ELEMENTS OF PROFESSIONAL DEVELOPMENT FOR SAMR TECHNOLOGY INTEGRATION IN THE EARLY GRADES

BY

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Froemming, C, & Heikes, G. (2017). *Young learners in a digital world: Exploring apps in practical application.* A symposium session for the Whole Language Umbrella of the National Council of Teachers of English: Global Literacies, Global Conversations-Celebrating Our Connections. Tucson, AZ. http://www.ncte.org/wlu/institute/sessions

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ABSTRACT

ELEMENTS OF PROFESSIONAL DEVELOPMENT
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In this qualitative research study the researcher sought to identify effective elements of professional development that encourage technology adoption and purposeful technology integration by early elementary educators. Puentedura's (2014) Substitution, Augmentation, Modification, Redefinition (SAMR) model served as the framework for the professional development. Seesaw, an online communications application and portfolio tool served as the testbed. The questions that guided this study before, during, and after the professional development intervention were: What elements of a SAMR focused professional development experience facilitate K-3 teachers' change in their 1) adoption of technology and, 2) purposeful integration of technology into their classroom teaching practices? The researcher identified 16 elements from the literature that encouraged technology integration. The 16 identified elements were then explicitly designed into a professional development experience and iteratively

examined. Findings from a pre- and post-intervention survey, participant reflections, digital artifacts, researcher notes, and a focus group indicate that the teachers' technology integration practices were positively impacted by identified elements designed into the professional development. The effective combination of elements most valued by the teachers included sustained, one-on-one, online and face-to-face support, as well as the pedagogy elements that were socially situated, personalized, scaffolded, and learner-centered. These findings align with the theoretical framework and prior studies that grounded this study.

Keywords: early elementary education, technology professional development, technology adoption, technology integration, Seesaw, SAMR, social-constructivist learning theory, diffusion of innovations, developmentally appropriate practice

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CHAPTER 1: INTRODUCTION

The emergence of ever-changing digital tools, apps, and mobile devices has profound implications for teaching and learning in the early-elementary grades (kindergarten through third grade). Research indicates that most children are entering kindergarten with prior digital experiences (National Association for the Education of Young Children and the Fred Rogers Center for Early Learning and Children's Media 2012; Blair, 2012: Guernsey & Levine, 2015; Barone, 2016; Common Sense Media, 2017). In 2017, 95% of America's children ages birth to eight were using mobile devices, and they were spending an average of 48 minutes each day on those devices (Common Sense Media, 2017). These numbers soared even higher as a result of the Covid-19 pandemic (Common Sense Media, 2020). Prensky (2001) argues that early technology exposure changes the learning demands of young children; thus traditional teaching methods no longer suffice.

Technology is beneficial when it is integrated into instruction in developmentally appropriate, purposeful ways (Guernsey & Levine, 2015). Early educators are expected to know "how and when to appropriately use, integrate, and evaluate technology and media to meet the cognitive, social, emotional, and linguistic needs of young children" (NAEYC & the Fred Rogers Center for Early Learning and Children's Media, 2012, p. 11). However, many early elementary teachers are not yet integrating digital learning tools to the fullest potential.

While most teachers understand the importance of creating authentic learning environments that reflect the real world of children growing up in a digital age, they are acutely aware of the challenges of trying to learn and integrate new technologies into their daily instructional plans (Barone, 2016). It can be particularly challenging for teachers when the life

span of a technology ends before they have a chance to fully learn and integrate tools successfully into their lesson plans. Some pioneering educators continue to blaze a trail in their innovative digital teaching practices; however, before most teachers will accept a new digital tool, they want evidence that it would benefit their students (Guernsey & Levine, 2015). They also want more support from school leaders (Luckhardt, 2018). With the pressure mounting to be proficient in meeting the unique learning demands of their young digital learners, teachers are calling for high quality professional development to bolster their digital teaching practice repertoires (Taylor, 2017; Luckhardt, 2018).

Inspiration for the Study

As a former classroom teacher, I was expected to be proficient in digital classroom teaching practices, but I believed technology was unreliable, changed much too quickly, and complicated the classroom learning experience for children. The technology professional development that the school provided was not conducive to breaking through my negative perceptions, fears, and frustrations. I was essentially a "laggard" (Roger's, 1962). But I was forever changed by my Educational Learning Technologies professor, Dr. Woodley and my educational technology mentor, Gwen. Dr. Woodley's assignments were challenging, and as a resistor of technology, I knew I would need help if I was going to thrive in her course. I reached out to Gwen, who was known for her innovative, digital teaching practices with young children. Gwen graciously met with me once in a face-to-face meeting and then continued to support me primarily through emails and text messages.

Gwen taught me about integrating applications (apps) in my teaching practices. First, she added me as her student in a Seesaw Demonstration Classroom and introduced the Seesaw tools. I became familiarized with the Seesaw tools, and was gradually introduced to easy to use, child-

friendly apps such as Chatterpix, Flipgrid, PicCollage, and Buncee. After exploring these new apps, Gwen taught me about digital storytelling through the process of mixing and layering apps, which is known as "app smashing" (Kuloweic, 2013; Brenner & Hauser, 2015). Finally, I learned how technology integration can spark higher levels of learning through Puentedura's (2014) SAMR technology integration model. Gwen scaffolded my learning in on-going, manageable chunks through practical application. She also addressed my pedagogical concerns and answered my questions in a timely fashion. As a result of this constructivist learning process, my confidence soared.

Mirroring Gwen's approach of teaching about apps in practical application, I began integrating a variety of digital tools into my teacher education methods courses. It quickly became apparent to me how the apps benefited my students, and my negative perceptions about technology integration were tempered. Within a matter of three weeks, I was awakened to the endless possibilities that apps and mobile devices held for teaching and learning. Innovators akin to Gwen, have a contagious influence on the adoption and purposeful integration of new technologies (Taylor, 2017).

As a literacy specialist and teacher educator, I have observed resistance like mine in early educators. I also found that most schools do not encourage or adequately support teachers in their attempts to keep abreast of new technologies, which further compounds the problem (Coiro, Knobel, Lankshear, & Leu, 2008). My research agenda was born out of these pivotal experiences. Through my work as an educator, researcher, and professional development designer/facilitator, I aim to have a positive influence on other educators, and apply a constructivist approach so they too may be successful in adopting and integrating technology into their own classroom settings, which in turn will benefit young digital learners.

Problem

The new and ever-changing technologies afforded to young children have created many pedagogical challenges for early elementary teachers; however, elements of professional development that overcome these challenges are yet to be fully identified (Barron, Cayton-Hodges, Bofferding, Copple, Darling-Hammond, & Levine, 2011). Some teachers embrace the practice of integrating purposeful technology into their classroom instruction, yet many are reluctant to so do so (Blackwell, Lauricella, & Wartella, 2014; Marsh, et al., 2015). Flewit, Messer, and Kucirkova (2015) assert that "if innovative uses of new technologies continue to remain absent from the school curriculum and from pedagogy, then we risk turning our backs on a powerful switch that can provide new directions to light up this generation's learning" (p. 27). Knobel and Kalman (2016) insist that teachers must be skilled in navigating new technologies and be able to purposefully integrate them into their daily teaching practices.

There are several reasons why educators today are not implementing technology to the fullest potential (Coiro, et al., 2008; Johnson, et al, 2016). School culture is one explanation, and, as noted by Wolfe, Steinberg, and Hoffman (2013), many schools are still operating with a twentieth century mindset and have not yet adopted the tools or professional development needed for twenty-first century education. Baker (2010) argues, "If our schools continue to limit the literacy curriculum to reading and writing traditional, alphabetic, printed texts, then our children will be well prepared for 1950 but ill prepared for 2050" (p. 2).

Barone (2016) claims that digital literacy learning is essential, and while there are digital tools and apps that can be easily adopted by early elementary teachers, this adoption is not happening due to the lack of preparation, training, time, and on-going support. In addition to an unsupportive school culture, teacher perceptions, attitudes, and confidence levels can stifle their

digital teaching practices (Ertmer & Ottenbreit-Leftwich 2010; Blackwell, et al., 2014; Johnson, et al., 2016). For example, some early childhood educators, are reluctant to adopt new technologies due to time constraints, or lack of a sense of self-efficacy, while others may be concerned about how quickly the life span of a new tool ends or the negative impact of screen time (Barron, et al., 2011). Some teachers view technology as merely a "shut up toy" (Radesky, Schumacher & Zuckerman, 2015, p. 2). There are also a number of teachers who fall into Roger's (1962, 2003) category of "laggards" and they are reluctant to try a new technology. This may be that they simply are unware of the potential, or they have other reasons to avoid the technology.

One of the main barriers to teachers' technology adoption is inadequate professional development (Inan, Lowther, Ross, & Strahl; 2010; Terada, 2020). Despite the wealth of research that proves the value in purposeful technology integration, many early elementary teachers need more support in refining their digital teaching practices. A deeper understanding of elements of professional development that address teachers'concerns is necessary to define on-going, hands-on professional development opportunities for early elementary educators so they can successfully adopt and integrate digital learning tools specifically designed with young digital learners in mind (Barron, et al., 2011; Guernsey & Levine, 2015).

Purpose of the Study

There is a need to identify elements of professional development that specifically support early elementary educators in the adoption and implementation of digital learning tools in the context of their own kindergarten through third grade classroom settings. Qualitative research can provide evidence-based insight necessary to fully understand how to develop, improve, and

support innovative digital teaching practices in the early grades (Office of Educational Technology, 2017).

This naturalistic inquiry was an exploration of the impact on early elementary teachers' digital teaching practices as a result of a SAMR focused professional development intervention that facilitated the adoption and purposeful integration of technology. Seesaw, an online communications application and portfolio tool, served as the testbed. The research objective was to examine effective elements of professional development that encourage technology integration by early elementary teachers. A social-constructivist lens was used to explore SAMR.

I designed this professional development experience to positively impact the participants digital teaching practices by empowering, inspiring, and connecting the teachers to "people, data, content, resources, expertise, and learning experiences" (Office of Educational Technology, 2017, p. 28). A combination of sixteen face-to-face, online, and pedagogical elements that encourage technology integration were identified in the literature. I explicitly designed these sixteen elements into the on-going professional development experience:

1) personalization,
2) scaffolding,
3) learner-centeredness,
4) an in-house technology coach,
5) applying SAMR levels to digital tool use,
6) a focus on developmentally appropriate practice,
7) opportunities for reflection,
8) one-to-one, face-to-face support,
9) face-to-face workshop,

10) face-to-face peer support.

11) one-on-one online support,

12) an online Personal Learning Network offering peer support,

13) an online course that served as the presentation during the workshop,

14) access to the online course for future reference,

15) access to on-demand resources, and

16) digital badging and micro-learning credentials.

This study uses qualitative methods to iteratively examine each of these sixteen elements throughout the professional development experience to learn how early elementary teachers changed in their adoption and integration of technology in their classroom teaching practices, and which elements facilitated the greatest change in the K-3 teachers' integration of purposeful technology.

Significance of the Study

Many early elementary teachers need professional development to facilitate adoption of digital learning tools and to refine their digital teaching practices; it is also important to remove barriers to technology integration and identify an all-inclusive working model of technology professional development to address teachers' concerns and provide the support they seek (Darling-Hammond, et al., 2017; Office of Education Technology, 2017). According to Chen (2008) teachers believe there is value in educational technology, which is why educational theory and practice must be further examined regarding their use of technology in the classroom.

The teachers were positively impacted by social interaction, which therefore contributes to the theory of social-constructivism. They learned to use the digital tools in developmentally appropriate ways for their young students, which provides direction for developmentally

appropriate practice for technology integration. Moreover, literature presents theoretically-based and research-based elements of technology-related professional development that address teachers' needs and concerns relative to known barriers to technology integration (Johnson, Jocavina, Russel, and Soto; 2016). Identifying such elements imparts knowledge about Rogers (1962, 2003) Diffusion of Innovations theory as well as professional development practices in the early elementary grades. Findings inform teachers, teacher educators, administrators, researchers and policymakers regarding elements of technology professional development that encourage the adoption and purposeful integration of technology in early elementary classroom teaching practices (Baker, 2010).

Research Questions

The segmented question of inquiry that guided this study is: What elements of a SAMR focused professional development experience facilitate K-3 teachers' change in their:

1) adoption of technology, and

2) purposeful integration of technology into their classroom teaching practices?

Definitions of Terms

The definition of terms used throughout the study are as follows:

Early grades: Kindergarten through third grade.

Digital literacy: Twenty-first century literacy skills that go beyond reading, writing, speaking and listening; digital literacy skills include finding, consuming, producing, creating, making, designing, evaluating, communicating, and sharing digital content.

Young digital learners: Young technology savvy children, also known as "digital natives," with unique learning demands that require 21st century, innovative teaching methods rather than traditional teaching practices (Prensky, 2001).

Technology Adoption: The acceptance and use of a new technology.

Purposeful Technology Integration for Meaningful Learning: Hierarchical levels in correlation to Bloom's Taxonomy to digital tool use, through which substitution/augmentation activities may be used to enhance the learning outcomes, and modification/redefinition activities may be used to transform learning through higher levels of thinking (Puentera, 2014).

Developmentally Appropriate Technology Adoption and Integration for K-3: The process of selecting, accepting, and implementing age appropriate, purposeful technology into teaching practices to support meaningful learning in a way that allows students to creatively express what they already know and what they have learned (NAEYC and the Fred Rogers Center, 2012)

Best Digital Teaching Practices: The developmentally appropriate digital teaching practices and methodologies used to intentionally engage children in authentic, personalized, student-centered learning experiences that enhance and extend student learning goals (Kolb, 2017).

Personal Learning Networks (PLNs): The sharing of resources and learning within an online network of like-minded, online educators (Richardson & Mancabelli, 2011).

Structure of the Dissertation

In this chapter, I introduced my research topic, the inspiration for the study, the problem, purpose, significance of the research, questions under investigation and the definition of terms. In chapter two, I provide an overview of the literature as it relates to the research questions and the intersecting topics under investigation. I also explain the theoretical frameworks and models that the literature draws upon, and previous research which laid the groundwork for this study. Chapter three is grounded in best research practices and describes my methods, research design, participant information, the researcher positionality, paradigm, the research context, procedures,

and processes for data collection and analysis. In chapter four I present participant profiles and a holistic overview for how the K-3 teachers changed in their digital teaching practices, and the professional development elements that were effective in facilitating such changes. In chapter five, I share a summary of the findings, how the findings contribute to both theory and practice, limitations and delimitations of the study, and recommendations for future research.

CHAPTER 2: LITERATURE REVIEW

This chapter is a review of existing literature that underscores the importance of identifying an effective, high quality professional development model to support early elementary educators in the adoption and integration of purposeful technology. Here I introduce the theoretical framework and background for digital teaching practices in the early grades, the adoption and integration of technology, challenges teachers face with technology integration, and known effective elements of professional development that facilitate changes in teaching practices. To ground the research and capture the essence of practitioners' voices in the field, I have drawn upon various resources, such as professional journals, websites, textbooks, news features, blogs, and video files. The majority of these resources were derived from key words searched in Google Scholar. This literature review aligns with my questions of inquiry and emphasizes the relevancy and timeliness of the study.

Theoretical Framework

This study was grounded in the theories of social constructivism (Vygotsky, 1978), Developmentally Appropriate Practice (NAEYC & the Fred Roger's Center, 2012), and the Diffusion of Innovations (Rogers, 1962, 2003). The premise of constructivism is that learning is constructed through the active, social, meaning-making processes and prior experiences of the learner (Vygotsky, 1978). When teachers of young children apply the principles of constructivism in their classrooms, they 1) serve as learner-centered facilitators, 2) incorporate developmentally appropriate practice, modeling, and scaffolding based upon prior knowledge, 3) infuse culture and language into instruction, 4) create safe learning environments, 4) have high expectations and socially construct activities within the learners zone of proximal development,

5) use formative assessment to inform instruction, 6) provide experiential learning opportunities rather than worksheets, 7) facilitate whole group, small group, and individual instruction to meet the needs of students, and 8) provide opportunities for reflection and collaboration (Soderman, Gregory, & O'Neill, 2011). Therefore, to best support early elementary grade teachers in technology integration, the principles of constructivism and learner-centeredness need to be applied to the professional learning design (Reigeluth, 2012, 2016; Duffy & Jonassen, 2013; Merrill, 2013a). This conceptual framework provides insight into how technology professional development can positively impact early elementary teachers' adoption and integration of technology, as well as the elements that facilitate changes to benefit their students.

Background

In 2015, the Obama administration implemented the Every Student Succeeds Act (ESSA); this act not only lifted accountability constraints in teacher evaluations, standards, testing, staffing, and school spending, it also addressed educational inequalities in the early grades (First Five Years Fund, 2016). In exchange for more resources, funding, and flexibility, each state was expected to deliver high-quality, equitable education for all children; as a result, schools were afforded several new technologies (Office of Educational Technology, 2017). In 2016, the National Education Technology Plan called for on-going professional development to ensure that these new technologies would be leveraged to support 21st century teaching and learning. This plan included the youngest of learners, and many early educators rose to the occasion by experimenting with new technologies (Office of Educational Technology, 2016). However, nearly half of them felt that they lacked the adequate tools, devices, and support that they needed to successfully integrate the technologies into their lessons (Office of Educational Technology, 2017).

When the technology plan was revised in 2017, educational leaders, teachers, and the research community were urged to explore digital literacy, the processes involved for selection and use of digital learning tools, and to "provide ongoing support for early educators in implementing technologies, including evaluating the impact of technology-based professional development interventions on the interactions and practices of early childhood educators." (Office of Educational Technology, 2017). Then, less than three years after the technology plan was revised, thousands of educators across the nation were reeling with new pedagogical dilemmas while teaching remotely from home during the coronavirus pandemic (Common Sense Media, 2020).

To slow the spread of the novel coronavirus, also known as Covid-19, many schools closed, and teachers were mandated to migrate their traditional lesson plans to online environments. During this time, approximately 2,000 teachers responded to a survey aiming to identify their distance teaching and learning needs (Collins, 2020). The teachers reported feeling overwhelmed and were needing emotional support, online teaching resources, and social justice materials. Most of the respondents felt they were in the dark about online safety, ethics, and access issues. They were also struggling to understand how to keep their students engaged and foster cultural awareness. Despite these times of uncertainty, Basilaia and Kvavdze (2020) claim that school closures roused teachers to envision how innovative technology affordances could benefit students – even after the pandemic comes to pass.

Guernsey & Levine, (2015) discuss the many implications for teaching and learning in the early grades due to technology affordances. First off, children's access to ever-changing technology tools have greatly increased the learning demands for both students and teachers. Second, when digital learning tools are adopted by schools, teachers are not necessarily

integrating the tools to the fullest potential. Third, even when teachers attempt to integrate technology to reflect the world of their young digital learners, schools may not provide the professional development, on-going support, or resources needed. Fourth, teachers are calling for technology professional development to address their concerns specific to their own teaching and learning needs. Finally, there has yet to be an identified professional development model that offers the personalized support teachers need to employ purposeful, developmentally appropriate digital teaching practices.

Developmentally Appropriate Practice

Developmentally Appropriate Practice (DAP) was born out of Froebel's (1985) objectives requisite in meeting the needs of young learners. Today, teachers in the early grades are expected to know best practice in teaching methods and how to effectively integrate technology into their instructional plans in developmentally appropriate ways (NAEYC and the Fred Rogers Center, 2012). The term best practices refers to the application of proven teaching methods in planning, instruction, and assessment (Morrow & Gambrell, 2018). When making pedagogical decisions teachers must

> 1. Select, use, integrate and evaluate technology and interactive media tools in intentional and developmentally appropriate ways, giving careful attention to the appropriateness and the quality of the content, the child's experience, and the opportunities for co-engagement.
> 2. Provide a balance of activities in programs for young children, recognizing that technology and interactive media can be valuable tools when used intentionally with children to extend and support active, hands-on, creative, and

> authentic engagement with those around them and with their world. (NAEYC and the Fred Rogers Center, 2012, p. 11)

Technology in the Early Grades

Pioneering early elementary teachers have proven that there are many benefits to integrating technology into the classroom (Guernsey & Levine, 2015). In a nation-wide survey, 75% of 500 teacher respondents believed that educational technologies were beneficial (PBS, 2013). A few of these known benefits include literacy learning, increased student engagement and achievement, cultural awareness, personalized learning environments, differentiation, opportunities to provide timely feedback, and a myriad of digital tools and formative assessment options that allow children to express themselves and demonstrate what they know (Tierney, 2020). Although educational technologies are ever-present in the lives of young children today, there are also many concerns regarding the appropriateness of technology use in schools. Some of these concerns include bullying, privacy and safety issues, or potential health risks due to screen time (Guernsey & Levine, 2015; Radesky, Schumacher, & Zuckerman, 2015, Tierney, 2020). While these are valid concerns, mobile devices and apps hold innovative promise for bringing student learning to life (Christensen, 2011; Public Broadcasting Service, 2013; Beers & Probst, 2017).

Communication and Student Engagement Apps

Remind, ClassrDojo, and Seesaw are just a few examples of communication apps that enhance school, student, and family engagement through self-expression and home-school connections (Meacham, 2015). Social media apps such as Twitter, Facebook, and Instragram are social networking sites (SNS) are also used to enhance communication and engagement by many teachers throughout the nation (Greenhow & Askari, 2017).

Literacy Development

Literacy development plays a critical role in society (Goodman & Martens, 2010; Valenzuela, 2016). Every child has the right to receive high quality literacy instruction (Jiban, 2020). In addition to reading, writing, speaking and listening, being literate today also means being able to appropriately use and create digital products (Barone, 2016; Cifuentes & Vilbert, 2014). Beschorner and Hutchison's (2013) in-depth case study proved that iPads and apps could be used to foster reading, writing, listening, and speaking skills in the youngest of learners. Semingson (2017), further noted that interactive e-readers, alphabet knowledge apps, and digital storytelling apps enhanced communication, enabled comprehension, strengthened vocabulary, and the assisted with the pronunciation of new words. Wohlend (2015) proposed that that touchscreens and developmentally friendly puppetry apps were beneficial for collaborative play, literacy learning, and digital storytelling.

Digital storytelling is the production of multimedia narratives. When children share their personal narratives, they can connect with others in and beyond the classroom; this in turn develops their cultural awareness (Wolfe, et al. 2013; Flores-Carmona & Luschen, 2014). Technology has the power to connect or divide society (National Council of Teachers of English, 2013; Bradshaw, 2017). Therefore, early educators must be proficient in teaching the foundational skills of digital literacy and digital citizenship. They must also know how to select the right technologies to do so. More importantly, they need to know how to integrate technology in a way that will encourage children to responsibly share their voice for the good of all (Bradshaw, 2017).

Adoption of Technology

Technology integrated literacy instruction is dependent upon resources, thoughtful planning, and teacher input (Hamilton, 2007). Cviko, McKenney, and Voot's (2014) eight week cross-case analysis found that teachers who were actively involved in the creation and delivery of technology-rich literacy learning activities yielded higher levels of student achievement. This supports the notion that teachers are instrumental in curriculum planning and the adoption of digital tools to enhance student learning (NAEYC and the Fred Rogers Center, 2012). However, teachers must first be willing to accept a new digital tool if they are to integrate the tool meaningfully into the curriculum (Taylor, 2017). For this study, technology adoption is defined as the acceptance of a new technology. While digital learning tools can lead to transformative learning opportunities for children, the adoption and purposeful integration of technology is a social learning process that first requires teachers to change (Christensen, 2011; Couros, 2015).

