, complex instruction during the customized learning experiences. We did not want to create a plan that would discourage teachers from following through implementing what they learned. While I recognize the mid-level technology users involved in this inquiry had an interest in learning how to climb the SAMR model, I am cautious that successful planning for customized professional learning could shift in a different educational setting or if another set of teachers with a lower set of skills were asked to participate.

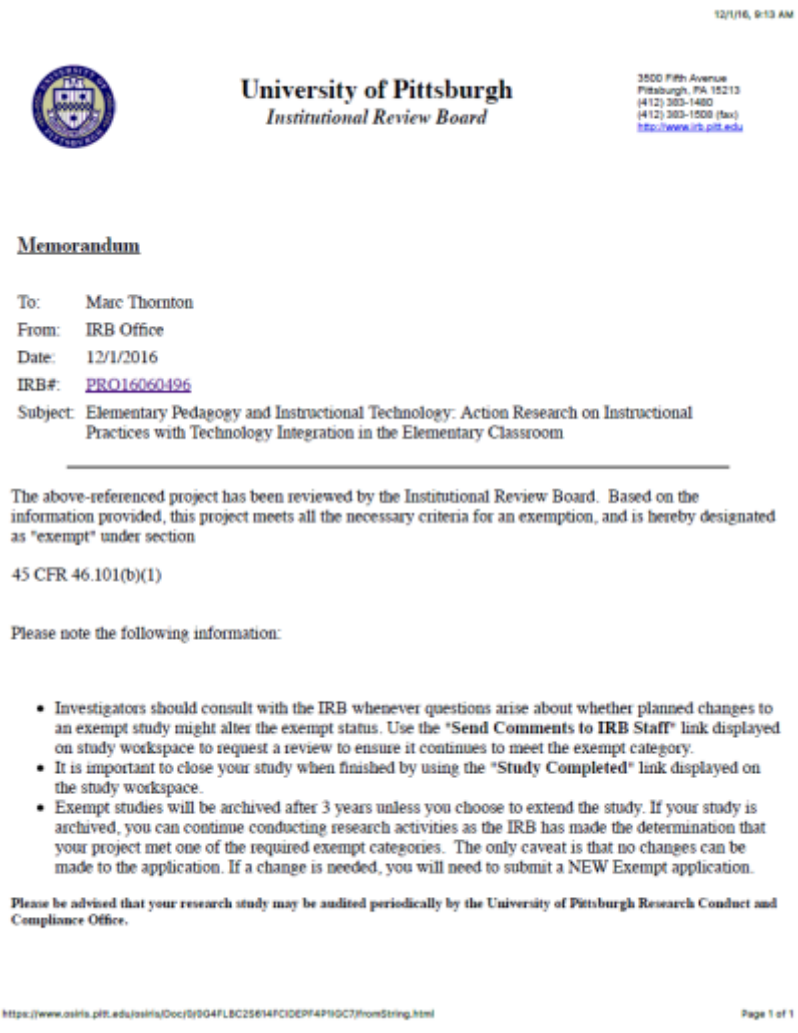
I recognize that I am passionate about technology's purpose in the classroom and how it enhanced teaching and learning in this inquiry. However, as mentioned in Chapter 1, on its own, technology could not ensure that good teaching and effective student learning outcomes have been achieved. Technology's purpose in the classroom must be driven by teachers and school leaders who can guide students to use technology as a tool for learning that will help them to

perform at levels that were previously inconceivable without the integration of technology in the classroom.

# APPENDIX A

## IRB APPROVAL LETTER

Figure 1: IRB Approval Letter



12/1/16, 9:13 AM

**University of Pittsburgh**
*Institutional Review Board*

3500 Fifth Avenue
Pittsburgh, PA 15213
(412) 383-1480
(412) 383-1508 (fax)
http://www.irb.pitt.edu

**Memorandum**

To: Marc Thornton
From: IRB Office
Date: 12/1/2016
IRB#: PRO16060496
Subject: Elementary Pedagogy and Instructional Technology: Action Research on Instructional Practices with Technology Integration in the Elementary Classroom

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The above-referenced project has been reviewed by the Institutional Review Board. Based on the information provided, this project meets all the necessary criteria for an exemption, and is hereby designated as "exempt" under section

45 CFR 46.101(b)(1)

Please note the following information:

- Investigators should consult with the IRB whenever questions arise about whether planned changes to an exempt study might alter the exempt status. Use the "**Send Comments to IRB Staff**" link displayed on study workspace to request a review to ensure it continues to meet the exempt category.
- It is important to close your study when finished by using the "**Study Completed**" link displayed on the study workspace.
- Exempt studies will be archived after 3 years unless you choose to extend the study. If your study is archived, you can continue conducting research activities as the IRB has made the determination that your project met one of the required exempt categories. The only caveat is that no changes can be made to the application. If a change is needed, you will need to submit a NEW Exempt application.

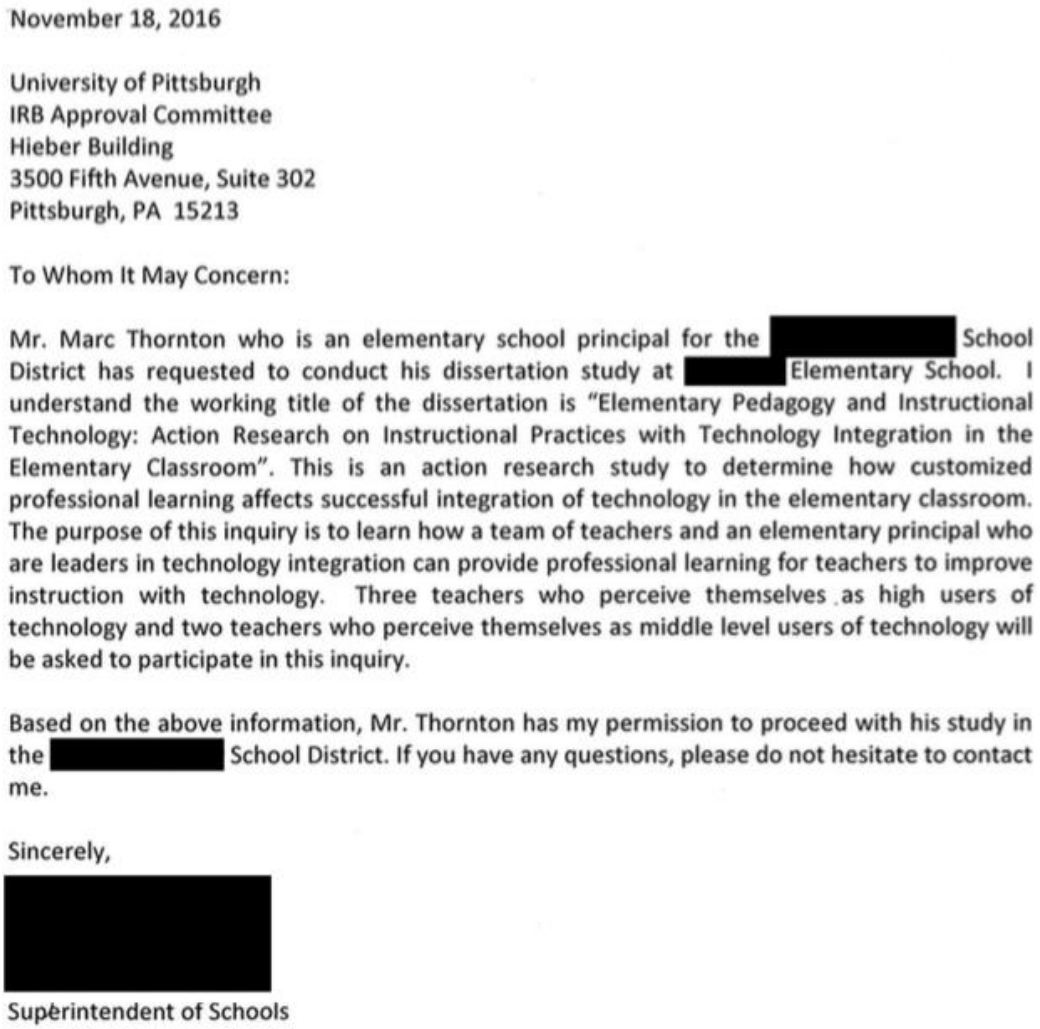
**Please be advised that your research study may be audited periodically by the University of Pittsburgh Research Conduct and Compliance Office.**

https://www.osiris.pitt.edu/osiris/Doc/0/0G4FLBC25614FCIDEPF4P1GC7/fromString.html Page 1 of 1

## APPENDIX B

## INQUIRY SITE LETTER OF PERMISSION: REDACTED INFORMATION

Figure 2: Inquiry Site Letter of Permission



November 18, 2016

University of Pittsburgh
IRB Approval Committee
Hieber Building
3500 Fifth Avenue, Suite 302
Pittsburgh, PA 15213