Diffusion of Innovations

There are many change theories and models that speak to the rate in which new innovations are adopted. Roger's (1962, 2003) Diffusion of Innovations (DOI) is a long-standing, thoroughly examined model often situated in social science research. DOI involves the community-based adoption of innovative technologies and the analysis of how people are influenced at various stages throughout the adoption process.

The DOI perspective is that the adoption of new technologies is dependent upon communication networks and an individual's characteristics, which follow a bell curve and are categorized as follows: 1) innovators: risk takers who are at the forefront of adopting innovative technologies, 2) early adopters: leaders who are quick in the uptake of new technologies and change, especially when they understand the strategies necessary to implement the new

innovation, 3) early majority: individuals who tend to adopt new technologies, but only when they are satisfied with the evidence that proves positive results, 4) late majority: skeptics who may take up a new innovation after the majority have first been glaringly successful in the adoption process, 5) laggards: conservative individuals that hold fast to tradition and fear change. Leveraging communication networks is an important factor in the adoption and spread of new innovations.

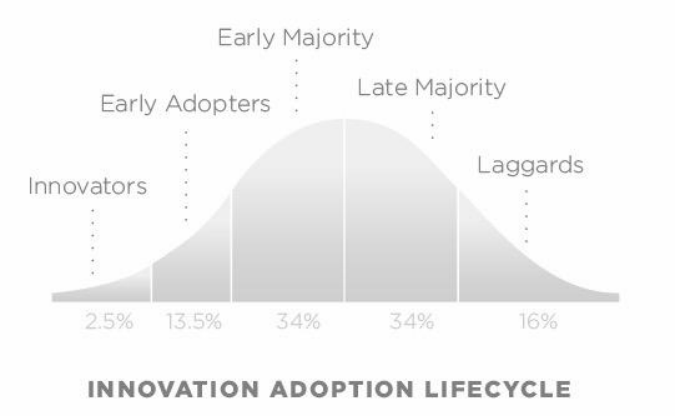
Volunteer Piloting

A positive professional development experience, may perhaps be the most important element for successful adoption of new technologies (Taylor, 2017). Taylor (2017) discusses the far-reaching effects of targeting educators that demonstrate DOI buy-in characteristics. These individuals will predominately influence the spread of any new innovation in education. She claims that "it is not necessary to address resistors or the 'late majority and laggards,' until there is a groundswell of people on board who can carry them along" (Taylor, 2017, para. 2). To ensure this spread occurs, she endorses "voluntary piloting" alongside of professional development, which she defines as "a small group of motivated [teacher-volunteers] to pilot a new initiative or work together to improve an area of their practice. No one is forced. All participants are fully committed. Results are outstanding. You should totally try this" (Taylor, 2017, para. 3).

Rather than imposing the technology onto teachers, voluntary piloting may be one viable solution to facilitate the adoption of new technologies in education. In the spirit of Rogers (1962, 2003), Taylor discusses the impact of DOI and the positive influence that volunteer innovators have on teachers' adoption processes. This adoption process is shown in Figure 1.

Figure 1

Diffusion of Innovations Model by Pnautilus is licensed under CC 2.5.



Purposeful Integration of Technology

Several researchers have explored how to facilitate teachers' change from resistance to technology adoption, and then subsequent integration of technologies in their teaching. In this section, research regarding how technology is adopted and integrated is reviewed. In particular, this includes efforts to ensure that technology is integrated more purposefully, such as to enhance and extend student learning.

Once a teacher has adopted a digital learning tool, the next step is to then integrate the tool into their instructional plans. Kolb (2017) argues that technology must be integrated with intentionality and with purpose. She describes purposeful technology integration as the transformative, developmentally appropriate digital teaching practices and methodologies used to intentionally engage children in authentic, personalized, student-centered learning experiences that enhance and extend learning. DiGiusto (2017) claims that to integrate technology purposefully, school leaders must help teachers select and recognize how the technology can enhance student engagement, increase learning, and generate feedback.

Selecting the right tool can be an overwhelming task for teachers (Hoefer, Chamberlin & Scot, 2004; Johns, Troncale, Trucks, Calhoun, Alvidrez, 2017; White, 2017). It is important for "learning to take center stage, but quite often, the digital tool or software steals the show and deep learning falls prey to the novelty of technology" (White, 2017, para. 1). The appropriate use of technology is essential for the delivery of quality instruction, and the technology tool should never overshadow student learning. Therefore, the application of a technology integration framework is much needed for determining the appropriateness of the technology selected for the delivery of a lesson (Green, 2014). Examples of such integration models include TPACK (Mishra & Koehler, 2006), Triple E, (Kolb, 2017) and SAMR (Puentedura, 2014).

TPACK

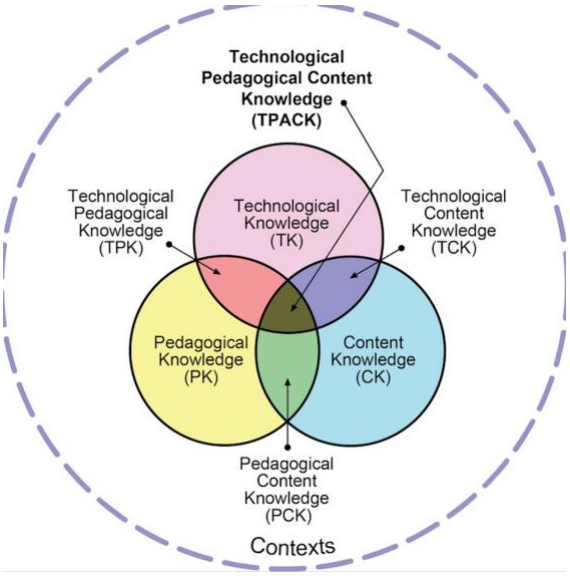
Mishra and Koehler (2006) describe the intersecting domains of Technology Pedagogical and Content Knowledge (TPACK) as the framework applied "when the teacher interprets the subject matter and finds different ways to represent it and make it accessible to learners" (p. 1021) (see Figure 2). TPACK is a framework designed for purposeful and organized, visual representation specific to technology learning. However, TPACK is often misused (Green, 2014).

Skeptics of TPACK claim that the effectiveness of the model is limited by factors such as teacher beliefs and their level of understanding or experience (Pamuk, 2011; Boschman, McKenney & Voogt, 2015). According to Kompa (2018), teachers have difficulties in understanding each over-lapping domain of TPACK. She describes the model as being "cumbersome, misleading and confusing" (Kompa, 2018, para. 16). Kompa deems the model useless in constructivist learning scenarios and states, "the model offers neither a goal-directed framework that is concerned with the empowerment of leaners… nor is it concerned about the

effects of digital socialization trajectories on society" (para. 17). Reaching underserved students through transformative digital ecosystems should be of the utmost importance (Zielezinski & Darling-Hammond, 2016).

Figure 2

TPACK by Koehler (2012) is licensed under CC 2.5.



Triple E

To ensure that student learning goals remain a top priority, some educators are tapping into Kolb's (2017) Triple E framework. Triple E is designed specifically for K-12 teachers. The aim of Triple E is to mitigate ambiguity in technology planning by providing measures to ensure that technology is integrated meaningfully and purposefully into classroom instruction. Triple E taps into the effective elements of different technology integration models like TPACK, but the central focus is on student learning through:

1) engagement: time-on-task, co-use, and learning goals,

2) enhancement: added value, scaffolds and supports, differentiation, personalization, and

3) extension; authentic experiences, connect to learning 24/7, soft skills.

Triple E aligns with the 2020 International Society for Technology (ISTE) standards that encourage educators to empower students to be productive digital citizens, designers, collaborators and problem solvers (see figure 3). Moreover, teachers are to facilitate active learning and keep in mind that "technology integration is only as good as the instructional practices used within and around the tool" (Kolb, 2017, p. 162). Many K-12 educators today embrace the Triple E framework as a means and measure to ensure purposeful technology integration. However, critics find that this model places minimal emphasis on how the technology may be used to elevate underserved students (Kelli, 2019; Zielezinski & Darling-Hammond, 2016).

SAMR Model

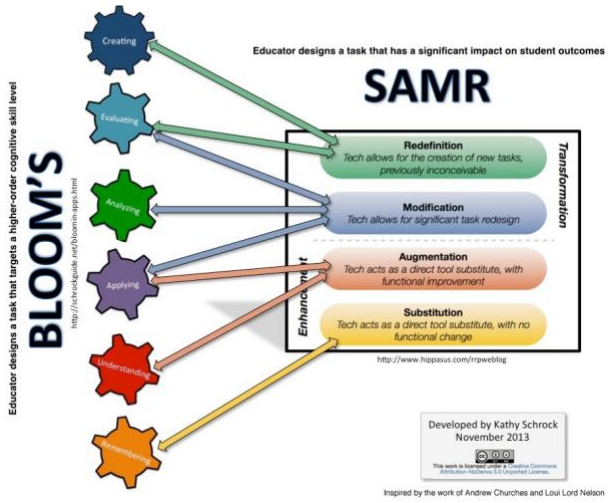
Puentedura (2015) claims that his Substitution, Augmentation, Modification, Redefinition (SAMR) model for technology integration, should ultimately modify or even redefine learning outcomes. He argues that if a technology tool only substitutes what can also be done using traditional paper and pencil activities, the tool may not necessarily be integrated purposefully. SAMR aligns with hierarchical levels in correlation to Bloom's Taxonomy through which substitution or augmentation activities may be used to enhance the learning outcomes, and modification or redefinition activities may be used to transform learning at higher levels. When SMAR is applied with student learning goals in mind, this integration model fosters 21st century skills, including critical thinking, communication, creativity, and collaboration (Terada, 2020).

Calvert (2015) fully endorses SAMR when used symbiotically with station teaching for a variety of reasons. Station teaching can enhance instruction, especially when skills are taught in authentic contexts for learning. This is a time-saving approach for integrating technology into learning across the content areas, which can be beneficial to young learners. Green (2014)

however, cautions educators not to misuse this model as a premise for shaping pedagogical beliefs. Green argues that SAMR should be used in conjunction with a learner-centered approach that focuses on enhancement of the meaning making process. Creating equitable digital environments is a challenging, but much needed undertaking (Zielezinski & Darling-Hammond, 2016). According to Terada (2020), SAMR can help teachers conceptualize how to integrate technology in transformative ways in and beyond the classroom. Even though SAMR is used by many educators today, Hamilton, Rosenberg, and Akcaoglu (2016) call for more qualitative and quantitative research on the impact of SAMR within flexible, learner-centered contexts due to the rigidity of the model and the dynamic integration processes involved. Figure 3 depicts how SAMR can be correlated with Bloom's Taxonomy to transform student learning.

Figure 3

SAMR Model by Scrock is licensed under CC 3.0.



SAMR and App Smashing

App Smashing was coined by Kulowiec (2013), where he found that the process of mixing together two or more apps served as an effective learning pathway because children could express original ideas through multi-media creations and easily share their projects with

authentic audiences. Brenner and Hauser's (2015) study solidified this theory that App Smashing could be used to engage students in authentic, learner-centered projects that encouraged self-expression. Fahrenbruck, Rutledge, and Froemming (submitted for peer review, 2019) organized a systematic App Smashing approach to model and scaffold digital learning activities that teacher candidates could use with their students. Several free apps and the SAMR model were introduced to the teacher candidates. The teacher candidates created and shared their digital projects to the Seesaw app so the instructor and classmates could comment and learn from one another. The engagement was effective in creating an active, social, and reflective learning environment, and illustrated how students, families, and teachers could be involved in the learning process. The teacher candidates concluded that they would use this innovative approach to technology integration in their future classrooms.

Teacher Perceptions of Technology in the Classroom

Research shows that technology integration benefits students, yet many early educators are still not embracing digital learning tools due to negative perceptions (Kontovourki, et al., 2017). As other practitioners have previously demonstrated, it is possible for technology integrated instruction to become second nature to teachers. However, teachers need time to explore and plan for the use of the technologies; they also want their concerns and perceived challenges addressed (Belanca & Brandt, 2010; NAEYC & the Fred Roger's Center, 2012; Guernsey & Levine, 2015).

According to The Organization for Economic Co-operation and Development (2016), innovation is lagging drastically behind many other sectors and teachers view technology as problematic because "there are too many changes imposed on them without much consultation or the necessary preconditions for successfully implementing change. (Organization for Economic

Co-operation and Development, 2016, p.12). While some early elementary teachers embrace new innovations, others are resistant due to low confidence levels, lack of school leadership and support, and pedagogical beliefs (Ertmer & Ottenbreit-Leftwich, 2010).

Confidence Levels

PricewaterhouseCoopers (2018) examined technology use in schools today and claimed that out of the 2,000 K-12 teachers surveyed in the United States, only 10% of the teachers felt confident integrating technology for higher levels of learning. They argue that schools must support teachers to ensure students today have the technology skills they will need for their jobs in the future. Ertmer and Ottenbreit-Leftwich (2010), claim that teachers are much more motivated to integrate technology into their instructional plans when they are confident that a tool will positively impact student learning. A culture that supports teacher's knowledge, perceptions, and confidence levels are key in overcoming technology resistance in schools today.

The Role of School Leadership

Several systemic factors drive a negative school culture toward resistance in technology integrated instruction, and while society has a mindset that was once relevant for the industrial age, reformers continue to advocate for a shift toward a learner-centered paradigm better suited for today's digital age (Reigeluth, 2012, 2016). Teachers count on school leaders for support and to address their concerns regarding their students' lack of access to quality devices and internet (PricewaterhouseCoopers, 2018). Strong school leadership is key and according to Vrasidas and Glass (2005), ambiguous policy, weak infrastructure, low access, pedagogical approaches, assessment, curriculum constraints, and lack of teacher preparation and on-going professional development are the primary contributing factors to technology resistance. To overcome

resistance, it is necessary to address these contributing factors both systemically and systematically.

Even though there is a great deal of evidence that technology-rich instruction benefits students, teachers do not necessarily know which digital tools and devices are most beneficial to adopt and integrate into curricula (Guernsey & Levine, 2015). Additionally, teachers need support in making socially just pedagogical choices regarding the integration of technology and "close the digital use divide by ensuring all students understand how to use technology as a tool to engage in creative, productive, life-long learning rather than simply consuming passive content" (Office of Educational Technology, 2017, p. 21). Teachers need support and encouragement from school leaders if they are to embrace global, collaborative, and communicative learning environments (Lindsay, 2016). The adoption of effective digital teaching pedagogies and tools is dependent upon supportive leadership and a positive, supportive, and participatory school culture (Ertmer & Ottenbreit-Leftwich, 2010).

Pedagogy Beliefs

Ertmer and Ottenbreit-Leftwich (2010) suggest that teacher participation is essential in the process for envisioning future pedagogical changes. Inan, Lowther, Ross, and Strahl's (2010) study pointed to a direct correlation between the pedagogy of the classroom teacher and the types of digital learning tools they chose to meet their pedagogical goals. After observing 143 technology integrated lessons, they found that teachers with learner-centered pedagogies embraced project-based learning where students used the Internet, word processing, or presentation software. In contrast, teachers who used more traditional pedagogies used drill-type software programs for managing practice and reinforcement of skills. Despite teachers needing to be proficient at technology integration today, they struggle with the nature of evolving online

spaces, apps, and the development of new devices (Blackwell, et al., 2014; Guernsey & Levine, 2015). To attain a greater understanding of current digital teaching practices and the problems that teachers face, researchers need to examine their perceptions, technology support, access, and instructional strategies within a grade specific context (Inan, Lowther, Ross, & Strahl, 2010).

Technology Integration Barriers

According to Terada (2020) the number one barrier that hinders technology integration is the lack of adequate professional development. She claims that COVID-19 has revealed the challenges associated with the current state of distance education, and rather than being skillfully managed, "online learning is more like triage - a form of crisis management" (Terada, 2020, para. 2). There is a need to examine the ever-present barriers teachers face within the context of real classroom settings (Barone & Wright, 2008; Ertmer & Ottenbreit-Leftwich, 2010; Vrasidas, 2015). Commonly reported unresolved barriers include the lack of funding for digital learning tools, but also a lack of consistency in leadership, support, resources, time, access, knowledge, and training (Johnson, Jocovina, Russell, & Soto, 2016). Other pressing concerns include assessing technology integrated activities and dealing with family engagement issues (Barone & Wright, 2008; Barron et al. 2011; Guernsey & Levine, 2015). Teachers feel they need and deserve high quality technology professional development that provides adequate support and addresses their concerns (Luckhardt, 2018). Johnson, et al. (2016) argue that while it is important to address external technology integration barriers, it is crucial to also address the internal challenges that teachers face when learning how to integrate technology.

Elements of Technology Professional Development to Facilitate Change

Educators argue that traditional professional development is not sufficient and call for a better working model (Taylor, 2017; Luckhardt, 2018). An increasing concern is the lack of

sufficient professional learning for how to integrate technology (Inan, Lowther, Ross, & Strahl, 2010). Early elementary educators need access to affordable, flexible professional development opportunities that include technology training, ongoing support, and access to digital learning tools and devices that keep young learners in mind (Barron et al. 2011, NAEYC, 2012). Ertmer and Ottenbreit-Leftwich (2010) suggest that the best way to support teachers is to facilitate their first-hand learning that shows how their students may benefit from these tools. An all-inclusive professional development model that supports teachers and improves student outcomes has not yet been identified (Office of Education Technology, 2017). In addition, identifying and removing silos that impede technology professional development needs to be prioritized in education (Darling-Hammond, L., Hyler, & Gardner, 2017).

Many scholars are invested in the examination of effective professional development elements to find such a model. For instance, Garet, Porter, Desimone, Birman, and Yoon (2001) gathered nation-wide survey data from 1,027 mathematics and science teachers to determine the impact of professional development. Teachers reported that knowledge and skills related to their teaching practices were positively influenced by 1) the structural type (workshop, study group) of the professional development, 2) opportunities for collaboration with grade level colleagues who taught the same subject, and 3) a long duration of the professional development activity. These results exceeded what literature had previously said about traditional "best practice" in professional development and showed that a deep financial commitment is necessary in order to provide teachers with sustained, high quality professional development experiences.

Darling-Hammond, et al. (2017), studied various professional development models to identify barriers and common elements of effective professional development that facilitates

changes in teaching practices. The elements that resulted in teacher adoption of more complex teaching methods for 21st century student learning included:

- A content focused agenda
- A hands-on, active learning design
- An authentic and collaborative context and space to learn together and share ideas, such as a PLC
- Modeling the use of best practices, student work samples, peer observation, and video or
- Written reflection of teaching
- Expert coaching that focused specifically on the needs of the teachers
- High-quality feedback and reflection with opportunities to modify teaching practices
- Time to practice and implement changes with sustained professional development
- Opportunities for teachers to witness how their learning benefited the students. (Darling-Hammond, et al., 2017, pp. v-vi)

The National Council of Teachers of English (2017) concurs that it is critical for schools to provide on-going professional development opportunities that ensure the adoption of tools that support an integrative approach to classroom instruction. LaMorte (2018) advocates for applying a participatory approach to professional development scenarios to increase the adoption and successful integration of new innovations. Focused research efforts are needed to identify a strategic technology professional development model specifically for early educators (Guernsey & Levine, 2015). Professional development elements prevalent in the literature include face-to-face, online, and pedagogical supports. Some include variations and combinations of two or all three types of support.

Elements identified by Darling-Hammond, et al. (2017) also align with the combined professional development elements explored throughout this study. These elements include personalization, scaffolding, learner-centeredness, an in-house technology coach, applying SAMR levels to digital tool use, a focus on developmentally appropriate practice, opportunities for reflection, one-to-one, face-to-face support, face-to-face workshop, face-to-face peer support. one-on-one online support, an online Personal Learning Network offering peer support, an online course that served as the presentation during the workshop, access to the online course for future reference, access to on-demand resources, and digital badge micro-credentialing.

Pedagogy Professional Development Elements

In order to positively influence a teacher's pedagogical beliefs, the technology professional development model type is an essential element to keep in mind (Ertmer & Ottenbreit-Leftwich, 2010). Constructivist learning environments can have lasting effects through scaffolded, personalized, hands-on opportunities for inquiry, reflection, communication, and collaboration (Duffy & Jonassen, 2013; Johnson, et al.). The constructivist focused pedagogical elements under investigation in this study align with the work of Darling-Hammond, et al. (2017).

Scaffolding

According to Duffy and Jonassen (2013), even if a teacher is expected to provide students with constructivist experiences, they may not necessarily do so if the task appears too complex. Therefore, to address these shortcomings in professional development scenarios, they recommend modeling scaffolded learning to help teachers envision how their own students could potentially benefit from a constructivist experience.

Matzen and Edmunds (2007) suggest exploring constructivist professional development models and how they may impact digital teaching practices. Their mixed-methods study examined the effectiveness of Quality Teaching and Learning (QTL) professional development and the impact on pedagogy and technology integrated instruction. The components of QTL include on-going, active learning experiences with an emphasis on grade specific content, collaboration and best practices. The intensive, seven day, 50-hour training focused on technology use, curriculum, theory, and practice. The results of the study were consistent with existing research in that technology selection and use directly aligned with the pedagogical and theoretical beliefs of the teacher. For example, constructivists used technology affordances to design learner-centered opportunities. Surprisingly, the findings also suggested that regardless of a teacher's preference for traditional teacher-centered pedagogy, when technology was modeled and scaffolded in professional development using a constructivist approach, the teacher was more likely to use technology in constructivist ways (Matzen & Edmunds, 2007). Scaffolding is an important element of a constructivist learning experiences.

Learner-Centeredness and Personalization

Teachers want and need professional development that addresses their teaching and learning needs and concerns in the context of their own classrooms (Johnson, et al., 2016) DeMonte, 2017). Effective professional development with a focus on learner-centeredness helps teachers understand role technology plays in formative assessments and helps them to determine what, why and how they teach (Wolfe, et al., 2013; Darling-Hammond, et al., 2017). Learner-centered practices draw from constructivist learning theory and provide project-based learning opportunities and encourage self-expression (Wolfe, et al. 2013). Personalized learning opportunities allow teachers to have a voice as they actively drive their own learning based upon

their goals and mastery of competency-based skills (Cator, Schneider, & Vander Ark, 2014). A context-specific, personalized approach to professional learning has proven to impact teacher pedagogy and in turn will benefit students (Darling-Hammond, et al., 2017). This can be an arduous task, but Duffy and Jonassen (2013) synonymously refer to coaching and scaffolding as an effective, personalized solution.

In-House Technology Coaching

Personalized educational technology coaching and mentorship maintains a focus on the learner and establishes a climate of trust, which in turn raises teacher confidence in using technology more productively with their students (Flanigan; 2016; Ehsanipour & Zaccarelli, 2017; Quintero, 2019). Technology coaches are an essential element for facilitating high-quality professional development (Harris, 2017; Quintero, 2019). Coaches can even lead to buy-in and drive change (Duffy & Jonassen, 2013). Quintero, (2019) claims that schools are spending up to 181 million dollars to improve teaching quality yet traditional workshop models fall short in supporting teachers in their daily technology integrated instructional needs. According to Harris (2017), characteristics of individuals who are effective technology coaches include "excellent teaching practices, desire to try new tools and methods, a growth mindset, a personable and approachable personality, and a commitment to the teaching faculty as a whole" (Harris, 2017, p. 3).

Applying SAMR to Digital Tool Use

Flanigan (2016) discusses the importance of SAMR and how technology coaches can help teachers integrate technology in impactful, transformative ways. Terada (2020) claims that SAMR is a sophisticated conceptual tool for technology integration and "good technology integration isn't about using the fanciest tool, it's about being aware of the range of options and

picking the right strategy – or strategies – for the lesson at hand" (para. 7). When SAMR levels are applied to digital tool use, Hamilton et al. (2016) claim that the context-specific learning goals and objectives should be the forefront of the instructional design decision-making process. Teachers must first understand the relationships between pedagogy and using the SAMR model if they are to integrate technology in ways that will have a positive impact on student learning (Hamilton et al., 2016). When teachers integrate digital learning tools, technology coaches can guide teachers in making solid decisions based upon pedagogy and the use of SAMR.

Focus on Developmentally Appropriate Practice

Knowledge of child development is important for being a learner-centered teacher (Darling-Hammond, et al., 2017). Early educators need reassurance that their digital teaching practices will positively benefit their students, therefore, when professional development is aligned with developmentally appropriate practice, teachers are more likely to integrated digital learning tools into their instructional plans (Ertmer & Ottenbreit-Leftwich, 2010; Gurensey & Levine, 2015). It is critical for early educators to have adequate support in their selection and integration of developmentally appropriate digital learning tools (NAEYC & the Fred Rogers Center for Early Learning and Children's Media, 2012).

Opportunities for Reflection

Professional development that encourages reflection helps teachers overcome their challenges and frustrations and therefore strengthens their teaching practices (Matzen & Edmunds, 2007; Wolfe, et al., 2013; McGrath, 2020). Matzen and Edmunds (2007) posit that reflecting on instructional practices is a major element of professional development to facilitate teacher change. According to McGrath (2020), teachers are motivated when they know they can immediately apply a new strategy in their own classrooms and their beliefs are impacted when

they have time to reflect upon the process of integrating the new strategy. She claims that structured reflection is key and "without time to reflect on change, adults often will find a way to dismiss a suggestion for change and continue on the path they are already taking" (McGrath, 2020, para. 7-8). Structured opportunities for reflection are an important element of professional development because teachers can process change in their teaching practices.

Face-to-Face Professional Development Elements

There are several face-to-face elements designed to support teachers in their professional learning goals. Such support may include workshops, one-to-one, face-to-face support through in-house technology coaching, face-to-face peer support with in professional learning communities, and more.

Workshops

Workshops alone do not bring about changes in technology integration practices. Delaney's (2011) study found that two-hour professional development workshops, also known as "sit-and-gets" initially inspired teachers to integrate technology into their instructional plans, but their motivation quickly faded due to lack of consistent coaching and on-going support. However, teachers did integrate new digital learning tools more effectively into their lesson plans when they had support through technology coaching.

One-on-One Face-to-Face Support

Research suggests that technology coaching may be worth pursuing for one-to-one professional learning. For example, Ehsanipour and Zaccarelli (2017) state that "coaching, as a professional development strategy, might provide the specificity that the current research on professional development has not found in other strategies" (p. 7). Blair's (2012) findings from a technology needs assessments indicated that teachers would benefit from having a one-to-one in-

house technology coach to assist with their technology teaching and learning needs, specific to their own classroom setting. While various coaching models have had positive research results for effecting deeper learning in teachers, there is an evident gap in the literature when it comes to coaching strategies for the purposeful adoption and implementing of new technologies, especially in the early grades.

Although technology coaching has become a recognized approach for supporting technology integration in schools, there are many factors to consider for this form of professional development to be successful. Flanigan (2016) discusses partnerships based upon trust, and as Zeigler, a technology integration specialist states, "The teachers who have someone there to be their cheerleader and coach them through their failures, those are the ones we see transforming their teaching practice… We find so often that teachers who try a new technology lesson or integration strategy without a coach are reluctant to ever try it again" (para. 4). In addition to trust and rapport building, Flanigan claims that coaches must be resourceful, have a high level of expertise, and provide timely feedback. Teachers' confidence levels may need to be bolstered by a technology coach and teachers must be willing to collaborate and draw upon available resources, such as information sharing networks.

Schools across the nation are incorporating various instructional coaching models to improve student outcomes. Minnesota's Quality Compensation Law (Q Comp), which went into effect in 2005, is just one of many models of instructional coaching. School districts may apply for Q Comp. The teachers are instrumental in the planning and negotiation processes related to professional learning, career advancement, and salary. Q Comp instructional coaches are experienced teachers that aim to improve the outcomes for all student and establish a school culture built upon collaboration, trust, and meaningful professional development opportunities to

ensure more innovative, research-based teaching practices (Minnesota Department of Education, 2018). While Q Comp has many benefits, the drawbacks are that the program is difficult to sustain and the teachers receive their pay regardless of the limited evidence that their learning has positively impacted student outcomes (Star Tribune, 2009).

Peer Support Within Professional Learning Communities

Cifuentes, Maxwell and Bulu's (2011) case study examined technology adoption and integration through a professional learning community (PLC), which they define as "a group of educators who engage with colleagues in a culture of collaboration to ensure that students learn" (p. 62). Three rural school districts took part in the project, known as STAR. The project was funded by the Texas Education Agency and included 50 educators, school leaders, teacher educators, and technology specialists. The study was conducted under the premise that a collaborative culture, conducive to sustained involvement in on-going technology professional development would hold more merit than a one-time workshop. The researchers applied Roblyer and Doering's (2010) criteria for effective professional development to ensure that technology was appropriately integrated into classroom instruction, which included the following according to Cifuentes, et al. (2011, p. 61):

- Seamless integration of technology observed by an outsider
- Teachers, students, and others understand the purpose of the technology in relation to the activity
- Student's content learning remains the focus, not the technology
- The teacher is able to articulate how the technology is used for individualizing student learning
- The learning objectives are dependent upon technology

- The teacher can articulate how the technology has contributed to student learning
- Every child benefits from the technology integrated activity

The application of change theory and learner-centered teaching strategies led to a powerful, social-constructivist experience which kept all stakeholders engaged throughout the process. Also, identified were elements of PLCs and professional development strategies that fostered teacher growth in the adoption and integration of technology. However, more research is needed to better understand how to build learning communities for sustained, high-quality professional development.

Online Professional Development Elements

Online elements for professional development can provide effective learning environments for teachers (Hug & Friesen, 2007; Green & Cifuentes, 2011). This includes access to peer support within online learning communities, one-on-one online technology support from a knowledgeable expert, online courses, on-demand resources, digital badging and micro-learning credentials, to name a few. There are many variations of flexible teaching and learning opportunities in online spaces (DeMonte, 2017).

Peer Support Within Online Learning Communities

Green and Cifuentes (2011) compared three groups of school librarians from 12 purposefully selected school districts to gain insight into the effects of online professional development intervention with follow-up and peer interaction. The task for all participants was to ultimately create a student support plan. Following the online professional development, one group had face-to-face and online follow-up with peer interaction, another group had face-to-face and online follow-up without peer interaction, and the third group was provided with a face-

to-face professional development follow-up experience but had no peer interaction. The researchers found that participants with both face-to-face and online follow-up and peer interaction felt less isolated and had greater rates of completion of the support plan. Yet across all three groups, for those who did complete the support plan, there was no difference in the quality of the support plan. The results show the power online follow-up and peer interaction to support completion of tasks presented in professional development.

Personal Learning Networks (PLNs). While face-to-face technology coaching may seem ideal, McLoughin and Lee (2008) discuss a pedagogical shift toward on-demand professional learning. Yet to boost their confidence and motivation, Delaney (2011) found that teachers needed a combination that included professional development, technology coaching, and PLNs.

Online One-on-One Support from A Knowledgeable Expert

Access to online, one-to one support is key through private messaging is a key element to address teachers' concerns and sustain their learning over time. When technology integration challenges arise, teachers want their issues to be addressed in real time by knowledgeable experts (Luckhardt, 2018). This "just in time" support from a is an invaluable element of professional development (Office of Educational Technology, 2017, p. 40). Anytime access to online coaches and mentors encourage teachers to skillfully integrate technology into their instructional plans.

Online Courses and On-Demand Resources

Online Courses and on-demand resources for professional learning are commonplace today (Office of Educational Technology, 2017). Many companies, such as Seesaw Learning, Inc. (2020a) provide online courses and professional development resources to ensure a positive

end-user experience with software applications. Seesaw is a developmentally appropriate student engagement app that can support social constructivist learning for children (Rogowksi, 2020). Seesaw Learning, Inc. (2020a) provides a robust variety of professional development opportunities. For example, Personal Learning Networks for educators can be found on Facebook, Twitter, and other platforms. There are also online professional development experiences that teachers may take part in, such as the "PD in your PJs" webinar. Higher level users of Seesaw may apply for a Seesaw Ambassador training opportunity to receive an official digital badge and professional development materials to share with other educators. The various learning experiences provided by Seesaw aim to scaffold and differentiate learning in order to support educators in the use of the app.

According to Gadtke, (2019, personal communication), Seesaw caters to on-demand learning in various ways. For example, a flexible yet systematic ambassador program is provided to promote and educate teachers about the many useful features within the application. Educators who are interested in becoming a Seesaw Ambassador must first submit an online application. Upon acceptance, participants then complete the online Seesaw Ambassador professional development which is delivered as an online course directly within the Seesaw application. The online course was first developed by Seesaw using Versal (2019), a web-based learning and development training platform used for authoring, delivering, and managing online chunks of information often referred to as microlearning experiences. Hug and Friesen (2007) define microlearning as "special moments or episodes of learning while dealing with specific tasks or content, and engaging in small but conscious steps" (p.4).

Upon successful completion of the online course, Seesaw Ambassadors are granted online access to the full Seesaw Ambassador Toolkit, which includes a customizable Seesaw

professional development slide presentation, a certificate of completion, an official Seesaw digital badge, a coupon for a free Seesaw t-shirt, and an upgrade from the free Seesaw subscription to the paid version, *Seesaw Plus*. Within a year of completion, ambassadors are encouraged to become active participants in Personal Learning Networks found on public and group social media platforms such as Twitter and Facebook. Seesaw also asks their Ambassadors to share their knowledge with other educators through the delivery of a Seesaw professional development experience of their choice.

The Seesaw Application

Teachers across the nation are embracing Seesaw (Rogowksi, 2020). Seesaw Learning, Inc. (2020a) describes the Seesaw app as being compatible with a variety of devices and platforms, including computers, Android, iOS, Chromebook, and Kindle devices. The all-in-one, multi-media creator serves as 1) an online learning journal, 2) a digital portfolio, and 3) a form of social media, 4) a culturally responsive translation tool where teachers, students, and families can translate Seesaw content into over 55 different languages. The Seesaw app also was designed to encourage an inclusive community of inquiry and can be used for organizing, housing, and sharing school related news, messaging, announcements, formative assessments, student work samples, and group projects.

Seesaw serves many purposes (Rogowksi, 2020). For one, teachers can share their lessons or draw from those already made by other teachers in the activities library. Step by step student directions can be shared for how to complete digital learning projects for lesson/activities. These activities are often used in stations. Another added benefit for using Seesaw, is that it can be used as a formative assessment tool and digital portfolio for housing group and individual work samples or digitally created projects in folders. Seesaw is also a social

medium for self-expression and provides a platform for students, parents, and families to post messages and other content in real-time. The app was designed with the youngest digital learners in mind, but may be used for all ages, as well as English Language Learners. The messaging tool can be used for enhancing communication with families through private/group messages, reminders, updates and newsletters. Students, teachers, and parents can interact within the app. Content that may be posted, shared, liked, and commented includes photos, website links, audio/video links to story texts (i.e. YouTube, Tumble Books), pdfs, word/Google documents, and projects and presentations (i.e. Google slides/sheets). The application includes many features such as audio/video recording, writing and drawing tools, and importing and mixing other apps. Because Seesaw is so easy to use and a benefit to young children and families, many teachers across the nation are motivated to participate in convenient, self-paced, online professional development courses to learn how to best leverage the app into their instructional plans (Gwen, 2019, personal communication).

Digital Badging and Micro-Learning Credentials

Microlearning experiences ensure that the learning of specific skill are prioritized (Hug & Friesen, 2007). Ryerse (2020) explains that micro-learning credentials include a digital badge component to encourage personalized, life-long, professional learning experiences. These credentials are awarded when educators "apply their learning into their practice, collect evidence, and demonstrate their competence" (Ryerse, 2020, para 1.)

Gamrat and Zimmerman (2014) claim that digital badges have become a valuable, system for empowering teachers within personalized professional development scenarios. Their study, known as "Teacher Learning Journal Passport" (TLJP) consisted of 36 teachers who participated in online professional development that offered differentiated learning opportunities based upon

their goals, skill level, and content areas of expertise. Each participating teacher had access to webinars, tutorials and written content. Once an activity was completed, teachers were asked to submit a reflection to their TLJP mentor. Upon satisfactory review of the assessment, teachers were then awarded a digital badge. This represented the teachers' successful completion of the learning activity. Pre and post interviews and activity logs from eight teacher participants were then analyzed to gain understanding of personalized professional development opportunities, as well as the teachers' goal setting and decision-making processes. The digital badge system showed promise for flexible, personalized professional development based upon goal setting and teacher needs, but more research is needed in the contexts of educators' classrooms.

Summary

New technologies have historically challenged educators and researchers. Lankshear and Knoble's (2003) extensive review of the literature identified a significant research gap for how technology was being used to engage children from birth through age eight in their learning goals. It was noted that conducting research, in the context of classrooms, could have a far-reaching impact on this much under-researched area of study. Purposeful technology integration proves to be beneficial in the early elementary grades. If instruction is to reflect the world in which children live, it is vital to identify professional development elements that will support the learning demands of teachers. Several effective professional development elements have already been identified by scholars in the field, such as 1) social-constructivist, hands-on, active learning; 2) learning in both face-to-face scenarios, such as PLCs, as well as local and global online spaces, such as PLNs; 3) several opportunities for peer interaction; 4) sustained follow-up from knowledgeable professional developers; 5) scaffolding, modeling, practice, reflection, feedback; and 6) opportunities to witness how teacher learning may positively impact students.

Based upon the literature reviewed for this study, I have identified sixteen elements that encourage teachers to adopt and integrate technology into their instructional plans: 1) personalization, 2) scaffolding, 3) learner-centeredness, 4) an in-house technology coach, 5) applying SAMR levels to digital tool use, 6) a focus on developmentally appropriate practice, 7) opportunities for reflection, 8) one-to-one, face-to-face support, 9) face-to-face workshop, 10) face-to-face peer support, 11) one-on-one online support, 12) an online Personal Learning Network offering peer support, 13) an online course that served as the presentation during the workshop, 14) access to the online course for future reference, 15) access to on-demand resources, and 16) digital badging and micro-learning credentials.

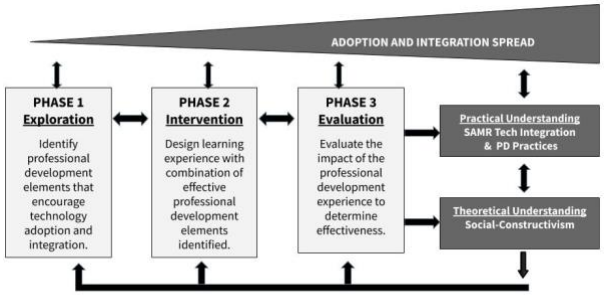
Combining these sixteen, face-to-face, online, and pedagogy focused elements into a professional development design - while calling upon enthusiastic volunteers, might provide a deeper understanding of what works. Since high quality professional development leads to positive student outcomes and the good of all, the time to research effective elements that encourage adoption and purposeful technology integration in the early grades is now.

CHAPTER 3: METHODOLOGY

In this chapter, I describe the design and procedures applied to find answers to my research questions. I used qualitative methods to conduct this naturalistic inquiry within a social-constructivist paradigm (Creswell, 2013). To reveal the best-informed truth of the participants, I engaged in crystallization. I sought to understand if and how teachers in the early grades changed in their technology adoption and integration in their classroom teaching practices as a result of a SAMR focused professional development, and to determine the effective professional development elements that facilitated change (Ellingson, 2009). Education Design Research (EDR) provided insight into practice and theory through the application of a professional development intervention and focused, cyclical reflections (McKenney & Reeves, 2019). A thematic analysis was conducted on data gathered from six data sources. A timeline of the research procedures can be found in Appendix A. This inquiry led to a descriptive representation of the authentic voices of the teachers regarding the overall impact of a professional development intervention. The phases involved 1) identifying professional development elements known to encourage technology adoption and integration, 2) designing the professional development, and 3) evaluating the effectiveness before, during, and after the intervention as described in Figure 4.

Figure 4

Educational Design Research for K-3 Professional Development (McKenney & Reeves, 2019).



Participants

Professional Development Designer, Facilitator, and Researcher

In this study, I served as the professional development designer, facilitator, and researcher. I was a classroom teacher at each of the targeted research sites from 1994-2012 and my children attended school in this district. My background knowledge was advantageous because I understood the school culture, and my familiarity with the participants helped them to perceive me as being not only an external professional developer telling them what to do, but as one of them (Holmes, 2014; Sanghera & Thapar-Bjokert, 2008). This prior knowledge allowed me to quickly build trust to gather honest answers to important questions from each participant. The participatory approach provided ample opportunities for rapport building (Stringer, 2007) and motivated the teachers to identify and solve problems specific to the needs of their own classrooms (Zeichner, 2003). This in turn helped to level the hierarchy of differentials amongst the participants and myself as researcher and instrument (Jacobs, 2016). Crystallization (Ellingson, 2009) and bracketing (Tufford & Newman, 2010) were embedded into the overall design of the study to minimize bias and increase reflexive engagement with the participants and their data (Malterud, 2001).

Positionality of the Researcher

As the primary research instrument for data collection, it is important to reveal my positionality due to the participatory nature of my study (Burke, 2014). My social-constructivist ontological, epistemological, and methodological assumptions were born out of my formative and professional life experiences (Denzin & Lincoln, 2005). I identify with being a Caucasian, middle class female. I grew up on a farm in the upper Midwest. My father often adopted innovative machinery for greater efficiency in farm management. My mother, a gifted artist,

fully embraced the benefits of country living. When I was a young child, she piqued my curiosity and helped me to contextualize the world in which I lived by immersing me in constructivist learning opportunities. My teachers inspired me to become an educator.

I obtained my elementary education degree and had the privilege of teaching in each grade level, preschool through 6th grade. Early in my career, I earned my master's degree in education. Concurrently with my elementary teaching position, I hosted or supervised student teachers, and intermittently served as an adjunct instructor in teacher development. After nearly twenty years of teaching in the elementary grades, I accepted a full-time position in teacher development, where I most recently taught elementary methods courses and supervised preservice teachers. During that time, I completed a graduate certificate program as a K-12 literacy specialist. Determined to continue my work as a scholar, I began a Ph.D. program in the online Curriculum and Instruction graduate program at New Mexico State University. My pedagogy and research interests were sparked by my Educational Learning Technologies (EDLT) professor, Dr. Woodley and first grade teacher and educational technologies mentor, Gwen. I also applied for and was accepted into the Seesaw Ambassador program. This training further ignited my confidence and passion for researching grades K-3 technology professional development.

Teacher Participants

Per the district superintendent's request, all participating teachers in the study were tenured and required to have a full-time teaching contract for a minimum of three consecutive years (2018, personal communication). Out of the 33 teachers in grades kindergarten through third grade, 27 teachers met this criterion and were invited to participate. Of those, five volunteered and all five completed the study. Table 1 shows the participant's demographics

inclusive to age, gender, ethnicity, grade, how many years they taught, and the year they had been tenured. I used pseudo names for participant confidentiality.

Table 1

Demographics of the Teacher Participants

Name	Age	Gender	Ethnicity	Grade	Years of Teaching	Tenured
Tia	42	F	White	K	9	2019
Jory	27	M	White	1	5	2017
Celeste	46	F	White	2	23	2000
Jayla	45	F	White	3	9	2015
Kain	30	M	White	3	7	2017

Participant Recruitment

I emailed the principals at each of the two elementary schools in the district to request permission to attend either a faculty meeting and/or grade-level meetings. After obtaining permission, I met with the grades K-1 tenured teachers at one school, and the grades 2-3 teachers at the other school. At each meeting, I explained 1) the purpose of the study, 2) the time commitment required, and 3) the learning objectives, which included ability to apply Seesaw features and to integrate Seesaw and other apps purposefully into their lessons using the SAMR model, 4) the opportunity to set learning goals for integrating Seesaw in meaningful ways to better serve the students in the context of their own classrooms, 5) the chance to accomplish their goals in a face-to-face workshop, followed by on-going support throughout the duration of the study, and 6) the incentives they would receive upon completion of the study.

Incentives

To encourage participation, the district offered six Continuing Education Units for completion of the study. I offered an Amazon gift card for $15 as well as breakfast,

refreshments, lunch, and snacks during the professional development workshop. Also, with input from the technology liaison, a system was established for participants to receive a professional development digital badge (Gamrat & Zimmerman, 2014).

After meeting with the tenured K-3 teachers at the schools, I obtained their email addresses from Gwen and invited them to participate in the study. The invitation included a link to the Technology Teaching & Learning, Needs, and Perceptions Pre-Intervention Survey and was delivered to the participants using RedCap, our university's secure, web-based survey tool for electronic data capture. The first page of the survey was the consent form and a notice that indicated that if a participant agreed to take the survey by providing an electronic signature, this also served as their permission to participate in the study (see Appendices B and C).

Technology Liaison as Key Informant

My technology mentor Gwen, a white, tenured educator with over 20 years of classroom teaching experience - was jointly appointed by the superintendent and I to fulfill the vital role as the technology liaison and key informant in the professional development intervention. She was selected because she was a Seesaw Ambassador, an instructional coach in the district, and had deep understanding of the status of technology integration at the research sites. Gwen, provided much the district's background information for this study.

According to Gwen, the teachers needed more guidance to integrate technology more purposefully and would benefit from Seesaw workshops directly aligned with the SAMR model, thus setting the context for this study. Gwen promoted the project, assisted in the coordination, development, and delivery of the professional development experiences, provided answers to probing questions, provided technology resources, and fostered communication among participants, school administration, and myself (McKenney & Reeves, 2019). As the key

informant, Gwen was the built in “critical friend” to ensure validity within dialogue and peer review. I drew upon her knowledge, resources, and deep insight to better understand the impact of the elements explicitly designed into the professional development (Herr & Anderson, 2015). Additionally, I aimed to build rapport with her so she would not feel threatened by my position as an outsider professional development designer, facilitator, and researcher (Jacobs, 2016).

Research Context

This study took place in a small, upper Midwest, outer suburban city, well-known for manufacturing, with a population of approximately 15,000. The targeted research site included kindergarten through third grade teacher participants, from two different elementary schools within the district. One school housed preschool through first grade and the other school second through fifth grade. The population was made up of predominately white students and teachers. There were approximately 25 students in each classroom and typically eight classrooms per grade level. Title 1 paraprofessionals were distributed as needed throughout the elementary schools. The school district served a large free and reduced lunch population.