To Whom It May Concern:

Mr. Marc Thornton who is an elementary school principal for the [redacted] School District has requested to conduct his dissertation study at [redacted] Elementary School. I understand the working title of the dissertation is "Elementary Pedagogy and Instructional Technology: Action Research on Instructional Practices with Technology Integration in the Elementary Classroom". This is an action research study to determine how customized professional learning affects successful integration of technology in the elementary classroom. The purpose of this inquiry is to learn how a team of teachers and an elementary principal who are leaders in technology integration can provide professional learning for teachers to improve instruction with technology. Three teachers who perceive themselves as high users of technology and two teachers who perceive themselves as middle level users of technology will be asked to participate in this inquiry.

Based on the above information, Mr. Thornton has my permission to proceed with his study in the [redacted] School District. If you have any questions, please do not hesitate to contact me.

Sincerely,

[redacted]
Superintendent of Schools

## APPENDIX C

## RECRUITMENT EMAIL SCRIPT

Dear Elementary Teacher,

I am conducting a research study as a doctoral student in the University of Pittsburgh's Education Leadership program. The study's focus is to further our knowledge around technology integration in the elementary classroom. Completion of this study will fulfill the dissertation requirements for the doctoral degree and hopefully contribute to the body of research regarding professional learning and instruction with technology.

You have been selected as a potential participant in this inquiry, as you are either viewed as a teacher leader with technology use, or someone who has expressed a desire to learn more about technology integration. I would be most appreciative if you would take the time to read this email and consider participation in this study.

This is an action research study to determine how customized professional learning affects successful integration of technology in the elementary classroom. Its purpose is to learn how a team of elementary teachers and an elementary principal can provide professional learning to improve instruction with technology. Three teachers who perceive themselves as high-level users of technology and two teachers who perceive themselves as middle-level users of technology are asked to participate in this inquiry.

To conduct this study, teacher participants will take a self-assessment to determine their level on the Substitution, Augmentation, Modification, and Redefinition (SAMR) model popularized by Dr. Ruben Puentedura. This model will determine how each teacher perceives their current use of technology in the classroom. Additionally, a needs assessment will be administered to establish each teacher's professional learning needs focused on technology integration.

Using the results of the needs assessment, professional learning activities for technology integration will be delivered to all who participate, and a follow up robust lesson will be scheduled and observed to collect field notes and document our learning and experiences.

There are no direct benefits for participation in this study, nor is there any compensation. Your participation is voluntary, and you may choose to discontinue your participation at any time. There are no risks associated with participation. Approval from the Institutional Review Board at the University of Pittsburgh was sought and granted prior to conducting this inquiry.

Should you wish to receive results of the study, you may request a copy by emailing me at met94@pitt.edu. Your information will be anonymous and will not be connected to your name. Even your de-identified information will be treated as confidential. The data collected will only be available to me as the researcher, as well as my Advisor and Committee Chairperson, Dr. Cynthia Tananis. If you have questions or concerns about the study, you can also contact Dr. Tananis at tananis@pitt.edu for additional information.

Should you choose to participate in the study, I thank you in advance. You are asked to print a copy of this email and to sign the bottom, indicating that you've received this informed consent letter, are participating voluntarily, and grant me permission to utilize your de-identified data as a part of the study's reports.

Thank you in advance for your consideration and willingness to contribute to this study.

Respectfully,

Marc E. Thornton

| Printed Name | Signed Name | Date |
|---|---|---|

## APPENDIX D

## SAMR RUBRIC AND SELF-ASSESSMENT TOOL

Table 4: Lesson Evaluation and SAMR Model Rubric

Teacher: _____
Grade Level: _____
Date: _____

***Lesson Evaluation – SAMR Model Rubric***

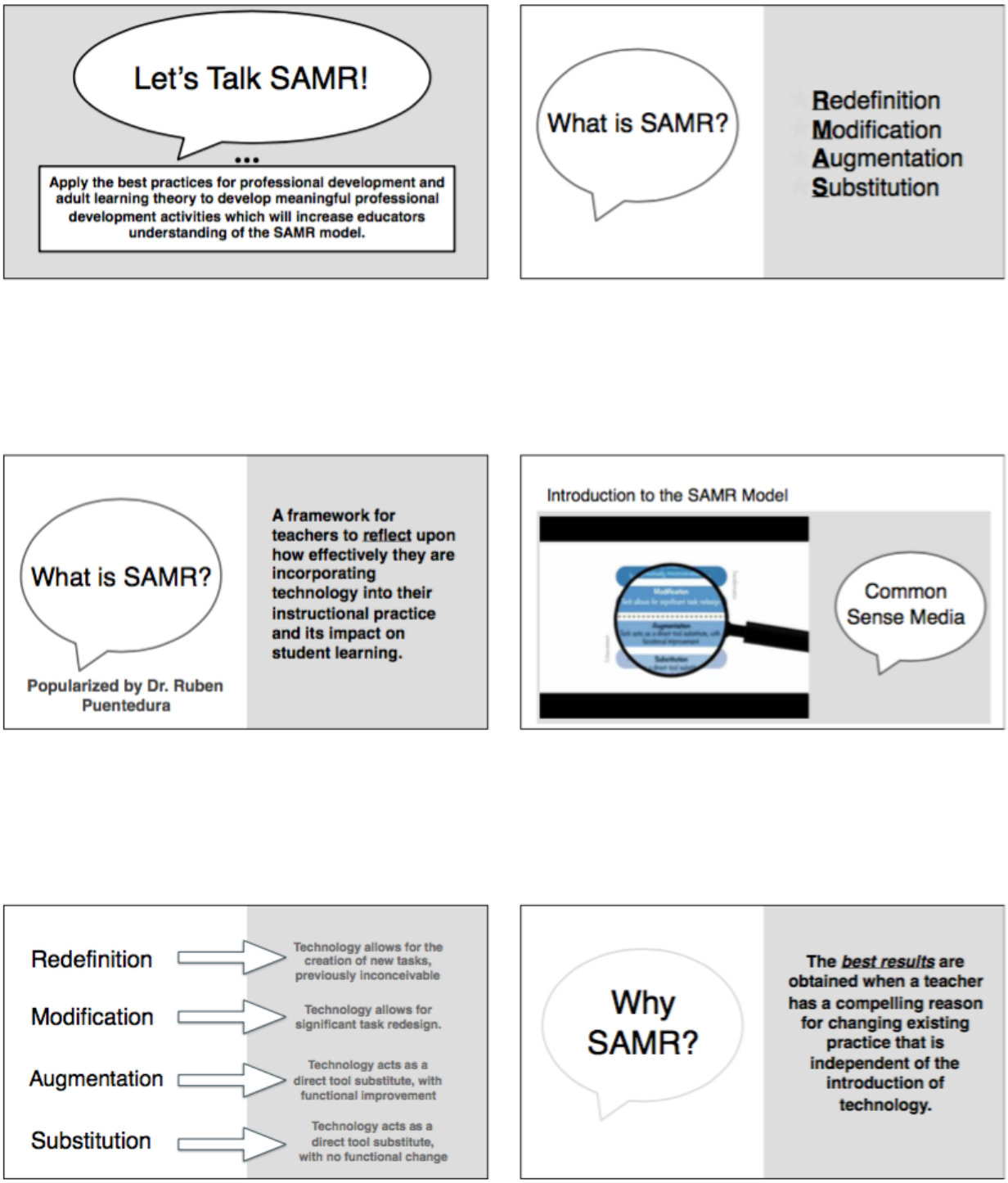
| Level | Definition | Examples | Rank – Include the following: Lesson Idea, Where it Ranks and Why |
|---|---|---|---|
| **Substitution** | Involves doing the **same thing as you would do without the technology** and without modification of the task. | Student uses a drawing type website or App, like Doodle Buddy, to solve a math problem.<br>Use a word processing program to type out a story instead of handwriting. | |
| **Augmentation** | Involves some **functional improvement** but is still a direct tool substitute.<br>Again the **task is not changed,** but perhaps use of features of the technology are incorporated. | Student uses the extra features, like stickers, in the website or App to illustrate the math problem along with solving it.<br>Use a tool such as Spell Check to make sure all words are spelled correctly. (Other tools – Thesaurus, Word Count, Clip Art, etc.) | |
| **Modification** | The **outcome** is still the same **but has been enhanced,** the product has changed.<br>**Involves giving a different kind of assignment.**<br>For example using multimedia, adding sound, video, etc. The question to be asked is does the media enhance the message? | Student uses a screen casting website or App to illustrate and verbally explain how they solved the problem.<br>Bring a story to life using an online multimedia application. (Flipboard, Sock Puppets, etc.) | |
| **Redefinition** | Is doing something that is **inconceivable without technology**<br>Gives students a stage.<br>For example posting on the web so that the audience is the world and there is a **feedback** loop. | Student creates video math problems of their own and posts to a blog, website or App for other students to solve. Student monitors and provides feedback for those solving their problems.<br>Use video conferencing to tell a story. (Google Hangout, Poly Com, Face Time, etc.) | |