The K-3 classrooms had internet access, an interactive white board, a computer, a laptop or a Chromebook, and the ability to check-out mobile devices for student use. The district followed the Professional Learning Community model (Marzano, 2003; Hattie, 2009), where the teachers met once weekly prior to the arrival of their students, for approximately 45 minutes. During that time, the teachers met in grade level teams to examine and discuss instructional strategies, student data, and school improvement. The district held staff development opportunities each trimester, as well as monthly two-hour late start meetings. The school year began in late August and ran through mid-June. Technology in the district was supported by a

technology innovation specialist in the district. Also, a small handful of classroom teachers served as educational technology liaisons in each of the school buildings.

The learner-centered professional development intervention – with a focus on SAMR tasks, modeled best teaching practices and facilitated teachers' learning in how to integrate the many features within the Seesaw application. Seesaw was critical for this study due to extensive experience with micro-learning objectives for students and educators Hug & Friesen, 2007) and sustained exploration and support (Duffy & Jonassen, 2013). This context was necessary to better understand what elements of the professional development experience may - or may not - have been effective for encouraging early elementary teachers to adopt and integrate technology for instructional purposes.

In the fall of 2018, all preschool through grade 3 teachers in the district were encouraged and invited to pilot the Seesaw for Schools premium paid version of the app, which ended in the Spring 2019. Only the preschool and first grade teachers were willing to take part in the pilot program. During the pilot, all preschool through second grade teachers were invited to attend four different, one-hour Seesaw workshops. These workshops were facilitated by a first-grade teacher who also provided on-going support as a certified Seesaw Ambassador throughout the pilot period. The adoption of the Seesaw for Schools app and teachers' attendance of the Seesaw workshops were highly encouraged by administration. However, the workshops were not mandated due to teacher resistance and therefore were held outside of the contracted working hours. Approximately ten Kindergarten through first grade teachers attended the first workshop, but only three out of the ten teachers returned for a following workshops even though they were asked to try the materials and return to the next workshop with questions and for deeper learning. The content in the first workshop consisted of setting up a Seesaw classroom. All teachers were

invited to the second workshop which consisted of a review of the most basic tools and features of Seesaw. The next two workshops introduced Seesaw's shared activities library and the private teacher folder, as these were the added features within the Seesaw for Schools package. All teachers could arrange for one-on-one sessions. No teachers took advantage of the one-on-one learning opportunities.

The voluntary pilot period for adopting Seesaw for Schools ended. Due to cost and minimal teacher participation, the premium paid version was not officially adopted. However, some teachers continued to use the free Seesaw ap. The free version of the app does not allow the teachers to share lessons in the activities library, utilize a shared activities folder specifically for the school, or access a private teacher folder. Teachers who continued to use Seesaw were using only the most basic of the free features to post student work and/or family announcements. There were many new teachers in the district who didn't get the chance to learn how to integrate Seesaw into their classroom instruction, and the teachers that continued to use Seesaw and attended workshops to do so, were not yet integrating the app to the fullest potential.

The superintendent, principals, and technology integration specialist expressed that they wanted to see higher levels of technology integration in the teachers' classrooms. This included using more of the features of Seesaw as well as SAMR. Because my research interests closely resonated with the districts' technology integration goals, I was invited by the superintendent and building principals to move forward with this timely intervention.

Intervention: The Professional Development Experience

I conducted this study in the context of a professional development experience that I designed and developed based upon findings in the literature review. It was an intervention designed to enhance the adoption and integration of Seesaw and other apps. I aligned the

professional development with the research questions from start to finish. The intervention provided the authentic context needed to explore the sixteen professional development elements that facilitated change in teachers' adoption and technology integrated teaching practices. These elements included personalization, scaffolding, learner-centeredness, an in-house technology coach, applying SAMR levels to digital tool use, a focus on developmentally appropriate practice, and opportunities for reflection, one-to-one, face-to-face support, face-to-face workshop, face-to-face peer support. one-on-one online support, an online Personal Learning Network offering peer support, an online course that served as the presentation during the workshop, access to the online course for future reference, access to on-demand resources, and digital badge micro-credentialing.

The Seesaw Demonstration Classroom provided the online space and testbed to 1) apply my own experiences using Seesaw, 2) explore the questions of inquiry in a collaborative setting, 3) investigate the sixteen effective elements found in professional development models as discussed in the literature review, 4) gather quality data to inform the study such as digital artifacts and Teacher Reflection Benchmarks, 5) deliver a learner-centered, scaffolded, professional development workshop with sustained follow-up in a PLN, 6) examine the intersection of best teaching practices, social-constructivist learning spaces and teacher change, 7) integrate the features of the free app for all educators that have access to apps and mobile devices, and 8) apply project-based learning using SAMR focused tasks and competency-based Teacher Reflection Benchmarks. Figure 5 depicts the visual representation that I created of the scaffolded, professional development intervention. I included an image of the "K-3 Tech PD digital badge" that I created for the participants in Canva. I also included an image of my own digital badge that I earned as a Seesaw Ambassador.

Figure 5

A Representation of the Scaffolded Professional Development Intervention

As a certified Seesaw Ambassador, I had access to the teacher professional development editable slides designed by Seesaw to prepare teachers to use Seesaw in their classrooms. I modified these slides by creating an online course using the authoring tool Articulate (See Appendix D). The online course was designed to meet the needs as expressed by the school superintendent, principal, and technology liaison, as well as to address the sixteen elements of effective professional development identified through my literature review.

With Gwen's input, I modified the Seesaw slides based upon the teachers' expressed needs in the pre-intervention survey and included examples of aligned SAMR activities, step-by-step instructions for the practical application of Seesaw tools in stations. I removed slides that were not aligned with the goals and six performance objectives as shown in Table 2

Table 2

Professional Development Learning Objectives and Goals

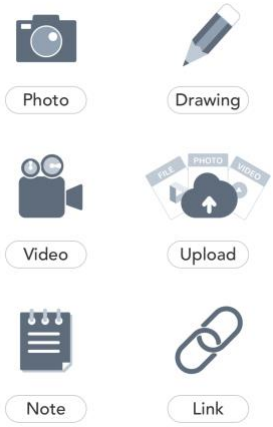
Objective	Goal
1	Access Seesaw Tools - Use the green plus sign to access Seesaw features that can be integrated in classroom activities.
2	Post Student Work in Seesaw - Use Seesaw features to post products associated with classroom activities post photos, use the drawing tool, make a video, upload a file (i.e. Word, Google doc, PDF).
3	Send a Private Message in Seesaw -Write a note, and share a link, the write and send a private message using the note feature and upload a file feature, and to prepare students to use Seesaw features.
4	Prepare Students to Use Seesaw - Upload a file feature, and to prepare students to use Seesaw features to post products associated with classroom activities: post photos, use the drawing tool, make a video, upload a file (i.e. Word, Google doc, PDF).
5	Design Seesaw Activities with SAMR - Write a note, share a link, create and implement technology integrated activities in their classrooms as prescribed by the SAMR focused Guided Reflection Rubric.
6	Teach Students Seesaw Activities with SAMR - Apply SAMR tasks to assure purposeful integration of Seesaw and other apps.

With assistance from Gwen, I guided the teachers through the workshop using the online course.

A goal was for the teachers to adopt and integrate the Seesaw tools in Figure 6.

Figure 6

Seesaw Tools
Retrieved from a Screenshot in a Seesaw Demonstration Classroom



During the workshop, a Seesaw Demonstration Classroom served as the learning space for modeling and guided practice throughout the face-to-face workshop and continued to be used as a PLN during the six-week follow-up implementation period. The teachers used their google email address to enter the Seesaw Demonstration Classroom/PLN. They used the first two letters of their first name and selected an avatar of their choice to minimize future redaction of the digital artifacts included in the report. The participant names were recorded on a list and shared so all posts in the PLN could be identified by the participants. Gwen and I guided the teachers through the objectives. The teachers were provided an overview on how to access and use the features and tools within the Seesaw app. Then each teacher had time to practice the tools at their own pace in stations where they were given step-by-step instructions for applying and completing an activity using each tool. The teachers posted their work from each station in the Seesaw Demonstration Classroom/PLN.

After the stations were completed, Gwen and I introduced and showed examples of activities designed with each SAMR level. To meet their Teacher Reflection Benchmark tasks, we discussed how they would use the Guided Reflection Rubric: Using the SAMR for Purposeful Technology Integration (See Appendix F). This rubric was from adapted the Midway Independent School District to help the teachers gauge their application of the SAMR model and their self-reported competencies in the developmentally appropriate and purposeful integration of technology (Midway Independent School District, 2013). Then the teachers practiced the Teacher Reflection Benchmark tasks through which they later used with their own students.

Next the teachers recorded their perceived SAMR competency levels on the Guided Reflection Rubric. They uploaded and sent the rubric to me using the Seesaw private message feature. They then participated in strategic planning to share ideas for applying what they learned

into their classrooms. Last, the teachers learned that they would have access to the online course for what they learned in the workshop, and would have access to the resource as long as needed. Table 3 shows each SAMR level and a description of the Teacher Reflection Benchmark tasks modeled at the workshop.

Table 3

SAMR Level Teacher Reflection Benchmark Tasks Modeled at the Workshop

SAMR	Benchmark Task
Substitution	Take a picture of the main character in the book; use the Seesaw text tool to type adjectives to describe the main character in the book; post to Seesaw for peers to see.
Augmentation	Take a picture of the main character in the book; use the Seesaw text tool to type a reflection about the main character in the book; use the audio tool to record their voice reading the reflection; post to Seesaw for peers to see.
Modification	Create a retelling of the story by taking a picture of the main character in the book; apply App Smashing using Chatterpix and Seesaw tools of choice to retell the story; post to Seesaw for peers and families to see and comment.
Redefinition	Create a digital story by taking a picture of the main character in the book; apply App Smashing using Chatterpix and Seesaw features to retell the story; then share the digital story with classmates, families and in a classroom blog for other educators outside of the classroom to see and comment on the blog.

I encouraged the teachers to use interactive SAMR flashcards and download the course so they would have a hard copy of the information presented to support their retention and transfer. The link to the online course was shared during the workshop and later posted again in the PLN. Finally, I provided the teachers with a detailed calendar and a schedule of two teaching benchmarks (see Appendix F). I further discuss this schedule in the following section. I also discussed expectations, described what would take place during the remainder of the study, and answered the teachers' questions. For the purpose of micro-credentialing (Cator, Schneider &

Ark, 2014), I asked the teachers to reflect upon their learning goals over the next six weeks in the use of SAMR and the integration of Seesaw and other apps for their students and to report their SAMR competency levels based upon the same criteria used in the pre- and post-intervention surveys (Christensen & Knezek, 2008).

Professional Development Workshop Schedule

The participants were given a schedule and calendar to ensure their success and keep them on track throughout the professional development experience. In Table 4, I have included the schedule of the professional development workshop with a description of activities and the number of minutes spent on each activity.

Table 4

Professional Development Workshop Schedule of Activities

Minutes	Activity	Description
10	Welcome	• Coffee, donuts, juice • QR code to enter the Seesaw Demonstration Classroom/PLN
10	Introduction	• Agenda and Study Overview • PD Objectives • Ground Rules • Guided Reflection Rubric and other handouts
10	Objective #1	• Access Seesaw Tools
10	Objective #2	• Post Student Work in Seesaw
30	Objective #3	• Send a Private Message in Seesaw
10	Stretch Break	• Snacks
120	Objective #4	• Preparing Students to Use Seesaw
60	Lunch Break	• Lunch
45	Objective #5	• Designing Seesaw Activities with SAMR
4	Objective #6	• Teaching Seesaw with SAMR
10	Follow-Up	• Seesaw Demo Classroom for ongoing PLN • Guided Reflection Rubric • Discuss Survey & Focus group • Question and Answer

Following the workshop, Gwen and I provided on-going support during implementation of Seesaw and SAMR in teachers' classrooms for six-weeks. The follow-up support consisted of a PLN, my weekly one-on-one check-ins via private messaging, and the Seesaw online course. The PLN was conducted in the context of the Seesaw Demonstration Classroom and consisted of all participants, including myself. I helped the teachers meet the objectives by reminding them of upcoming Teacher Reflection Benchmarks, encouraged peer interaction, provided timely feedback, conducted weekly check-ins, addressed concerns, answered questions, and shared relevant resources in the PLN. Gwen was available in-house and online to address the teachers' concerns and questions.

Professional Development PLN Schedule

The allotted time for lesson planning was two weeks, and the allotted time for implementing each activity with their students was approximately for 20-30 minutes, however this was determined by each teacher based upon their grade level, classroom needs, and learning goals for what they hoped to achieve as a result of the professional development experience. After each activity was taught in the teachers' classrooms, they sent me their benchmarks that included their lesson and SAMR Rubric Reflection (Appendix F), and they then posted their digital artifact to the PLN to show their peers an example they designed of the completed SAMR activities. No student work was posted. The teachers were encouraged to engage in the PLN with commenting on and liking other work. In Table 5, I have included a schedule of professional development PLN to provide a description of the activities and Teacher Reflection Benchmarks throughout the six-week implementation period. These benchmarks were also included in a calendar for the participants (Appendix F).

Table 5

Professional Learning Network Activities and Benchmarks

Week	Activity/Benchmarks
1	Teacher Planning Week for SAMR Activity 1
2	Teach SAMR Activity 1
3	Teacher Reflection Benchmark 1 Guided Reflection Rubric & Self-Reported Competencies SAMR examples posted to PLN
4	Teacher Planning Week for SAMR Activity 2
5	Teach SAMR Activity 2
6	Teacher Reflection Benchmark 2 Guided Reflection Rubric & Self-Reported Competencies SAMR examples posted to PLN

I connected with each teacher one-on-one at least once weekly via the Seesaw private messaging tool, text, or email to offer one-on-one assistance in activity lesson planning, answer questions, and gauge their comfort levels. Also, throughout the week I gave feedback in the PLN by addressing specific learning needs, posting encouraging words, offering assistance, replying to teacher posts with comments and/or likes, and interacting in a way that continued to model the various Seesaw tools. Each weekday, I followed a schedule for checking in with the teachers and posted news, announcements, resources, and words of inspiration. The structured schedule for my posts are shown in table 6.

Table 6

Scheduled PLN Posts by the Researcher

Day	Type of Post
Monday	News and announcements
Tuesday	Shared resources (i.e. apps for early learners, links to articles, YouTube tutorials, Seesaw Activity Library
Wednesday	Check in with each teacher via Seesaw private message inbox
Thursday	Inspirational message (i.e. quote, video, etc.)
Friday	Weekend wishes and important reminders/dates

These combined professional development experiences allowed me time to reflect upon the research questions and consider how the pedagogy, face-to-face, and online professional development elements explicitly designed into the study impacted the teachers in their digital teaching practices.

Data Sources

I used the following means to evaluate and reflect upon elements of the professional development intervention. Prior to conducting the study, IRB permission was granted (Appendix B). The following data sources, pre and post intervention surveys, researcher notes, Teacher Reflection Benchmarks, digital artifacts, and a focus group, aligned with the research questions: What elements of a SAMR focused professional development experience facilitate K-3 teachers' change in their 1) adoption of technology and 2) purposeful integration of technology into their classroom teaching practices?

Careful measures were taken to ensure that the data collection process informed my study, and that the tools and resources could be duplicated and implemented in other educational settings and studies. (Herr & Anderson, 2015).

Pre- and Post-Intervention Survey

With Christensen and Knezek's (2008) teacher self-reported competencies and Guskey's (2000, 2002) professional learning in mind, I used a backward design approach for my pre- and post-intervention survey instruments. To ensure consistency and dependability in the survey construct and content validity, I consulted with authoritative, experts who had shared interest in my research (Smith, 2015). These individuals included my committee chairperson, the technology liaison in the study, a professor from an unaffiliated university with experience in survey design and change theory, and a Ph.D. candidate whose area of expertise is in online

learning, early childhood, and developmentally appropriate practice. With their input, I included survey questions consistent with the research questions and removed any leading, irrelevant and confusing survey questions. Both the pre-intervention and post-intervention surveys were administered and collected using RedCap (Harris, et al., 2009) to protect confidentiality.

Pre-Intervention Survey

The purpose of the Technology Teaching & Learning, Needs, and Perceptions Pre-Intervention Survey (see Appendix C) was to gather information regarding the teachers' use, adoption, and integration of technology, their needs, and perceptions regarding school leadership, and pedagogy and their competency levels using SAMR, Seesaw, and technology in general. This included accessing the camera roll and integrating the Seesaw (SS) photo, drawing, video, file, note and link tools in developmentally appropriate ways to enhance and extend learning goals and for communicating with students and their families.

The pre-intervention survey was used as a comparative measure to the post-intervention survey. The pre-intervention survey sections included: 1) informed consent and information about the study, 2) demographics (name, age, gender, ethnicity, grade level teaching, number of years with teaching experience, and if tenure has been achieved, 3) technology teaching and learning needs, 4) Seesaw, SAMR and general technology competencies, and 5) perceptions. To develop my survey questions, I adapted the Power Up What Works Quick Teacher Technology Survey (American Institutes of Research, 2014). The questions were aligned with my research questions and the Checklist for Identifying Exemplary Uses of Technology and Interactive Media for Early Learning by The Pennsylvania Digital Media Literacy Project (Fred Rogers Center, 2014). A Likert-scale (Likert, 1932) was applied to the teachers' perceptions regarding the role of school leadership, pedagogical beliefs and confidence levels for technology

integration. The levels of agreement signified 1-Strongly Disagree, 2-Disagree, 3-Neither Agree or Disagree, 4-Agree, and 5-Strongly Agree. For the teachers' Seesaw, SAMR, and general technology self-reported competencies I adopted Christensen and Knezek (2008) criteria, Beginner-1, Developing-2, Proficient-3, Advanced-4 as described in table 7.

Table 7

Seesaw, General Technology, and SAMR Competency Scale

Beginner-1	The teacher has not heard of or has basic familiarity of the features of the SAMR model, Seesaw, other apps, or general technologies. They will need to learn about these features before integrating.
Developing-2	The teacher has knowledge gained in professional development but may not be fully integrating the features of the SAMR model, Seesaw, other apps, and/or general technologies. They will need help integrating.
Proficient-3	The teacher has integrated the SAMR model, Seesaw, other apps and/or general technologies into their lessons with minimal guidance. They can do this independently, but may use resources or need help. They understand and can discuss these features.
Advanced-4	The teacher has consistently integrated SAMR model, Seesaw, other apps and/or general technologies into their lessons successfully and independently. They are also capable of discussing/helping others with these features and feel comfortable finding/using outside resources if necessary.

Post-Intervention Survey

The purpose of the Technology Teaching & Learning, Needs, and Perceptions Post-Intervention Survey was to answer the research questions by comparison with pre-intervention survey data and to identify elements of the professional development that facilitated change (Appendix H). I designed the Post-Intervention Survey which included: 1) technology teaching and learning needs, 2) technology skill level, 3) technology perceptions, 4) intervention follow-up questions, 5) evaluation of the researcher and the elements of the professional development. The Post-Intervention Survey was entered into RedCap for web-based delivery and took the

teachers approximately 25 minutes to complete. The agreement and competency scales, as well as the first 19 questions regarding technology adoption, integration, and teachers' perceptions were identical to the pre-intervention survey (pages 61-62). The teachers self-reported their final competency levels based upon the extent to which their learning goals were met as a result of the professional development experience.

The professional development follow-up questions primarily focused on the teachers' satisfaction and the sixteen professional development elements under investigation. The questions were adapted from Best Practices in Course Evaluation Surveys by the University of Wisconsin, Madison. The first half of the follow-up questions were primarily open-ended and related to the participants' satisfaction of the professional development. The remaining questions were a combination of closed and open-ended questions regarding their perceived level of importance of the 16 elements that I explicitly designed into the study. To determine the elements' levels of importance for facilitating change in the teachers' technology integration teaching practices, I applied a three-point Likert-scale (Likert, 1932) with 1-being not important, 2-somewhat important, and 3-very important.

Researcher Notes

As I observed my participants' actions and viewed their online Seesaw posts throughout the professional development experience (face-to-face and PLN), I took written and/or audio notes that provided the data to identify emerging patterns, themes, and categories as they related to the research questions (Terrell, 2016). I recorded information that addressed Guskey's (2000, 2002) five levels of evaluation for professional learning which includes 1) participants' reactions, 2) participants' learning, 3) participants' integration of new knowledge and skills, 4) elements of support that lead to change, and 5) Teacher Reflection Benchmarks. This

information was key to my inquiry, especially during weekly check-ins and to address the individual needs of each teacher. Throughout the data collection process, I mitigated bias through reflexivity and bracketing (Tufford & Newmen, 2010). As I journaled about what I had learned and what I wanted my readers to know, I drew upon theories which grounded the study and recorded ideas for how to represent the participants' voices through crystallization (Ellingson, 2009). To protect the participants' confidentiality, I used a code that only I would know and stored my notes on a password protected laptop.

Teacher Reflection Benchmarks

The purpose of the two Teacher Reflection Benchmarks (TRB 1 and TRB 2) was to obtain details about the effectiveness of the key elements of professional development designed into the study; specifically for which elements were and were not effective, what could be improved upon to more positively impact teaching and learning, how their digital teaching practices had changed, and what personalized support was still needed for learning. Over the six-week span of time, the teachers were asked to consider their learning goals and complete two teaching benchmarks. Both Teacher Reflection Benchmarks 1 and 2 consisted of 1) teaching a technology integrated activity with their students 2) completing a Guided Rubric Reflection with SAMR lesson plans with self-reported competencies, and 3) posting their SAMR activities to share with each other in the PLN.

Self-Reported Competencies

Each teacher planned and integrated Seesaw and/or other apps into two different SAMR focused activities for their students. They were asked to try each SAMR level during the implementation period and self-report their competencies using a Guided Reflection Rubric, which I further describe in the next section (see Appendix F). Self-reported competencies were

used to measure the impact of a professional development on the teachers' adoption and purposeful integration of the Seesaw application, use of technology in general, and SAMR. To ensure consistency in these measurements, the same rating scale was also used on the pre- post-intervention surveys and is previously described on page 62 and included: 1- Beginning, 2- Developing, 3- Proficient and 4- Advanced.

Guided Reflection Rubric

The *Guided Reflection Rubric: Using SAMR for Purposeful Technology Integration* (Appendix F) was provided to each teacher in a template. The rubric consisted of a guide for 1) using SAMR levels, 2) a checklist for ensuring purposeful use of technology for early learners, 3) reflection prompts regarding their Teachers Reflection Benchmark 1 and 2 SAMR teaching tasks (Philipsen, Tondeur, McKenney, & Zhu, 2019), and 4) the competency rating scale (page 62). To protect confidentiality, the teachers uploaded this document to the private message inbox in the PLN or sent to me via an email attachment. I applied member checking in the final report to ensure credibility and dependability.

Digital Artifacts

In PLN (see Appendix F) the teachers posted their digital products made with Seesaw tools (photos, drawings, videos, uploaded files, notes, and links). They also posted two teacher-created digital artifacts, which were directly related to their SAMR aligned Teacher Reflection Benchmark tasks (Appendix E). To ensure the teachers met the benchmark date, they were provided a detailed calendar (See Appendix F). The teachers were encouraged to respond to their peers' posts with likes and comments, about something they found interesting, ask questions, and provide words of encouragement. The digital artifacts served as a representational form of data that other methods could not capture, and improved accuracy by providing new insights that I

may not have recognized (Creswell & Creswell, 2018). To ensure confidentiality, pseudo names and avatars were used in the PLN that only the participants and I knew.