## APPENDIX E

## INTRODUCTION TO SAMR PRESENTATION AND ACTIVITY

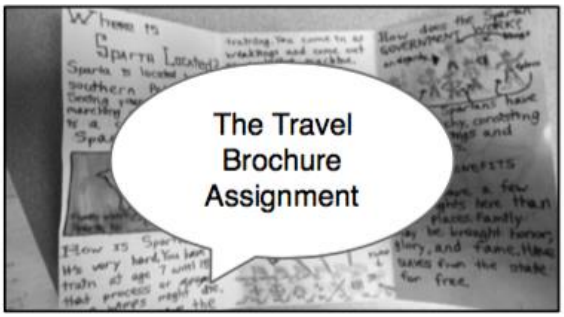
The purpose of the SAMR introduction was to facilitate a professional learning experience that focused on the use of technology in the educational setting. Teacher participants were asked to consider previously taught lessons and artifacts that integrated technology while they viewed this presentation and participated in the activity.

Figure 3: Introduction to SAMR Presentation and Activity



When Googling SAMR...use caution!


"Good tools do not make a good teacher, but a good teacher makes good use of tools."




**Students will use software (Word, or Publisher) to construct a *simple* travel brochure or travel presentation.**

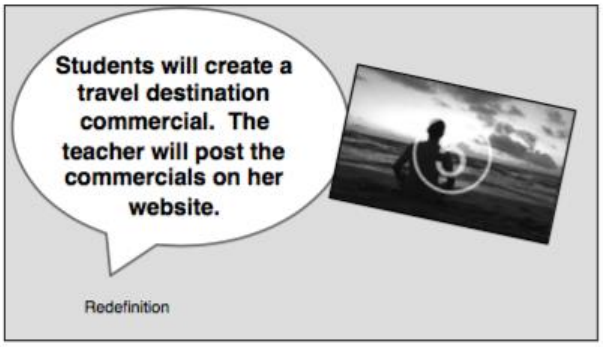
Substitution

**Students will create a travel brochure or presentation including *digital images* and *hyperlinks* to internet resources.**

Augmentation

**Students will create a *digital travel brochure* (ebook, Thinglink, etc.) that incorporates hyperlinks to digital multimedia resources.**

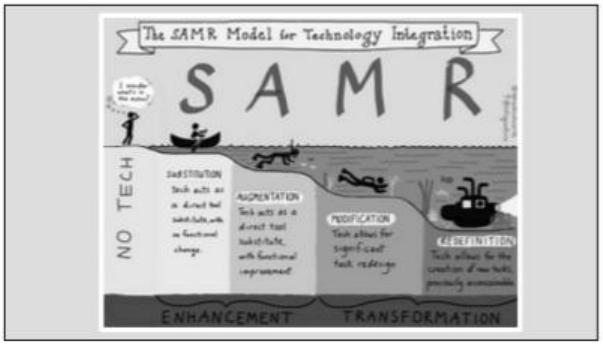

Modification


Students will create a travel destination commercial. The teacher will post the commercials on her website.
Redefinition


Coffee anyone?

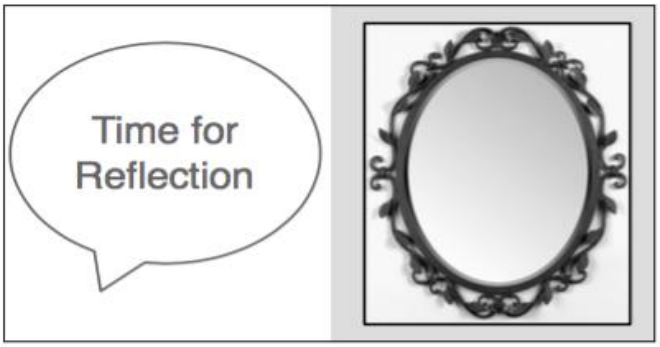

Digital Discoveries SAMR vs Latte
Modification


Pumpkin Spiced Latte
Caramel Macchiato
Iced Latte
Coffee
Let's talk SAMR!