Focus Group

I conducted a focus group at the end of the study. The purpose of the focus group was to gather my participants' inner thoughts, feelings, and opinions regarding elements of the professional development that facilitated changes and to generate knowledge for envisioning the most productive professional development scenario for supporting teachers in the adoption and purposeful integration of new technologies (See Appendix I) (Holstein & Gubrium, 2003).

A focus group stimulated brainstorming and cultivated specific knowledge about elements of effective professional development (Vogt, Gardner, & Haeffel, 2012). This gave me an opportunity to seek answers to unanswered questions through the perspective of the participants (McKenney & Reeves, 2019). This also fostered the iterative cycle of both organic and structured evaluation and reflection (McKenney & Reeves, 2019). The focus group protocol gleaned further insight into the professional development experience (see Appendix I). I requested permission from participants to audio/video record them, which allowed me to be responsive to the teachers. I then later reflected more deeply when reviewing the transcription. Member checking was applied to confirm accuracy in the transcription and to strengthen the credibility and dependability of the findings. All notes and recordings were encrypted and stored on a password protected lap top.

Data Collection

Data collection took place before, during, and after a two-part professional development intervention that consisted of a six-hour long face-to-face workshop, followed by six-weeks of classroom implementation with PLN online and face-to-face support. Procedures of data

collection included 1) Pre-Intervention Survey data prior to a six-hour-long Seesaw face-to-face workshop and researcher notes, 2) digital artifacts, Teacher Reflection Benchmarks, and researcher notes during the six-week follow-up support in a Professional Learning Network (PLN), and 3) Post-Intervention Survey data, focus group, and researcher notes following the professional development experiences.

Prior to conducting the professional development workshop, participants completed the Technology Teaching & Learning, Needs, and Perceptions Pre-Intervention Survey (see Appendix C), (Terrell, 2016). I used the data from the Pre-Intervention Survey to modify the contents of the subsequent workshop according to expressed needs of the teachers. After filling out the Technology Teaching & Learning, Needs, and Perceptions Pre-Intervention Survey and prior to the workshop, the teachers were invited to receive one-on-one assistance from the technology liaison to set up their Seesaw classrooms for their own students.

After completing the Pre-Intervention Survey, the teachers participated in a six-hour long workshop held in the K-1 school's Media Center. Upon completion of the professional development experience, the teachers completed the Technology Teaching & Learning, Needs, and Perceptions Post-Intervention Survey (see Appendix H). I took into consideration each teacher's post-intervention survey responses, as well as their Teacher Reflection Benchmarks 1 and 2 to determine if there was evidence of growth in their Seesaw, general technology, and SAMR self-reported competency measurements (page 62). I then awarded digital badges, which I created in Canva. Proficient and advanced users were encouraged to apply to become a Seesaw Ambassador.

Last, the teachers and technology liaison participated in a one-hour focus group after school hours, which was held virtually through Zoom due to COVID-19. The teachers were

given guiding questions from the semi-structured focus group protocol. During the first half of the focus group, the teachers used the questions as their guide and created a slide that represented the most important elements of the professional development essential to their learning. Then, in the second half of the focus group discussion, they presented their ideas to all focus group participants. Upon completion of the study, the teachers received six Continuing Education Credits from the district and a $15 Amazon gift certificate and digital badge from me.

Data Analysis

The iterative, reflective process of analyzing the data began on the first day of the study and continued throughout the entire study, with each layer of emerging data informing the next (Creswell & Creswell, 2018). As I collected data, I first cleaned it by organizing preparing, correcting, and removing duplicated information to be analyzed. Next, I read and reflected upon the data (Tufford & Newman, 2010). Then, I coded the data to align with the a priori categories related to the research questions. These categories included the background information of each participant, K-3 teachers' use of apps and mobile devices, evidence of technology adoption, evidence of technology integration, perceived challenges, and elements that facilitated the adoption and integration of technology. I then assigned a color-coded label to this data. Through focus coding, I reflected upon and recorded what I already knew about the themes identified regarding the teachers' technology use, their challenges and barriers to technology adoption and integration, and evidence of what professional development elements facilitated changes in their digital teaching practices. I searched for evidence of technology adoption and integration. I then considered all other possibilities and variations that emerged through crystallization (Ellingson, 2009).

Next, I color-coded a table that I created for taking notes about each participant to record and capture their unique perspectives and generate main themes and connections to answer the research questions through each participant's experience. After that, I examined the overall data to create a holistic, analytic account of the experience by comparing; counting frequencies; and determining which reoccurring patterns, themes, similarities, and differences to represent and describe in the report. Finally, I applied member checking by emailing the teachers the final themes and categories that emerged from the data to ensure they were accurately depicted. A transcription of the focus group, as well as a summary of the final report was sent via email to give the participants an opportunity to correct and/or share information that may not have been addressed in the report. Their responses were confirmed via e-mail (Guba & Lincoln, 1989). Bracketed abbreviations referenced each data source as shown in Table 8.

Table 8

Bracketed Abbreviations for Data Sources

Pre-Intervention Survey	PreS
Researcher Notes	RN
Teacher Reflection: Benchmark 1	TRB1
Teacher Reflection: Benchmark 2	TRB2
Digital Artifact: PLN	DA
Digital Artifact: Email	DAE
Digital Artifact: Text	DAT
Focus Group	FG
Post-Intervention Survey	PoS
Tia	T
Jory	J
Celeste	C
Ayla	A
Kain	K
Gwen	G
Whole Group	All

Although the steps I have outlined appear linear, data analysis was a cyclical, meaning-making process that required reflexivity and representation of the original data (McKenney & Reeves, 2019). Each data source was aligned with my research questions (Creswell, 2013). To ensure the study was of high rigor, I aligned the analysis processes and procedures with the data sources and Research Question Matrix (see Appendix I). I used the same competency scale throughout to ensure consistency in the measurements of the teachers' self-reported SAMR, Seesaw, and general technology competencies (page 62). I applied these aforementioned strategies and before, during, and after the intervention.

Before the intervention, I examined the Pre-Intervention Survey and initially coded the data by using quasi-statistical counts for frequencies to identify emerging themes (Becker, 1958). This process included closed-coding for the yes/no questions. I also used open-coding for the narrative data. During the intervention, I iteratively examined my researcher notes, as well as the Teacher Reflection Benchmarks and digital artifacts. In order to keep the open responses manageable, I highlighted the most frequent and important codes that were developed from the a priori categories that related to the research questions. I then identified similar concepts and themes that emerged through focused coding (Denzin & Lincoln, 2005). I then used code-weaving to holistically find evidence to answer the research questions and identify broader themes that speak to existing theories in order to generate new knowledge about the topic under investigation.

After the intervention, I examined the teachers' perceptions regarding the integration of new technologies, school leadership, and confidence levels for integrating new digital learning tools into their instructional plans. I identified and confirmed changes in technology adoption and integration by comparing the Teacher Reflection Benchmarks 1 and 2 and the pre-and post-

intervention survey responses. Then, I obtained a holistic picture by linking emerging themes, categories and patterns in relation to participants' perspectives found in my researcher notes, the verbatim transcription of the focus group, and the comparative results and follow-up questions from the pre- and post-intervention surveys (Creswell, 2013, 2018; Terrell, 2016).

To confirm evidence of acceptance in the adoption of new technologies, I examined the pre- and post-intervention survey data that captured the teachers' self-reported general technology competencies. To confirm evidence of purposeful technology integration and change, I examined the pre- and post-intervention survey data and the Teacher Reflection Benchmarks 1 and 2, which captured both their self-reported SAMR competency measurements and narrative data. I then corroborated these changes with the digital artifacts created by each of the teachers. Also, to identify change, I again examined the teachers' perceptions regarding the integration of new technologies, school leadership, and confidence levels for integrating new digital learning tools into their instructional plans. This evidence was captured in the collective teachers' five-point Likert responses for agreement found on page 62.

Last, I analyzed the post-survey follow-up questions and specifically teased out the pedagogy, online, and face-to-face elements that impacted the participants' technology use in the classroom for technology integration. The participants answered these questions based on their three-point Likert responses for the importance of each element described on page 63. Finally, I analyzed general frequencies in my comparative data before and after the intervention (Becker, 1958). These findings strengthened and confirmed particular themes identified within the narrative data from all cumulative sources.

Crystallization

To address implications of representativeness in my interpretations and final report, I engaged in Ellingson's (2009) steps of crystallization. It is important to note that I am a constructivist at heart and have had my own share of challenges with technology integration. Therefore, I paid close attention to the interactions with, and amongst, the teachers and technology liaison. I was especially empathetic to the teachers' concerns and aimed to provide the support that they needed to construct new knowledge and succeed in their learning goals. To help my readers' conceptualize the professional development experience, 1) took detailed notes, 2) simplified the language of the participants for clarity in the narrative examples cited, and 3) strategically wove my thematic findings into guiding principles to consider when designing professional development for early educators.

Trustworthiness

Trustworthiness ensures that data comes from valid and reliable sources (McKenney & Reeves, 2019). I applied trustworthiness measures before, during, and after the professional development experience (Stringer, 2007). Sentiments of Lincoln and Guba's (1985) attributes of trustworthiness, credibility, transferability, dependability and confirmability are integrated as well. I established credibility in my work by studying the phenomenon in the context of an authentic setting and with engaged participants; coding, member checking, participant debriefing, and referential adequacy was applied to ensure accurate representation of the participants' experiences and voices (Stringer, 2007). This "representativeness", according to McKenney & Reeves (2019), was paramount throughout the analysis and exploration phase of educational design research.

My methodologies may be applied to other situations, which increased the transferability of my study (Lincoln & Guba, 1985). For this study, the methods to increase transferability included multiple forms of data collection that may serve to guide the research of future authors. The procedures and processes within my study were clearly outlined to ensure consistency and replicability (Terrell, 2016). I incorporated weekly check-ins, which also served as inquiry audits to gather further insight and documentation of the events that take place and to increase the dependability of the study (Stringer, 2007). To enhance confirmability, I documented each step of this project and practiced neutrality and reflexivity while detailing my trail of evidence (Terrell, 2016). I applied crystallization and bracketing to ensure bias was minimized; this was especially the case while recording the participants' varied and multiple perspectives (Ellingson, 2009; Tufford & Newman, 2010). This helped me to establish a credible, rigorous trail of evidence that could be used to accurately portray each participant's story, and provide conceptual understanding of the overall problem (Ellingson, 2009; Terrell, 2016).

Ethical Demands

Throughout this study, I remained deeply committed to meeting the ethical demands as proposed to the Internal Review Board administration and my dissertation committee. Prior to the study, I successfully completed Human Subjects Training. During the study, the following measures were taken: 1) I ensured minimal disruption of the participants' schedules, 2) I employed the least obtrusive means for data collection, 3) I maintained the safety (emotional and physical), as well as the confidentiality of the participants and all individuals involved at the research site (McKenney & Reeve's, 2019), 4) I properly managed and secured the data through password protection and encryption, and 5) I followed relevant policies and met ethical demands. (Stringer, 2007).

This study did not include potentially vulnerable subjects and only minimal risk was involved. The participants were reminded that participation was voluntary and that they could withdraw at any time without penalty. No other safety controls were required. Risks and benefits included exposure of the participants' work to the larger community. Participation remained confidential. No names or locations were used in any publications or presentations given as part of this research. Confidentiality has been protected by use of an avatar and a pseudo name that only the participants and I would know. Participants' names were only used to match pre- and post-survey data that only I knew. All participant names, pseudo names and avatars were removed from the original data and replaced with a numerical code that only I knew. Research data was stored securely at all times. Before writing the final report, I asked the participants to review a transcription of the focus group, as well as a written report of what I learned as a result of the study. Participants were able to delete or edit any information that they thought was inaccurate.

Summary

This chapter depicts a flexible, yet structured research design that aligns with my research questions and applies methodologies that are firmly grounded in literature. Educational Design Research included the exploration of the literature, the design and construction of an intervention, which was the professional development experience, and 3) the evaluation and reflection before, during, and after the professional development experience (McKenney & Reeves, 2019). The sustained professional development intervention experience was informed by my own experiences and existing literature to help me to better understand working elements of technology professional development that encouraged the adoption and purposeful integration of technology by early elementary educators. The context of professional development on Seesaw

and use of the SAMR model allowed for an authentic experience and a scaffolded, social learning space. Key components within the educational design research model were mapped out to ensure trustworthiness, reliability, validity and transparency. My outlined plan allowed for flexibility, collaboration, and reflexivity throughout the meaning making process. Deep conceptual understanding and theoretical underpinnings have been woven throughout the study in order to inform social-constructivist teaching practices, developmentally appropriate practices for technology integration, diffusion of innovations, and elements of professional development that may positively facilitate change in both school culture and mindsets toward technology adoption and integration in teaching.

CHAPTER 4: FINDINGS

This chapter reveals the findings from all data sources, which are represented through crystallization. I have organized this chapter to provided a holistic overview for how the K-3 teachers changed in their digital teaching practices, and what professional development elements were effective in facilitating such changes. To set the stage, I first present a rich, descriptive profile of each teacher participant to portray what specific elements assisted them with adopting and integrating technology into their instructional plans. I also touch on the teachers' realities of teaching at home during Covid-19 distance learning, which occurred in response to the pandemic four weeks into the study. Subsequently, I answered the research questions by presenting an analytic account of the findings as a whole. These multiple representations holistically evidence the similarities, differences, reoccurring patterns, and themes that have emerged as a result of the professional development experience. Data sources are referenced in brackets as described on page 69 (See Table 8).

Key Informant and Participant Profiles

Each participant played a major role in the study. In this section, I provide the deep, contextual background to understand the professional development experience that facilitated changes in their digital teaching practices. The presentation of the data first includes Gwen's insights as the technology liaison in the study. I then detail each teachers' background information, perceptions about technology integration and the professional development, evidence of adoption and integration, how they overcame challenges, how their digital teaching practices changed, and what elements facilitated such changes.

Gwen

Gwen was the key informant and instrumental in helping the teachers overcome their perceived challenges associated with technology integration (Cviko, McKenney, & Voot, 2014). Prior to the study, Gwen was already an avid adopter and integrator of purposeful technology in the classroom [PreS-G]. She was also an innovator (Rogers, 1962, 2003). Throughout the study, she contributed ideas and resources, and she was instrumental in preparing for the workshop presentation. Gwen had a great deal of experience integrating technology in her own teaching not only for productivity and consumption, but for the creation of meaningful projects as well. She was an advanced user of digital learning tools such as Seesaw, Flipgrid, ShadowPuppet, Buncee, Google Slides, ChatterPix, PicCollage, Kahoot, and more [PreS-G; PoS-G]. Gwen stated, "I am a lifelong learner. I participate in Twitter chats 2-3 times a week. I get 80-100 emails a day from educational publications. I love to stay current" [PoS-G]. She was also skilled at integrating technology across all content areas to allow students to creatively share their knowledge with teachers, families, and others beyond the classroom [PreS-G; PoS-G; RN].

Gwen's primary reason for participating as the technology liaison in the study was to help the teachers adopt and integrate digital learning tools more purposefully. She focused her energies on supporting teachers one-on-one and for modeling how to use technology with students and how to "streamline their workload" [PoS-G]. Gwen put considerable time and effort to ensure the teachers had what they needed to purposefully integrate Seesaw and other apps through SAMR. She thought it was "a lot of hard work to get there" [PoS-G]. She also believed that professional development should consist of "people talking about the [SAMR] levels and to question what levels their activities are at" [PoS-G]. Gwen noted that it was critical for schools to provide teachers with more time for technology professional development in specific

applications, but she argued “to fully understand how to implement [a given] technology, you need six hours. You simply cannot pack it into an hour” [PoS-G].

Even though Gwen was already well-versed in SAMR prior to the study, during the workshop she became “more cognizant” of both her own and the teachers’ SAMR levels [PoS-G]. She aimed to encourage the teachers to move beyond the Substitution level and her digital tool kit continued to grow to meet the needs of the teachers, especially during Covid-19 distance learning [RN-G, PoS-G]. When the teachers were “in a pinch,” Gwen still encouraged them to move instruction “beyond substitution” [PoS-G]. She utilized screen-recording tools, such as Screencastify, and sent personalized tutorials specific to each teachers issue in real time [Pos-G]. She further explained,

> The videos I sent were very specific to the teachers’ individual needs. If they needed just one little nuance of Google Classroom, I made a Screencastify video specific to their needs. Over the course of our seven days of preparation for Covid-19 distance learning, I trained teachers and made 25-30 videos, so teachers could reflect back when needed, and they’d have ‘How-To’ videos to share with students and families.

Gwen did everything she could to help teachers move beyond Substitution to ensure meaningful student learning during Covid-19 distance learning (personal communication, Gwen). After the study was completed, she stated, “I was thankful and grateful I was available to help. If I had been in the classroom, I wouldn’t have been able to help nearly as much” [RN; Gwen personal communication].

Gwen's job in the district was to serve the teachers as an instructional coach, but during Covid-19 distance learning, her load was consumed with getting the teachers up to speed because they were “underprepared” [PoS-G]; she explained, “All of the teachers were expected to use Google Classroom [rather than Seesaw] as the main source of communication during Covid19. But the teachers did not know how to use that daily. They only had “dabbled with it for potential

snow days" [RN; personal communication- Gwen]. The parents and teachers relied on Gwen for Seesaw help; however, lack of familiarity and consistent connectivity increased the parents' confusion for using Seesaw [personal communication- Gwen; RN] . The grades 2-3 teachers were overwhelmed and mostly decided to stay with Google Classroom/Meet and screen-casting apps.

Gwen felt she was successful in helping the teachers build confidence, overcome barriers, and pull off Covid-19 distance learning due to her engagement in various PLNs [personal communication, Gwen]. She also stated "I would not have been able to integrate Seesaw to the level I have without resources and ideas I've collected and shared with other educators over the years" [ProS-G]. In our last meeting together, Gwen shared that she had a lot of respect for the teachers because they worked hard to understand SAMR and were developing skills to integrate Seesaw and other apps more purposefully. She felt they were primed to reach Modification and Redefinition in their teaching practices. However, time constraints made it challenging to do so, as they needed to prioritize learning the new tools needed to orchestrate lessons during the pandemic. Moving forward, she noted that time and professional development in practical applications would be a critical component for teachers to actively engage students with technology not only in the regular classroom, but if online instruction would continue into the next academic school year [PoS-G; personal communication, Gwen].

Celeste

Second grade teacher Celeste had over 23 years of experience in the district, but she used very little technology in her classroom and lacked confidence in her digital teaching practices [PreS-C]. Celeste's showed characteristics of a late adopter or laggard (Rogers, 1962, 2003) and new digital learning tools led to fear and frustration for this seasoned teacher [PreS-C]. She was

especially resistant if a new digital learning tool had not yet proven to benefit her students [PreS-C]. When the district first introduced the Seesaw app to the teachers, Celeste stated that she had attended "a quick professional development lesson that went way too fast" and therefore, she did not adopt the app [PreS-C].

Perceptions: Celeste

Prior to professional development, Celeste had grown skeptical about technology professional development and would get frustrated and "shut down" [FG-C]. She also did not use apps with her students, nor did she know about the SAMR model because she did not have access to iPads, time, or training to do so [PreS-C]. She believed that the Seesaw application was aligned with best teaching practices and thought it would be a beneficial digital learning tool because of "all the great things you can do with it" [PreS-C]. Celeste told me that she came to this technology professional development experience hopeful that she would receive the support she needed; her goal was to gain insight into Seesaw and learn tips to become a more confident user in her Chromebook and Google platform [RN].

During the face-to-face workshop, Celeste stated that she had been connecting with her students' caregivers with Class Dojo, a communication app. Her frustrations regarding her mobile device surfaced almost immediately. She explained, "My Chromebook is a leftover...the oldest one in the district...It's actually an ancient piece of junk" (personal communication, February 22, 2020; RN). At the workshop, Celeste let me know that she needed a guiding voice and one-on-one, ongoing support when learning to use a new digital tool stating "usually at professional development, I don't get the support I need… I need a whole lot of hand-holding" (personal communication, February 22, 2020; RN). Knowing that she was far more likely to be successful if her concerns were addressed, I focused on boosting her confidence by sharing my

own technology reluctance and reassured her that she could do the same. I also used proximity to ensure that she didn't fall behind her peers, and providing troubleshooting as needed.

Evidence of Adoption: Celeste

After attending the workshop on the SAMR model, Celeste was relieved when she realized that she had already been applying both substitution and modification while "pushing out differentiated activities through her Google classroom" [RN]. I wrote in my workshop notes,

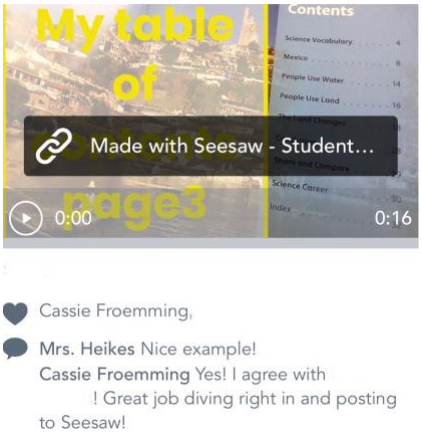
> … Celeste's perceptions appeared to shift and her fear began to subside a bit. Although she was hesitant to get started on the Seesaw stations, she quickly learned each tool and posted her products in Seesaw with relative ease...I was impressed that she reached out and asked for help in how she might apply SAMR into her classroom instruction using her student Chromebooks, the Google platform, and possibly even Seesaw [RN].

During the implementation period, Gwen and I offered Celeste guidance, resources, and encouragement through emails and texts at least once a week. Gwen provided face-to-face support while Celeste prepared to teach her first benchmark, which she needed an additional week to complete. She created an activity for teaching about Table of Contents in a language arts lesson. She integrated the Seesaw drawing, text, and recording tools and was pleased with how engaged her students were [TRB1-C].

After the first benchmark was completed, Celeste sent me an email stating that her students were "having a blast and were not afraid to experiment… they went crazy when they found out about using Seesaw. One student said, *this is so much fun!"* [DAE-C]. Later that day, Gwen sent me a text that said "Ooooh! Look at what Celeste just sent!" [DAT-G] A screen shot of Celeste's message stated "I am on cloud nine right now…I'm glad I jumped into this and got over my fear! My kids were so excited and we had fun together! I feel I could tackle this again!" [DAT-C]. Figure 7 shows Celeste's Table of Contents Teacher Reflection Benchmark 1 activity that she created with Seesaw tools and posted in the PLN.

Figure 7

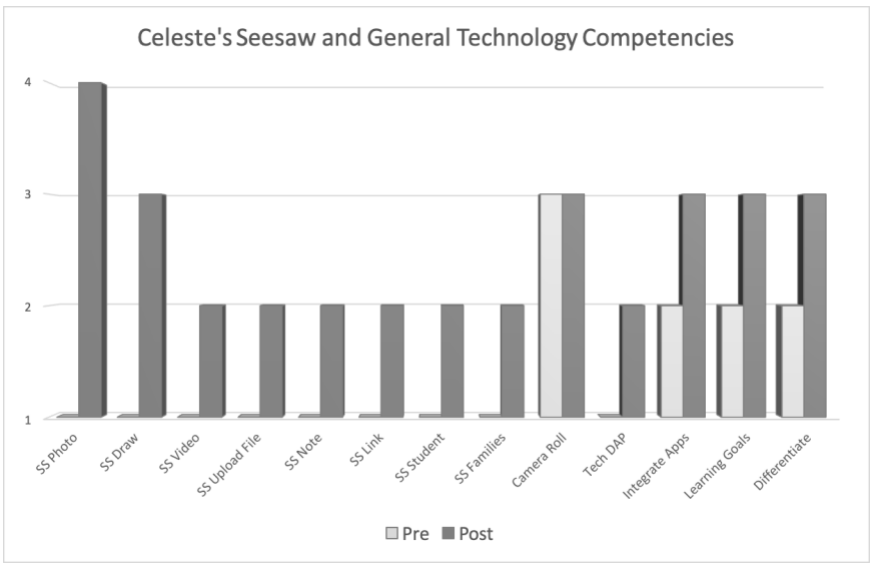
Celeste's Teaching Reflection Benchmark 1 Seesaw Activity Posted in the PLN



By the end of the workshop, Celeste showed empathy in my own struggles with technology. She noted that this helped overcome her own negative perceptions regarding technology in the classroom; she envisioned using what she learned at the workshop and was excited to get to work [RN]. Figure 8 depicts evidence of Celeste's growth in her overall use of Seesaw tools and general technology competencies.

Figure 8

Celeste's Seesaw and General Technology Competencies Pre- and Post-Intervention Surveys



Evidence of Integration: Celeste

During my final check-in, Celeste was especially proud of her SAMR growth [RN]. For the Teacher Reflection Benchmark 2, she integrated different apps such as Google Forms, Screencastify, and the Seesaw recording tool for her reading and math lessons. She focused on using the tools to differentiate instruction, independent practice, and formative assessment. Celeste's integration of Seesaw gave her students an opportunity to share their work with classmates; the recording and note tool was used to provide student feedback [TR2-C, PoS-C].

Overcoming Challenges: Celeste

Celeste witnessed increased student engagement. As a result she demonstrated a new-found sense of confidence and motivation. This was what she needed for overcoming what she saw as lack of equity regarding her obsolete device, and also for tackling Covid-19 distance learning during the pandemic [PoS-C]. When planning her Teacher Reflection Benchmark 2 activity, she faced major obstacle while using Google Web Cam. She had planned to link a recorded video to Google slides in the morning announcements, but the video failed to record [TRB2-C; RN]. Celeste reached out to Gwen for troubleshooting assistance. With a little help, Celeste was satisfied with the activity, which is shown in Figure 9 [DA-C&G; TRB2-C].

Figure 9

Celeste's Announcements Recorded with Google Web Cam Link in Google Slides for Teacher Benchmark Reflection 2

,

Celeste was proud of all that she had overcome and had accomplished during the study [PoS-C]. She noted in her second benchmark reflection,

> I made four google assessments yesterday without hesitation. I just jumped right in and said, *I'll do it! I'll figure it out!* It felt really good...I am learning every day through [Covid-19] distance learning. I could only send emails before, but now I know how to create Google folders and drag info into them to keep my drive organized and also for the assessments I created [TR2-C].

In addition, Celeste found value in the new tools because they provided opportunities for communication, critical thinking, creativity, and collaboration amongst her students and families [PoS-C, FG-C]. She noted that she was appreciative because she was less fearful,

> I really appreciated the one to one help. I learn best myself by doing, so the step by step guidance and then trying it again in the break out stations. My hardest issue is also coming up with lessons. I really appreciated being told and learning about all the lessons that are already created for teachers. This helped make it not so overwhelming to me and an easier task to tackle. I feel like I need to jump in more and not be so afraid… This is just a start and a huge step forward for me. Thanks for giving me the push I needed. It is not as scary as it seems [PoS-C].

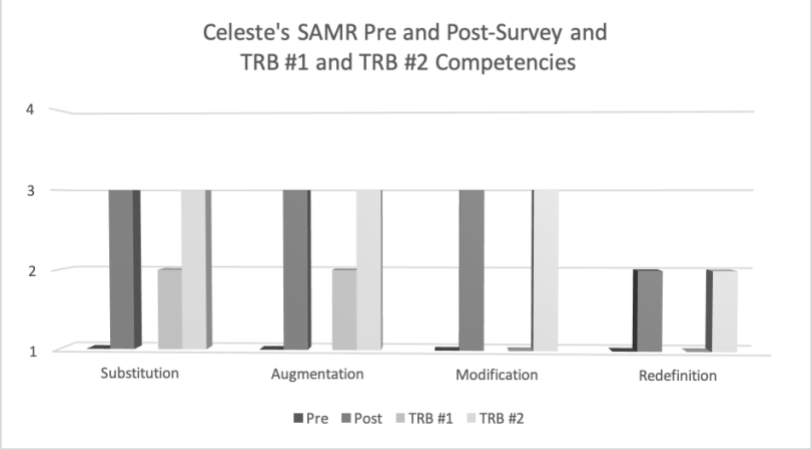
In the post-intervention survey, Celeste confided that she was not always engaged during the workshop because she occasionally found that the pacing was too fast and it was hard for her to keep up with her more experienced peers. She also thought the day was a bit long, but the one-on-one support, modeling, stations, and step-by-step directions were key to her success in learning how to integrate Seesaw, apply SAMR to her activities [PoS-C]. . Most importantly, she became more motivated to take on new digital learning tools to ensure the continuation of student learning during the pandemic [PoS-C]. When regular school resumed, Celeste claimed that she was "looking forward to learning more about the activities (Seesaw) library… and would like to try some breakout sessions with the technology specialist" [PoS-C]. Overall, Celeste's

comfort level had increased as well as her awareness of using digital learning tools to promote higher level thinking [PreS-C; PoS-C].

Celeste initially had reported that she had never heard of SAMR [PreS-C]. Following the professional development experience, she was learning and still developing her ability to create Redefinition activities, but was now proficient in the application of Substitution, Augmentation, and Modification [TR2-C, PoS-C]. Celeste believed that the Teacher Reflection Benchmark tasks, as well as each element designed into the professional development contributed to her increased comfort level and overall success in technology integration[PoS-C]. Figure 10 shows evidence of Celeste's growth through her SAMR Teacher Reflection Benchmarks 1 and 2 and evidence of purposeful integration through her SAMR pre- and post-intervention survey data.

Figure 10

Celeste's SAMR Competencies in Pre- and Post-Intervention Survey and Teacher Reflection Benchmarks 1 and 2

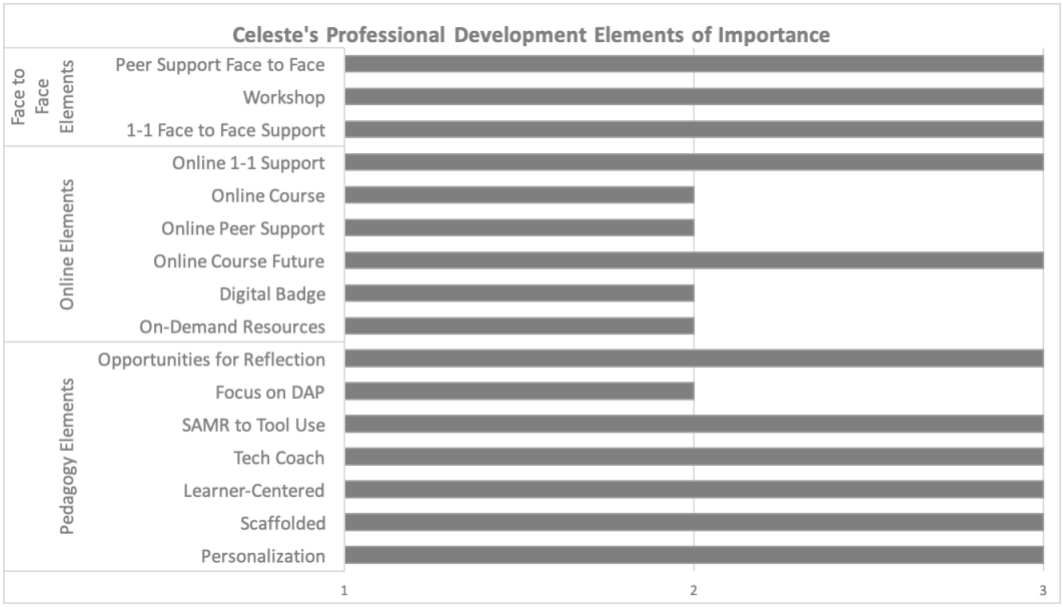


Despite the obstacles that Celeste reported, she endorsed this professional development experience and stated, "I really hope schools realize the importance of meaningful professional development for their teachers" [PoS-C]. It was apparent that Celeste benefited from a combination of professional development elements [RN]. She reported the pedagogy, online, and

face-to-face elements of professional development that were most important in helping her to overcome obstacles and negative perceptions as shown in Figure 11. [PoS-C].

Figure 11

Celeste's Professional Development Elements of Importance in the Post-Intervention Survey



How Changed: Celeste

Celeste changed her digital teaching practices by overcoming her fears and frustrations because her concerns were addressed and she felt she had the support she needed. At the end of the professional development experience, it was evident that Celeste's frustrations and fears shifted to a sense of pride and appreciation – not only for the adoption of digital learning tools that ensured student learning during the pandemic, but also for professional productivity, and in her awareness of higher levels of technology use as prescribed by SAMR.

Elements That Facilitated Change: Celeste

Elements of the professional development that were most important to her learning included small groups, scaffolding, modeling, examples of SAMR activities, step-by-step

instructions, one-on-one support, online support, and face-to-face interaction [PoS-C]. Celeste was especially appreciative of the one-to-one, face-to-face support that she received from Gwen, the in-house technology coach [FG-C]. Beyond the elements intentionally addressed in the intervention, Celeste identified effective elements: varied pacing according to needs of participants, empathy with my own reluctance, expressed alignment between best-practices and technology integration, learning the technology with her students, increased student engagement, modeling, opportunities for practice at stations, and Teacher Reflection Benchmark tasks.

Ayla

Third grade teacher Ayla, had been in the district for nine years. She showed signs of being a late adopter or laggard (Rogers, 1962, 2003), especially regarding Seesaw; she claimed that she was "definitely a beginning user of technology in the classroom, and would like to be more comfortable with this" [PreS-A]. Her pre-intervention survey revealed that she had been using Chromebooks with her students primarily for integrating reading and math skill reinforcement software such as Freckle and XtraMath. Like Celeste, Ayla believed Class Dojo already met her needs for parent communication and behavior management [PreS-A]. Ayla had some previous knowledge of SAMR and hoped that her participation in this study might inspire her to become more comfortable integrating apps and devices more meaningfully into her instructional plans [PreS-A; RN].

Perceptions: Ayla

Prior to the professional development, Ayla expressed concern regarding unreliable technology, poor internet connectivity, and lack of time for learning the features of new digital tools [PreS-A]. She did not feel previous professional development experiences provided the support she needed and was motivated knowing that in this professional development

experience, she would receive training and additional support [PreS-A]. My plan for Ayla, was to focus primarily on the practical application of SAMR. I wanted her to be able to envision how Seesaw could be used in tandem with SAMR, as well as her Chrome platform, Class Dojo, and other applications [RN].

Throughout the workshop, Ayla was consistently engaged in conversations with the whole group, but was slow to getting started with exploring the Seesaw tools during stations; she mentioned the she didn't like the sound of her "own recorded voice" [RN]. But once she started, she became more comfortable [RN]. Ayla was successful in meeting the learning objectives presented at the workshop [RN; DA-A]. When the SAMR activities were introduced, her comments demonstrated a conceptual understanding of the hierarchical levels for deeper learning. This was evidenced when she shared creative ideas for how the teachers could apply SAMR in their own classrooms using video recordings and YouTube [RN]. With SAMR, Ayla was quick to conceptualize how to integrate technology more purposefully.

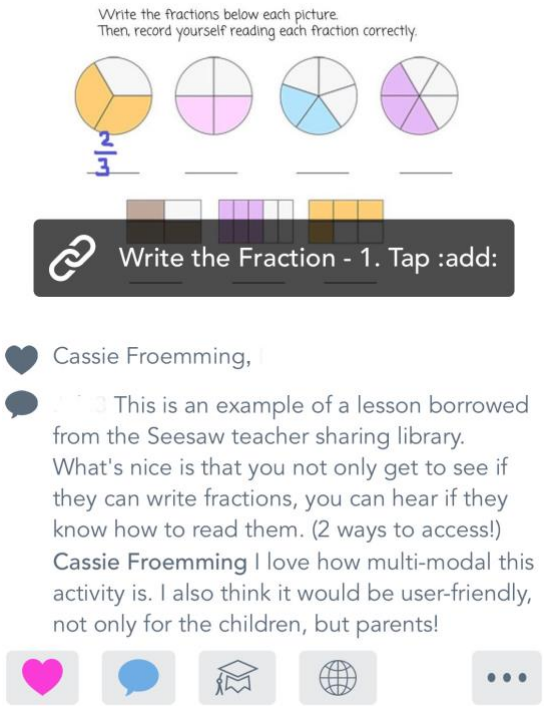
Evidence of Adoption: Ayla

Ayla evidenced her success with Seesaw and SAMR at the workshop, but during the six-week implementation period, she was minimally engaged in the PLN, my weekly check-ins, and did not complete her Teacher Reflection Benchmark 1 [RN]. Although she had planned and shared her first Teacher Reflection Benchmark 1 activity in the PLN, she ran out of time to teach it due to the COVID-19 school closure [PoS-A].

Ayla's math lesson on fractions came from the Seesaw activities library. She only had time to introduce the Seesaw photo, drawing, and audio and video recording tools to her students. She also noted that she only some of the students had time to try the tools [DA-A; PoS-A]. Figure 12 shows Ayla's use of the Seesaw for a math activity that she shared in the PLN.

Figure 12

Ayla's Teaching Reflection Benchmark 1 Posted in the PLN



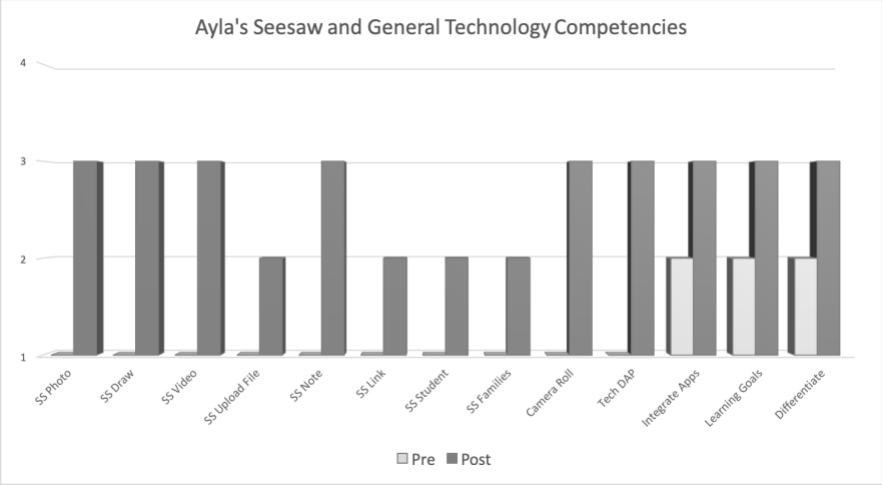
Ayla believed the Seesaw app aligned with best practice and thought it would be beneficial for various reasons, such as the multi-modal opportunities for formative assessment, skill building, communication, and sharing [PoS-A, FG-A]. She could envision using the app in other content areas and stated, “I was planning on having students modify in some way for their solar system project” [PoS-A]. Some of the new educational technologies that Ayla adopted throughout the course of the study included using Google slides, and Google meets, as well as screen, audio, and video recorders [DA-A; TR-B2-A; PoS-A].

Despite Ayla’s initial hesitation to use the audio and video recording tools modeled and practiced at the workshop, it did not hinder her use of Seesaw tools with her own students [RN]. Throughout Covid-19 distance learning, she used the video recording tool in Google Classroom

for making daily announcements for her students. Ayla showed growth in her overall use of Seesaw and general technology competencies, which is shown in Figure 13.

Figure 13

Ayla's Seesaw and General Technology Competencies Pre- and Post-Intervention Surveys



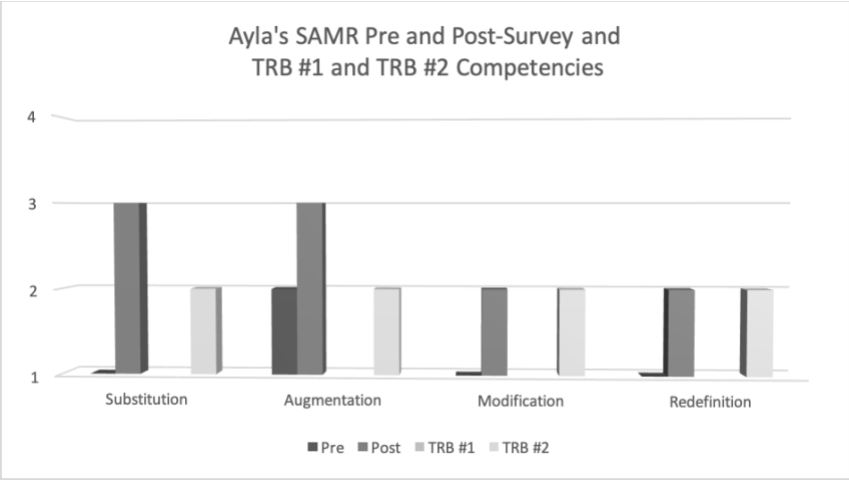
Evidence of Integration: Ayla

Ayla grew in her SAMR competencies over the course of the professional development experience. She self-reported that her SAMR focused competencies were "moving toward proficient" [TRB2-A]. Throughout Covid-19 distance learning, Ayla became familiar with other new technologies.

One of the technologies Ayla learned included embedding Screencastify recordings into Google Classroom for making daily announcements for her students. She did not report her SAMR competencies for Teacher Reflection Benchmark 1. However, her SAMR awareness and growth was evidenced in her Teacher Reflection Benchmark 2 and pre-and post-intervention survey data as shown in Figure 14.

Figure 14

Ayla's SAMR Competencies in Pre- and Post-Intervention Surveys and Teacher Reflection Benchmark 2



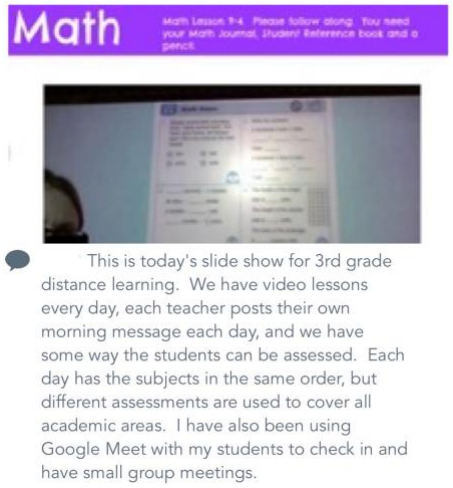
Ayla was clearly aware of the different SAMR levels, however, all of her Covid-19 distance learning plans were predominately Substitution activities [PoS-A; RN]. She shared a Google link with me to view a typical Covid-19 distance learning day, which consisted of 43 different Google Slides filled with hyperlinks to reinforcement software skill building activities, videos of the teacher using worksheets in front of the Smartboard, fill in the blank forms, and general announcements [DA-A]. The slides were created in collaboration with Ayla's grade level team and pushed out to the students through the Google Classroom platform [TRB1-A].

Gwen recognized Ayla and her grade level team for their hard work and efforts in preparing and delivering Covid-19 distance learning, but she also shared her deep concerns about the state of their digital teaching practices [DA-G; RN]. Gwen was especially concerned that there were too many slides made for young children and the activities were merely substituting what would take place in the regular classroom [DA-G; RN] Her email stated, "I would like to really rethink how some teachers are delivering their work. Some are teaching as if they're still

in the classroom, and their lessons are too long for [Covid-19] distance learning" [DA-G]. Ayla's Google slide in Figure 15 is an example of Substitution in a pre-recorded teacher-directed lesson with a worksheet and a Smartboard in the classroom [DA-A].

Figure 15

Ayla's Pre-Recorded Math Video Lesson Showing a Worksheet on the Smartboard for Teacher Reflection Benchmark 2



Overcoming Challenges: Ayla

After trying Seesaw with her students, Ayla felt more positive about using the app with her students [PoS-A]. The scaffolds built into the professional development workshop helped her to overcome her reluctance to use recording tools, which in turn she integrated into instruction with the students [TRB2-A; PoS-A; RN]. Not only did she feel it would be beneficial to use Seesaw during learning stations for reading and math, she was considering the adoption of this "powerful teaching tool" in the new academic school year [PoS-A].

Ayla demonstrated acceptance of Seesaw for future instructional use and a deep awareness of purposefully integrating various new technologies for prompting higher order thinking as prescribed by SAMR. Even though Ayla relied heavily on her grade level team, she

requested a second professional development session to explore Seesaw's features more in depth [PoS-A]. This implied her acceptance and integration of the Seesaw app.

How Changed: Ayla

Data showed that modeling and the practical application of the Seesaw recording tool was an important influence on Ayla's digital teaching practices. This created a bridge to her successful adoption and integration of other recording features in different applications, such as Google [PoS-A]. Ayla's data pointed to a change in her digital teaching practices, despite being content with the digital tools that she preferred to use prior to the professional development.

Change was evidenced by her acceptance of Seesaw, SAMR growth, and her awareness of using purposeful technology integration as a result of the professional development. Her expanded digital teaching tool-kit, adoption of Seesaw, and newfound awareness of SAMR proved to be beneficial, but to ensure the continuation of learning during the pandemic, she relied on her grade level team to plan and deliver activities predominately aligned with Substitution [PoS-A; TRB2-A; RN; DA-A; DA-G].

Elements That Facilitated Change: Ayla

Overall, Ayla positively received the professional development experience. She noted that the professional development met her teaching and learning needs [PoS-A]. The practical application of the tools and peer support surfaced as a major contributing factor to Ayla's satisfaction and success in the professional development [FG-A]. According to Ayla there were key professional development elements that influenced her shift toward accepting new technologies and in her awareness for integrating the tools more purposefully.