The SAMR Model for Technology Integration
S A M R
NO TECH
SUBSTITUTION
AUGMENTATION
MODIFICATION
REDEFINITION
ENHANCEMENT
TRANSFORMATION


#1
#2
Nearpod Activity
Small Group Activities

| | |
|---|---|
| **#1**<br><br>Students select the three most important presidents in American history and download images of these people. They then use a presentation tool of their choice to add their explanation for choosing these presidents and share the finished product by emailing it to the teacher.<br>***(Augmentation)*** | **#2**<br><br>Students read a piece of literature on an iPad.<br>***(Substitution)*** |
| **#3**<br><br>Students select a historical topic in social studies that they would like to research further. Students create a multimedia presentation via an online timeline maker to teach classmates about their topic and provide them a link to their presentation so each student can deeper explore and interact with the content further.<br>***(Modification)*** | **#4**<br><br>Students create an electronic questionnaire to better understand world customs and beliefs, share the questionnaire online with schools all over the world, and publish that data on an interactive map to support their research and hypothesis.<br>***(Redefinition)*** |
| **#5**<br><br>Students are asked to complete a writing assignment entitled "This is what I believe...". They must then make an audio recording of themselves reading their work over a suitable soundtrack.<br>***(Modification)*** | |



## APPENDIX F

## NEEDS ASSESSMENT/DISCUSSION GUIDING QUESTIONS

Time was spent meeting with the two middle-level users of technology at Oak Elementary School who were involved in this study. These were not the only questions to consider; however, they helped to guide a discussion to gain an understanding for their customized professional learning needs for technology integration.

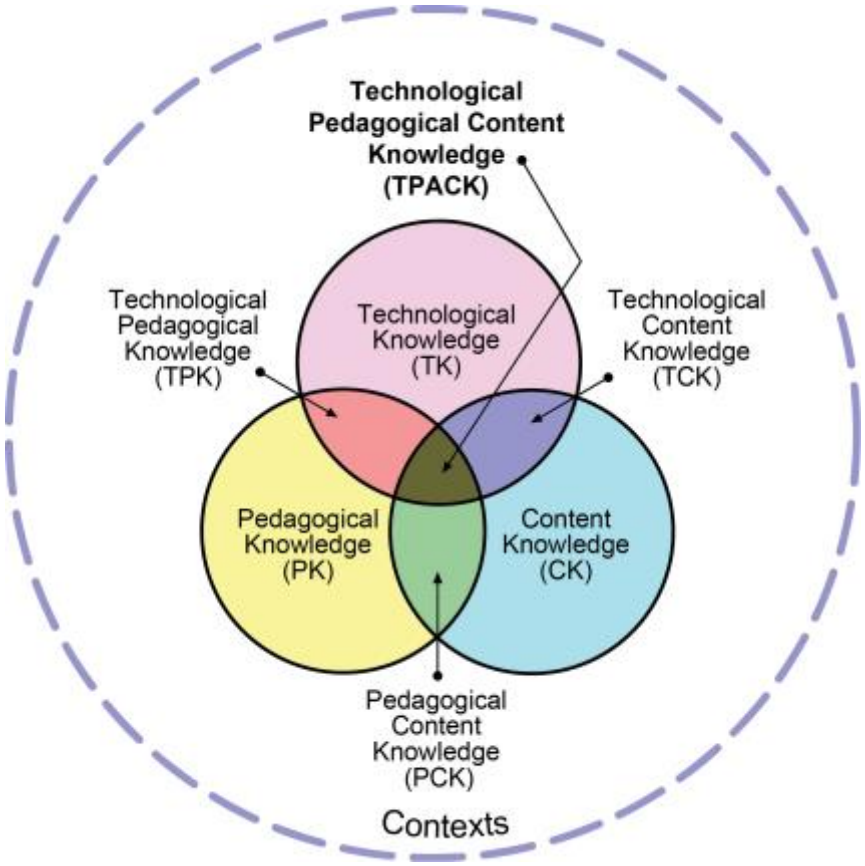
Based on your answers to the Self-Assessment/Observation Rating:

- To what extent do you participate in professional learning activities meant to improve your use of technology in the classroom?
- To what extent do you collaborate with other teachers who are attempting to share information about technology practices?
- If professional learning was customized to your needs, would you participate?
- What areas of technology integration do you feel you and your students would benefit the most?
- What types of resources would you need?

## APPENDIX G

## TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK)

Figure 4: Framework for Technological Pedagogical Content Knowledge



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