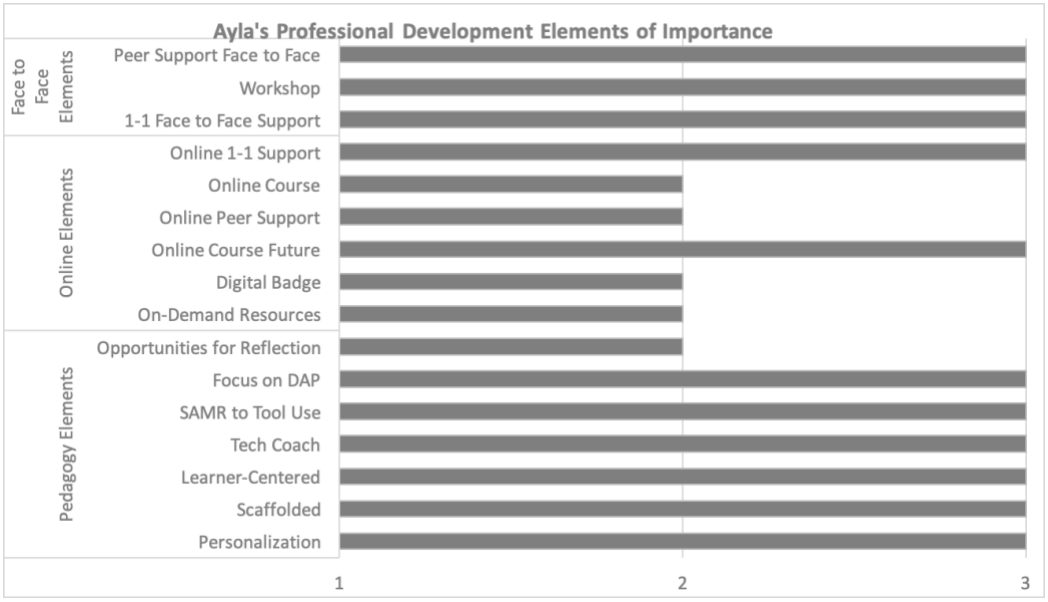
The elements that Ayla found most important to her learning included all the face-to-face support elements, the use of the online course for future reference, one-on-one online support, an

in-house technology coach, learner-centeredness, scaffolding, personalization, a focus on developmentally appropriate practice, and applying SAMR to tool use.

Beyond the elements intentionally addressed in the intervention, Ayla identified two effective elements: Alignment between technology integration and best practices, and practical application. The professional development elements that she identified as most beneficial to her learning are depicted in Figure 16.

Figure 16

Ayla's Professional Development Elements of Importance in the Post-Intervention Survey



Kain

Kain and Ayla team-taught a third grade class [RN]. Kain noted in the pre-intervention survey that he too, was using XtraMath and Freckle for differentiation and the reinforcement of skills such as math facts and reading fluency, and he also had been using Class Dojo for parent communication and behavior management [PreS-K]. Kain was satisfied with Class Dojo, but unlike Ayla, he was interested in learning about Seesaw and hoped to integrate the app into his classroom instruction [PreS-K]. Kain appeared to be an innovator (Rogers, 1962, 2003) when

adopting new technologies. One of the reasons Kain had not yet adopted Seesaw was because he "needed more training to modify and redefine technology integrated activities", and in this professional development experience he hoped to learn ways to overcome the limitations at his school "as far as type and number of devices" [PreS-K].

Perceptions: Kain

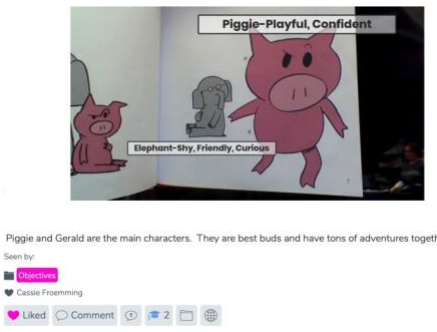
Kain explained that as a life-long learner, he enjoyed using technology both personally and professionally, and was "motivated to use technology to engage students" [PreS-K]. He saw promise in the multi-modal, child-friendly, Seesaw app [PreS-K; RN]. He believed the app was aligned with best practice, had potential to inform his planning and instruction, provided students with timely feedback, and provided the platform to allow his students to share their work with families, which in turn, could increase "student motivation" [PreS-K].

Evidence of Adoption: Kain

At the workshop, it was evident that Kain was a positive leader in the group [RN]. He jumped right into the Seesaw stations and got to work. He fully embraced the app and was successful at achieving each learning objective. Kain appeared to be a natural while using the Seesaw tools. He used the text box tool and recording tool to write adjectives to describe the characters in a book as shown in Figure 17 [RN; DA-K].

Figure 17

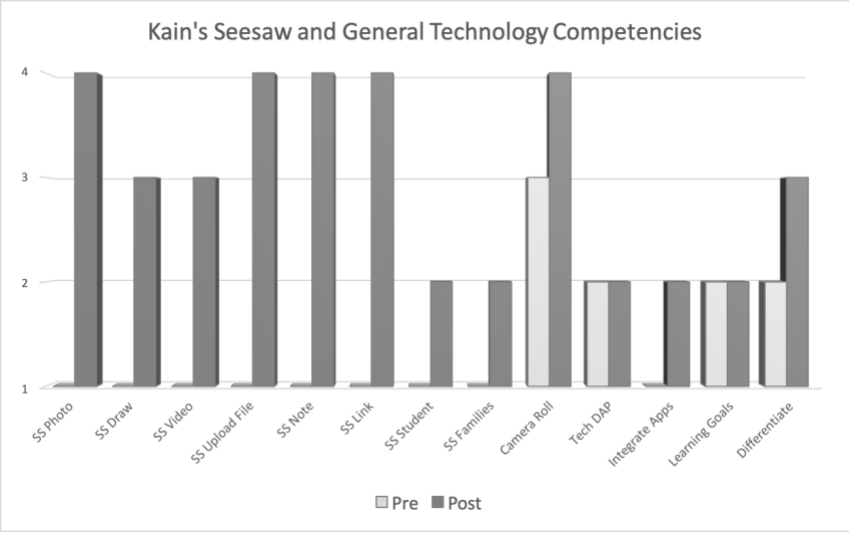
Kain's Use of the Seesaw Text Box Tool During Stations at the Workshop



During the implementation period, Kain noted that he had a positive experience using Seesaw with his students because of their high level of engagement [TRB1-K]. Kain integrated the drawing and recording tool into a math fractions lesson, which was quite similar to the activity that Ayla posted [TRB1-K]. Although Kain found Seesaw to be invaluable, he did not continue using the app for Covid-19 distance learning for two reasons. First, he was careful not to "overload" his families by introducing another communication tool, and second, school leaders asked the grades 2-3 to push out assignments and communicate with their students and families using the Google Classroom platform [PoS-K]. Overall, Kain showed evidence of adoption of Seesaw. He also was able to select and use appropriate new technologies to meet the needs of his students. This is evidenced in his self-reported Seesaw and general technology competencies shown in Figure 18.

Figure 18

Kain's Seesaw and General Technology Competencies Pre- and Post-Intervention Surveys



Evidence of Integration: Kain

Kain used Google Classroom during Covid-19 distance learning rather than Seesaw, [TRB2-K; RN]. He decided to integrate Flipgrid for his second activity as shown in Figure 19. He was "very pleased" with the high level of "consistent student engagement" while using Flipgrid [TRB2-K]. He stated that his "students could see videos quickly and respond making it feel like a conversation you would have if you were in the same room together" [PoS-K]. Kain also said, "the biggest thing it [the professional development] has changed, is how I think about analyzing my technology use. I'm becoming more aware of the need for integration and how to use it in my lessons." [PoS-K]

Figure 19

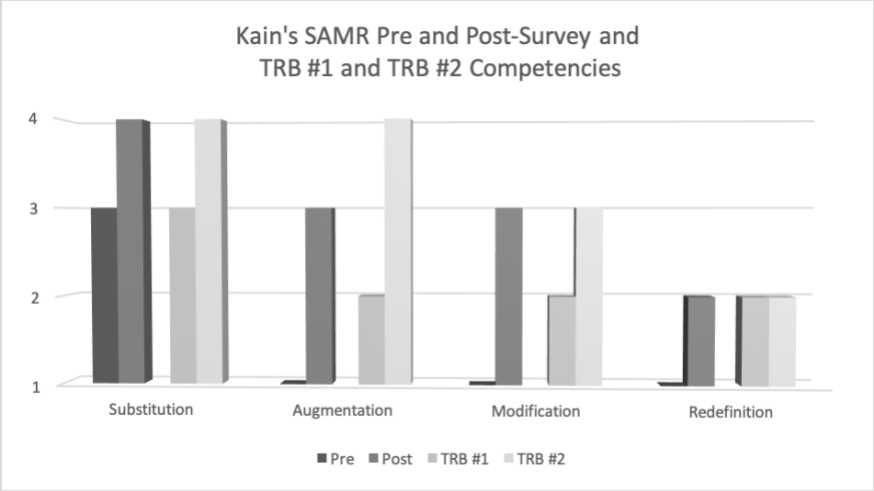
Kain's Flipgrid Modification Activity Posted in Seesaw for Teacher Reflection Benchmark 2

Kain was very reflective as he considered what was working or not working in his online teaching and what he might need help with. He explained "I need to look at my current practices for the things that I'm doing now. Which parts of my school day lend most easily to technology? Which of these subjects will be enhanced the most by using technology? How can I do a better job of assessing student work using technology? All of these questions will help me understand what I need to accomplish for my educational goals with my students" [TRB2-K].

Evidence of change was captured through Kain's SAMR growth in his self-reported Teacher Reflection Benchmark 1 and 2, and the pre and post-intervention survey data as shown in Figure 20.

Figure 20

Kain's SAMR Competencies in Pre- and Post-Intervention Survey and Teacher Reflection Benchmarks 1 and 2



Overcoming Challenges: Kain

During Kain's first benchmark activity, Kain said "my familiarity with learning the tools and features in Seesaw helped me anticipate potential problems the students may have" [TRB2-K]. Challenges he faced during planning and teaching remotely were described by Kain as "missteps" in communication with families about online start times, consistency in assignments, and ambiguity with assessments. [TRB2-K; PoS-K].] As for components directly related to the study, he stated, "Our timeline was delayed due to [Covid-19] distance learning. It was a huge problem and I was very appreciative to have Cassie to work out the issues" [PoS-K].

When asked what Kain may still need for integrating Seesaw and SAMR purposefully, he claimed that he would have benefited from having even more time for stations, and also

"modeling for assessing technology integrated activities" [PoS-K]. Kain especially liked seeing what his peers were doing in the PLN and learned from their examples [PoS-K]. Kain found PLNs to be a "great place to find answers to questions his colleagues can't answer" [FG-K]. He explained,

> I really like the concept of a PLN. I need to continue to get in a rhythm of interacting and responding with PLNs. Anytime I want to use Seesaw, I will go back to the Seesaw PLN to get ideas and information. Twitter PLNs are where I tend to go to more often. I don't know why I am more consistent with Twitter. It could be that I am in a better habit of checking Twitter as I read it for entertainment as well [FG-K].

How Changed: Kain

As a team-oriented, lifelong learner, Kain was open to technology adoption and integration, and was a positive influencer in the group [RN]. According to Gwen, he was "in a state of constant change and constant learning. John Maxwell says '*Change is inevitable. Growth is optional'...* with Kain, he continues to not only grow, but he will go out and teach others as a teacher to other teachers" [RN; personal communication with Gwen]. After the professional development Gwen reached out to enthusiastically share how impressed she was that Kain took the initiative to learn about new tools that would improve his teaching. Gwen shared in a private message that she had been having issues identifying an adequate replacement for the district's soon to be obsolete Smartboards, and she was thinking the Kami tool might be a viable solution. She stated,

> Kain had not heard of [Kami], so I had him install it on his desktop computer. He anxiously pulled up a Google slide that he uses often with his students for math. We tested a couple of theories that I wanted to make sure would work, and they did!! We were both thrilled with the results, knowing the other teachers would also be excited. Kain asked what else I had for tools. I explained that I had another tool similar to Flipgrid's whiteboard, called JamBoard, which is a Google product. I gave him a few examples of how it could be used in a Google Meet. Kain began listing off several more examples of other ways it could be used, similar to how we'd thought of using the whiteboard in Flipgrid. You could see the wheels turning in his head!!

The professional development experience provided Kain with the skill set he desired for understanding the features of Seesaw. This further strengthened his approach when integrating new digital learning tools into his instructional practices, such as using Flipgrid, Google Docs, Slides, and Forms for communication and differentiation.

Elements That Facilitated Change: Kain

Overall, Kain approved of the professional development experience and stated, "Anyone interested in using Seesaw will gain a lot of knowledge by participating in this workshop" [PoS-K]. Kain felt that several factors contributed to his progress in meeting his professional goals. For example, he claimed that workshop pacing was "just right. It was a long day, but any faster and it would have been hard to follow. But I used the Articulate course to keep things organized and clear" [PoS-K]. Kain also noted the importance of prioritizing learning in smaller, more manageable chunks of information [PoS-K].

Kain was team oriented and he consistently expressed his appreciation for peer interaction both face-to-face and online in his grade level PLN and the PLN designed into this study [RN; PoS-K; FG-K]. Kain appreciated the individualized, personalized professional development experience, a supportive grade level and technology support team, an in-house technology coach, and access to online experts in this PLN and other PLNs "when there are no answers" [PoS-K; FG-K]. Kain believed that there were "plenty of people to go to for help" [FG-K].

During Covid-19 distance learning, Kain valued "team orientation" and especially the support from his grade level team because they were "all in the same boat" [FG-K]. Gwen noted that Kain "had the growth mind-set" needed to add to his digital learning repertoire by "seeking out even more tools to learn about and integrate with his students" [DA-G; RN]. Kain was a

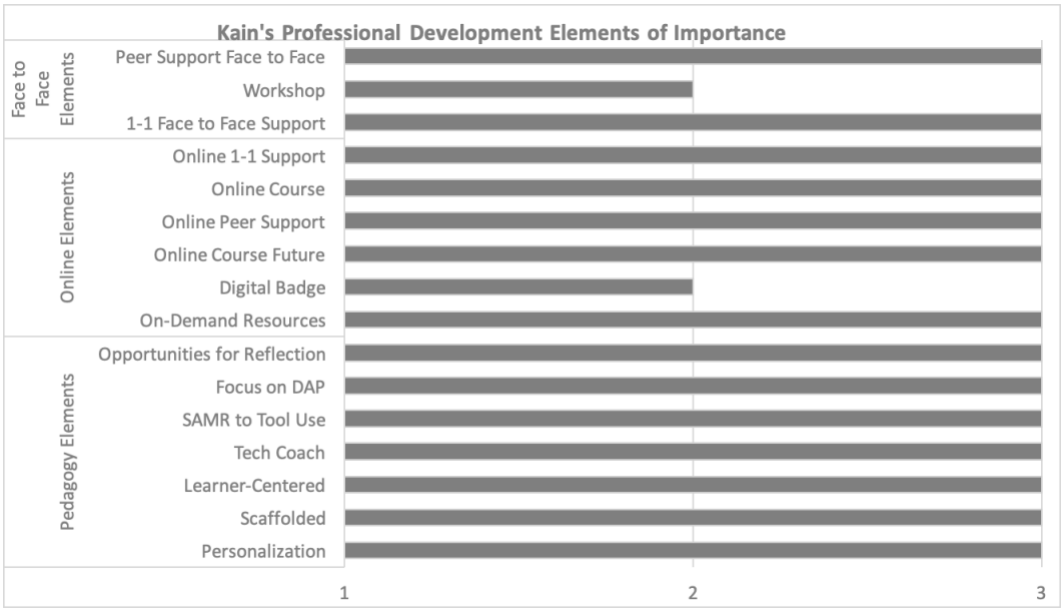
positive influencer, and a team-oriented individual with a growth mindset. He benefited from having Gwen as an in-house technology coach [RN; DA-G], as he and Gwen and had mutual trust [RN]. Gwen's tapped into Kain's prior understanding of familiar apps such as Flipgrid; she then linked what Kain knew to the new technology when teaching him about Kami. He quickly conceptualized how to use the new tool.

Beyond the elements intentionally addressed in the intervention, Kain identified effective elements: modeling, stations, practical application, learning in smaller chunks, being motivated by students' high level of engagement, team orientation, trust in Gwen, and empathy for colleagues.

The key professional development elements identified for helping Kain meet his professional goals are shown in Figure 21.

Figure 21

Kain's Professional Development Elements of Importance in the Post-Intervention Survey



Tia

Tia was an early adopter (Rogers, 1962, 2003). She had been teaching kindergarten for nine years in a different building than Celeste, Kain, and Ayla [PreS-T]. Tia used iPads and Chromebooks in her classroom and integrated apps and software programs such as Teach Your Monster to Read, Handwriting Without Tears (HWT), and Seesaw into her instructional plans [PreS-T]. Tia primarily used the Photo tool in Seesaw for the purpose of showing parents "evidence" of student work during station time [PreS-T]. She volunteered to become a participant in the study so she could learn more about Seesaw and SAMR stating "I am very willing to learn, but technology is not my strength!" [PreS-T].

Perceptions: Tia

Prior to the professional development, Tia had already adopted Seesaw and had a positive perception toward technology in general [PreS-T; PoS-T]. At the workshop, Tia worked through the stations with ease [RN]. Yet she indicated that she was not confident in her ability to integrate technology into her instructional plans and claimed it was "scary" and out of her "comfort zone" [PreS-T]. Tia had concerns regarding the limited life span of digital learning tools and the time it took to learn the "ever-changing tools" [FG-T; RN]. Since Tia was already familiar with Seesaw, I wanted to be sure she would get the most out of the professional development experience [PreS-T; RN]. I aimed to spark her interest by introducing new apps and provide many examples of activities aligned with SAMR while drawing upon her prior knowledge of Seesaw [RN].

Evidence of Technology Adoption: Tia

According to Gwen, even though Tia was an early adopter of the Seesaw app, she would still benefit from the professional development. Tia also thought she had room for growth and stated, **"**I know that there are ways to have 'work' for each student ready to go, but I haven't

done that yet." [PreS]. Tia had primarily been using the photo tool for parent communication [PreS-T]. Eventually, she started using all the tools for student assignments, such as the recording tool, drawing tool, posting videos, and communicating with peers [PoS].

In Tia's first benchmark activity, Tia showed evidence of leveraging the app for differentiation purposes [TRB1-T]. Her Seesaw activity consisted of a whole group cloud lesson that she taught on a "windy day" followed by Seesaw stations; rather than just having her student use the photo tool, they also used the drawing and recording tools that she had been comfortable using [TRB1-T]. Tia's Benchmark Reflection 1 demonstrated her application of redefinition using the Seesaw tools which she posted the PLN and then into the blog as shown in Figure 22.

Figure 22

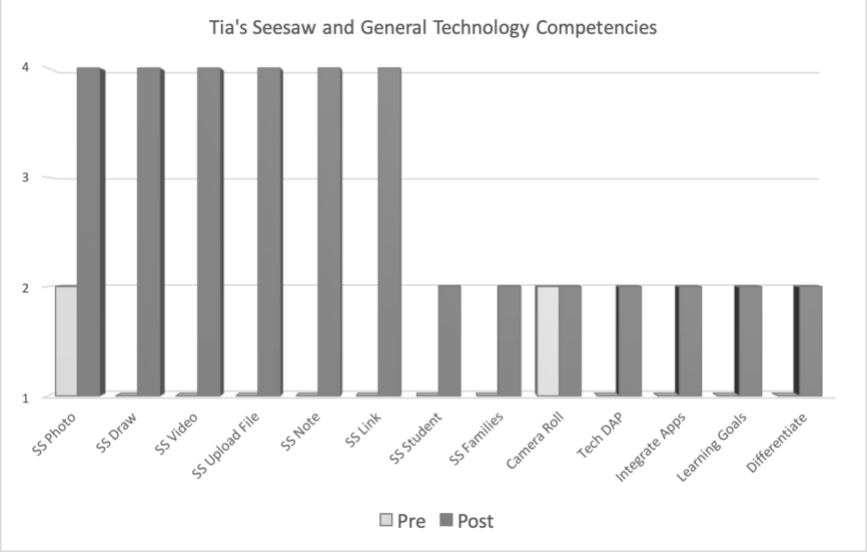
Tia's Teacher Reflection Benchmark 1 Shared in the PLN and Blog

Following the professional development, Tia utilized the full range of tools and took pride in learning "how to create more activities of my own by using the tools in Seesaw" [PoS]. In a private reflection, when asked, What might you still need to be successful integrating Seesaw and SAMR?, she responded, "at this point I feel pretty confident" [TRB1-T].

Tia demonstrated confidence and a growth mindset. It was evident at this point in the professional development experience that she was a life-long learner [RN]. Tia's progress toward adoption is illustrated in Figure 23.

Figure 23

Tia's Seesaw and General Technology Competencies Pre- and Post-Intervention Surveys



Evidence of Integration: Tia

Throughout the implementation period, Tia was engaged in the PLN and demonstrated her success in understanding SAMR through her examples of the activities she posted in Seesaw and through her Teacher Reflection Benchmark 1 and 2. She continued to use Seesaw to differentiate activities for her students [TRB1-T; TRB2-T]. Regarding her second benchmark activity, she stated, "I offered several steps for the activity but not all of them needed to be completed. I knew that some students would be able to complete one or two parts while other students would like more to do so that was an option" [TRB2-T].

Tia explained that she was pleased with her students' engagement in the Seesaw activities, "I could hear them reading the sentence and many times their voice was excited or

laughing. I also asked some children questions about their drawing or what they added and they were able to give me feedback" [TRB2-T]. Tia found that the added benefit of using Seesaw was that her students and parents were familiar with Seesaw prior to Covid-19 distance learning, which "allowed for an easy transition…Seesaw is so user friendly and easy for parents to navigate" [TRB2-T]. Figure 24 shows the activity that she created and posted in the PLN.

Figure 24

Tia's Teaching Reflection Benchmark 2 Activity Evidencing Use of Seesaw and SAMR

Published to Blog

(from blog) How fun! I liked the element of suspense when the student used their QR code!

(from blog) This is a really cool idea! Great way to integrate more uses of technology!

(from blog) This would also be great for a jigsaw activity. Peeking in on your blog is making me want to do more with Seesaw!

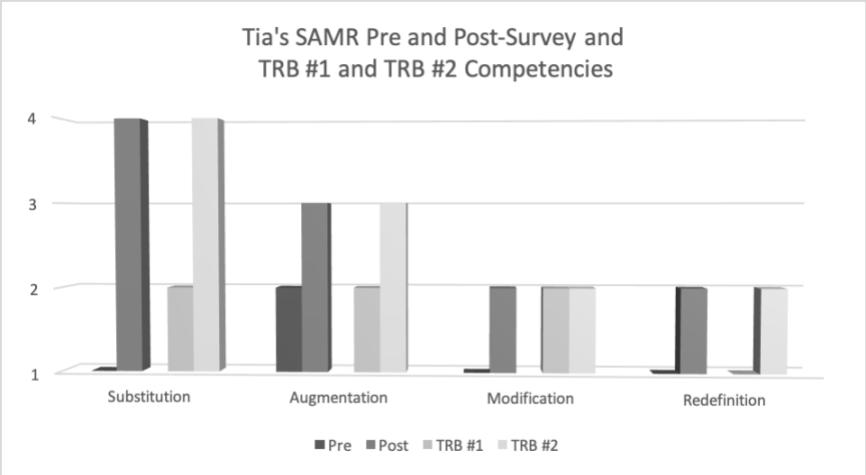
Cassie Froemming There are so many possibilities for educators to use Seesaw with all ages and content areas! Plus, there are ready-made lessons (designed by real teachers) embedded right into the app's activity library.

Tia applied Augmentation when planning her Seesaw learning stations where students listened to stories and then rated how they liked the story "using smiley faces" [Pos]. However, she argued that Modification and Redefinition activities were "a little too advanced for my

students" [PoS-T]. Yet she still demonstrated that she was beginning to conceptualize how she might one day integrate technology at higher levels in her classroom [RN]. In Figure 25, Tia shows evidence of SAMR growth.

Figure 25

Tia's SAMR Competencies in the Pre- Post-Intervention Surveys and Teacher Reflection Benchmarks 1 and 2



Overcoming Challenges: Tia

Throughout the entire professional development experience, Tia noted that her biggest challenges were due to time constraints [PreS-T; TRB1-T, TRB2-T, FG-T, PoS-T]. Yet she found benefit in the professional development experience, "I really appreciated being reassured that technology is great and you can do little bits at a time. The workshop also reminded me that taking on something out of my comfort zone is scary but very beneficial!" [TRB1-T].

Tia articulated that she learned best with others and would have liked even more time to practice how to create Seesaw activities and trying some of the apps to app smash [PoS-T]. Tia was able to overcome some of her challenges with a bit of reassurance; she affirmed this by stating, "Cassie, thank you for being a cheerleader me! I am so thankful that I am now more

comfortable with several apps that I can use every day with our distance learning. Your reassurance during the study was priceless" [PoS-T].

How Changed: Tia

Findings revealed that Tia began integrating the Seesaw app for differentiation purposes as well as parent communication and student engagement. She also stated that she would appreciate further support in "trying some apps to app smash" [PoS-T]. Overall, she endorsed the professional development experience and understood how to integrate technology more purposefully.

During the focus group, Tia explained that she felt the challenges brought about by rapidly changing digital learning tools were analogous to a "revolving door"- but the constant ingredient that she needed in order to overcome these challenges included having time to explore the new digital learning tools, collaboration with other educators, and a sense of team support [FG-T]. She stated "I was able to learn more about SAMR and now I can use it when I plan activities for my students. [PoS]. After the professional development experience, Tia had a newfound confidence for differentiating instruction with Seesaw and a deeper understanding of integrating digital learning tools more purposefully.

Elements That Facilitated Change: Tia

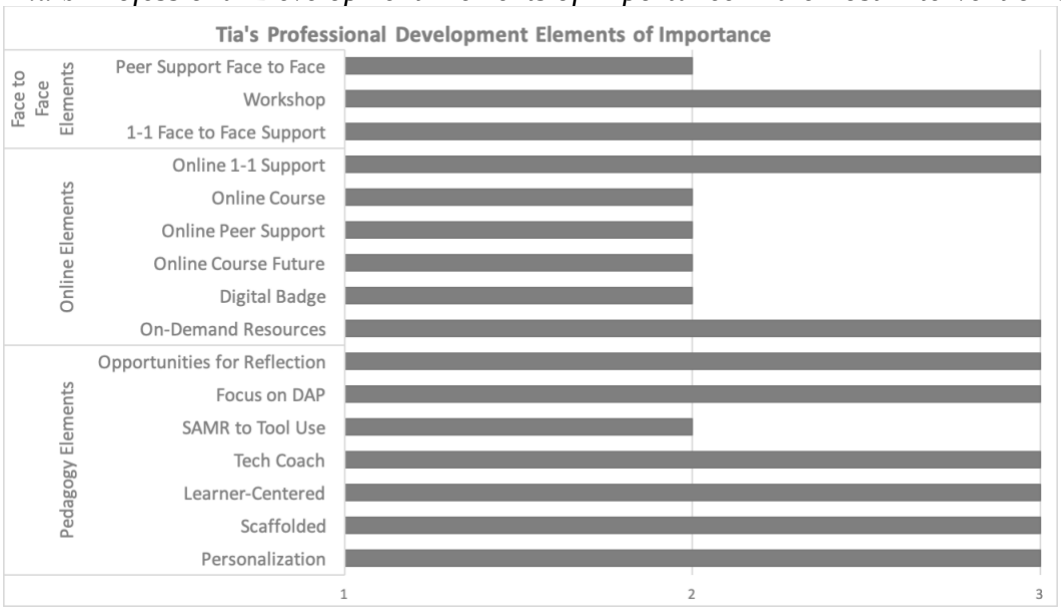
At the professional development workshop, I was transparent with the teachers about my prior reluctance to integrate technology in the classroom and how I overcame the challenge. As with Celeste, my prior reluctance had an impact on how Tia approached integrating technology in her own classroom [PoS-T]. She stated, "Cassie was a perfect example for me. She was honest about her beginning experience with technology. She became comfortable with applying new apps and that made me feel that I could have some success integrating technology into my

classroom" [PoS-T]. Tia especially benefited the feedback she received from not only Gwen and I, and her peers as well [PoS-T]. Although Tia desired even more time for peer collaboration and exploration of the new digital learning tools, she still believed in the professional development contributed to her learning [FG-T]. She also appreciated Gwen, stating that she "was very helpful with answering questions and helping to explain the specific technical aspects. She was also very reassuring to my uncertainties" [PoS-T].

The elements most important were a focus of Developmentally Appropriate Practice; personalization; the face-to-face workshop; one-on-one, face-to-face, and online support; on-demand resources; opportunities for reflection; scaffolding; learner-centered; and the in-house technology coach [PoS-T; FG-T]. Beyond the elements intentionally addressed in the intervention, Tia identified effective elements: practical application, stations, feedback, exploration time to learn the tools, empathy with my own reluctance, and team orientation. The elements Tia found to be most important are depicted in Figure 26 [PoS-T].

Figure 26

Tia's Professional Development Elements of Importance in the Post-Intervention Survey



Jory

Jory taught in the same building as Tia, but a different grade. He had been teaching first grade for five years and was tenured since 2017. Out of all of the participants, he had the least amount of time in the classroom, but consistently appeared to be the most independent and confident in his ability with both SAMR and Seesaw [PreS-J, PoS-J, FG-J]. Jory's pre-intervention survey showed characteristics of an early adopter (Rogers, 1962, 2003). He was using iPad and Chromebooks in the classroom, Freckle for math and reading practice, and a "myriad of educational apps" [PreS-J]. Jory used Seesaw with students to record, produce, and share their work. His experience with Seesaw also extended to using it for sharing monthly calendar events and announcements. He also recognized the benefit based on the ease of sharing work and ideas with parents of his students [PreS-J]

Perceptions: Jory

Jory wanted to learn about new ways to use technology to connect his students with others outside of the classroom. Although Jory appeared willing to learn about and try the tools and apps introduced at the professional development, he preferred to work independently to understand the complexities of each tool while learning to integrate them into his instructional practices [RN; PoS-J]. This was further evidenced in his post-intervention survey when he denied that the professional development facilitated the use of Seesaw. He argued, "the professional development how I facilitated Seesaw with my students was done by me" [PoS-J].

Evidence of Adoption: Jory

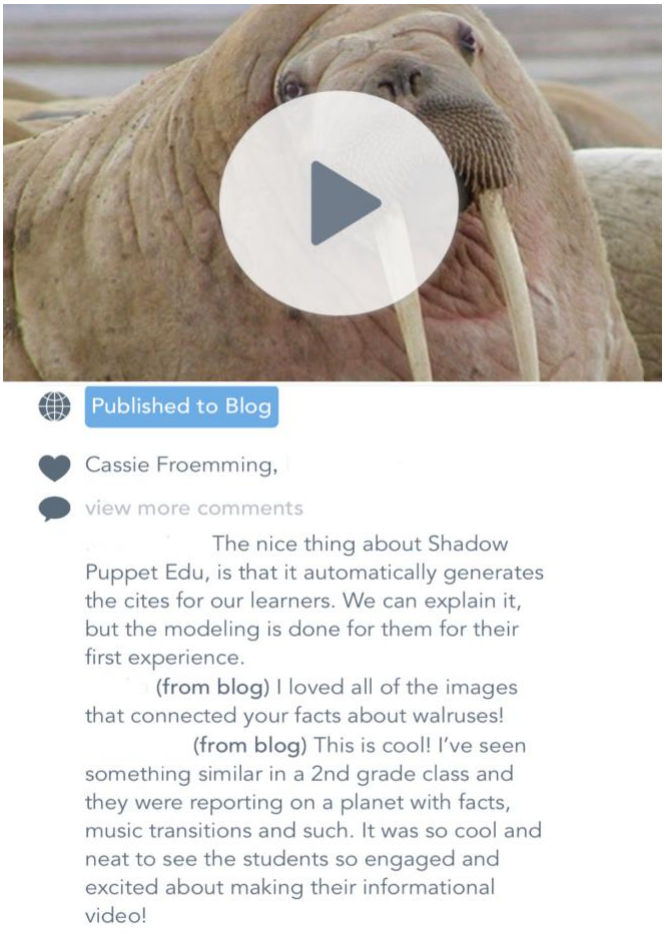
Prior to the professional development, Jory had already adopted the Seesaw app and he appreciated that it helped him connect to his students' families. He stated "by recording my voice in comments, I can give higher quality feedback since students don't have to be able to read what

I say. It involves parents. It involves some risk taking, putting [students] work on a platform where their peers can see it." [PreS-J].

In Jory's Teacher Reflection Benchmark 1, he applied the full range of Seesaw tools with his students for an animal research report and showed evidence of app smashing with the Shadow Puppet app. Educators were able to comment upon Jory's work because it was shared in the blog. Jory's early adoption of Seesaw and Shadow Puppet is shown in an animal research project in Figure 27.

Figure 27

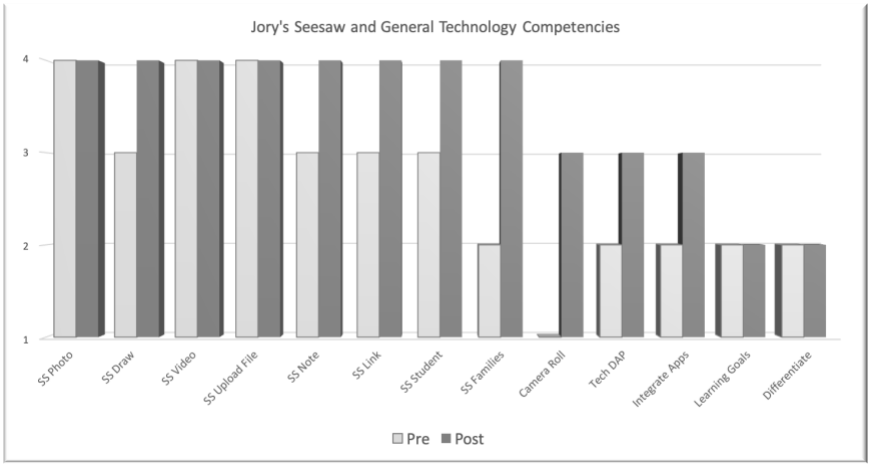
Jory's Teacher Reflection Benchmark 1 Shared to PLN



Jory continued to show growth in his use of technology. When asked what more might you still need from the professional development, he stated "potentially more ideas for how to implement various features on Seesaw in an effective manner" [TRB1-K]. Yet Jory was non-responsive to my check-ins. Jory's growth in Seesaw, SAMR, and general technology competencies are shown in Figure 28.

Figure 28

Jory's Seesaw and General Technology Competencies Pre- and Post-Intervention Surveys



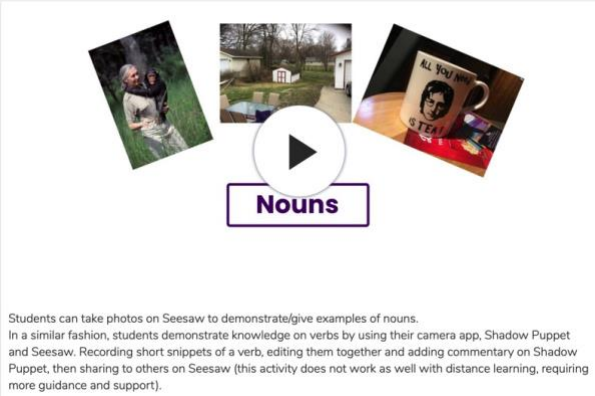
Evidence of Integration: Jory

Jory reported that he had reached Redefinition in his animal project post because it was shared in the Seesaw blog for other educators to comment upon [TRB1-J]. It was apparent that Jory met his professional goals to learn about integrating Seesaw and other apps to increase student engagement beyond the classroom [PreS-J; PoS-J; RN-J; FG-J]. But Gwen explained that Jory's animal research project in Benchmark 1 "was a mismatch because he did not reach redefinition when he actually taught it to his students" [DA-G; TRB2-J]. Gwen felt that Jory would benefit from further guidance to give him the confidence he needed to apply SAMR with

students. One of Jory's greatest strengths was his focus on how he could use the digital tools for efficiency in his planning and instruction [PoS-J; RN]. During distance learning, Jory designed a language arts lesson using Seesaw to teach nouns for his Teacher Reflection Benchmark 2. Jory's plan for Substitution and Augmentation was to record himself modeling how to read and record a book. His students would then read and record their own stories. For Modification, the students would demonstrate taking a picture and recording their voice while giving a definition of a noun and would then share examples of nouns. For Redefinition, the students would demonstrate examples of verbs in the same way, but this time integrating Shadow Puppet to create a video. The students would share their video with other students in his Seesaw classroom. Again, Jory used the full range of the Seesaw tools, and while he conceptually understood this level of SAMR, he did not share the video beyond his classroom for others to comment upon; nor did he submit an accurate plan for Redefinition. [TRB2-J; RN, personal communication Gwen]. Figure 29 is the example of Jory's activity created for Teacher Benchmark Reflection 2.

Figure 29

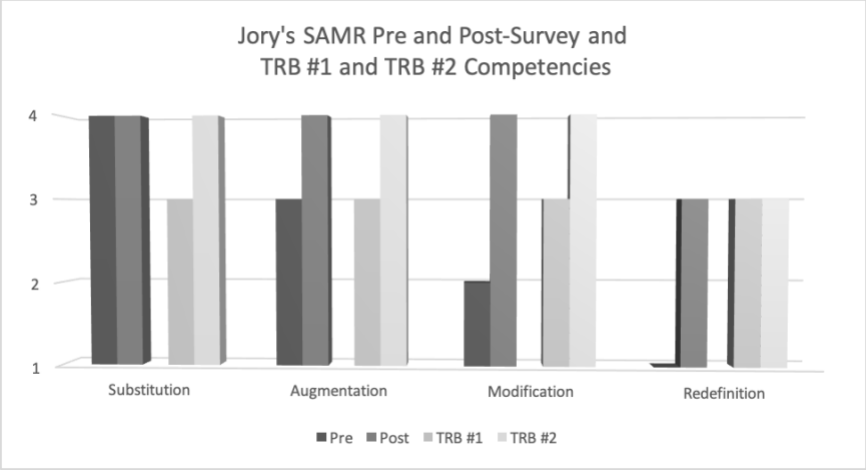
Jory's Teacher Reflection Benchmark 2 Activity Posted in the PLN



Jory self-reported that he was proficient in Redefinition, therefore presenting another mismatch [TRB2-J; RN, personal communication Gwen]. He self-reported his proficiency understanding of SAMR, which is shown in Figure 30.

Figure 30

Jory's SAMR Competencies in Pre- Post-Intervention Surveys and Teacher Reflection Benchmarks 1 and 2



Overcoming Challenges: Jory

Jory demonstrated growth in all areas, but was a mystery to me since he was quite capable and fiercely independent, so I emailed Gwen for insight into how we might best support him throughout the remainder of the study [RN]. Gwen responded, that Jory's biggest challenge was "needing a growth mindset, which is why these personalized and multi-modal learning opportunities are so important. Jory learns by diving in and likes his independence… I just wish he had the confidence to share all that he is doing with others and not feel like he has to be an island. He seems to have to have success in order to share it" [DA-G].

How Changed: Jory

In the post-intervention survey, Jory recognized there was a lot he still needed to learn about Seesaw and SAMR, even though he felt he knew "a lot about Seesaw already" [PoS-J]. After the professional development, Jory acknowledged that the experience "mostly reminded me of the SAMR model and helped me to think of ways to implement lessons at each level" [PoS-J]. Findings revealed that Jory would continue striving to meet his professional learning goals for redefining technology integrated activities to extend beyond the limited walls of the classroom, but he was likely to achieve his learning goals on his own [PoS; RN].

Elements That Facilitated Change: Jory

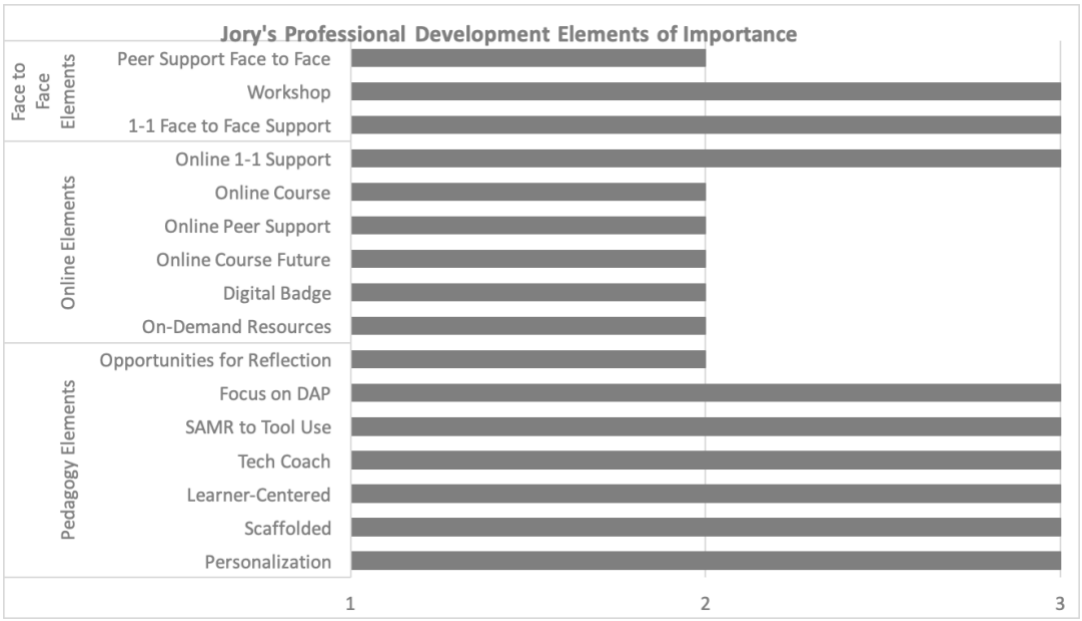
The professional development helped Jory to meet his goals of using the Seesaw tools more purposefully and he demonstrated that he could integrate the app to the fullest potential [DA-J; PoS-J]. The professional development was the first step in his journey for learning how to integrate technology in ways that would extend beyond the classroom.

After the professional development, Jory recognized how PLNs might be helpful for some educators, but he denied that he was likely to participate in them again [PoS-J]. However, Jory was pleased with the technology liaison's expertise and the personalized assistance she provided during the workshop and implementation period. He said that she was "available whenever I had questions or needed advice." Despite Jory's independence, he felt positive about the social aspect of the professional development stating "it was helpful to have people I could connect with to help with specific questions/task" [PoS-J]. Gwen and I agreed that the Seesaw Ambassador program would provide the on-demand resources, self-pacing, and multi-modal experiences that Jory would need to further support his independent approach to learning, so we encouraged him to apply [RN; DA-G].

Jory did not identify elements beyond those intentionally addressed in the intervention. But much like the other teachers, he especially found value in the SAMR examples provided at workshop, and for the professional development as whole. The pedagogy focused elements were of high importance, as well as the expertise of the in-house technology coach and their one-to-one, face-to-face and online interactions as shown in Figure 31 [PoS-J].

Figure 31

Jory's Professional Development Elements of Importance in the Post-Intervention Survey



Synthesis of Case Findings

Comparison of the pre- and post-intervention survey data and data from the other sources are interwoven to provide a holistic overview of the final results. The data are arranged in an increasing order of importance or to represent change in the pre- to post-intervention survey comparison. Emergent themes illustrate the participants' technology adoption and integration, perceptions, challenges, and barriers, as well as the professional development elements that facilitated changes. A synthesis of the thematic findings is presented in Table 9.

Table 9

Thematic Findings

Technology Adoption
• The teachers felt positive toward the tools they were using prior to the professional development [PreS- all; RN]. • All teachers tried Seesaw and were satisfied with the outcome for students [PoS-all]. • When teachers knew that a technology benefits their students and was aligned with best practices, they adopted the new technology [PreS-all; PoS-all]. • If teachers are to learn and accept a new technology, they need to have a positive attitude and mindset to do so [RN; personal communication Gwen; PoS-K; FG-K; FG-T]. • When teachers have step-by-step directions, hands-on practice working in stations, one-on-one support from a knowledgeable expert, opportunities to work with peers, and time to play with the technology, they are likely to have a positive attitude toward the new technology [PoS-all; FG-all]. • The constructivist professional development experience fostered a positive perception toward technology adoption and integration [PoS-all; FG-all]. • When professional development meets the needs and concerns of teachers, they are likely to adopt a new digital tool [DA-all; PoS-all; TRB2-all]. • Teacher reluctance can impede the adoption and integration process of a new technology [PoS-all; RN].
Technology Integration
• Teachers can have negative perceptions toward adopting and integrating new technology due to several barriers, such as the short life span of rapidly changing tools, quality of the technology (i.e. track pad/mouse issues, Chromebooks vs. iPads), lack of time, training, troubleshooting assistance, or too many tools and resources [PoS-all; FG-all].

- Collaborative, positive influencers and access to knowledgeable experts have a positive impact on teachers' negative perceptions, which in turn can have a positive impact on the adoption and integration of new technology [PoS-all; FG-K,T,C,A; RN; Personal Communication Gwen;].
- The teachers accepted Seesaw and grew in their SAMR competencies; thus they were able to conceptually understand how the purposeful integration of technology could benefit to their students [DA-all; PoS-all; TRB2-all].
- The teachers were concerned about the amount of time it would take to learn the new tools and align activities with the SAMR levels [PoS-all]
- Although teachers felt positive toward integrating technology for formative assessment, some teachers were concerned about how to assess technology integrated assignments. [DA-all; PoS-all; TRB2-all].
- When professional development met the needs and concerns of the teachers, and included a SAMR focused with constructivist learning opportunities, they adopted and integrated a new digital learning tool more intentionally and purposefully [PoS-all; FG-all]
- The teachers were underprepared for Covid-19 distance learning and primarily planned lessons at the Substitution level [personal communication, Gwen]. They also faced student/family access and communications issues and were concerned about assessing student work [PoS-C,A,K,T; personal communication, Gwen]

Overcoming Perceived Challenges

- Teachers expressed their needs, concerns, challenges, barriers, and negative perceptions towards technology adoption and integration [PoS-all; RN; TRB2-all]
- When teachers' concerns were addressed, there was a positive shift in their perceptions and confidence levels, which ultimately fostered a positive change in their digital teaching practices [PoS-all; RN; FG-all].

- Despite negative perceptions, teachers will overcome obstacles and be persistent in learning a new technology when they have a reason to use the technology [FG-all; RN; personal communication Gwen].
- When teachers' needs are addressed specific to their own classrooms, they are more likely to succeed at technology integration despite barriers [PoS-all].
- When teachers have time to collaborate with peers and explore the new digital learning tools they have greater confidence and are able to stay abreast of rapidly changing technologies [PoS-T,C,A,K; FG-all].
- Teachers can empathize with professional development leaders' when they are transparent about overcoming their own negative experiences with technology integration. This may have a positive impact teachers' negative perceptions [PoS-T,C,A,K; RN; personal communication Gwen].
- The teachers felt a sense of urgency and accountability, along with high expectations. This was germane to the adoption and integration process [PoS-all; FG-T,K; RN; personal communication Gwen].
- The participants revealed the elements that helped them to be most productive in the integration of technology in their classrooms and online environments [PoS-all; FG-all].

Effective Elements of Professional Development

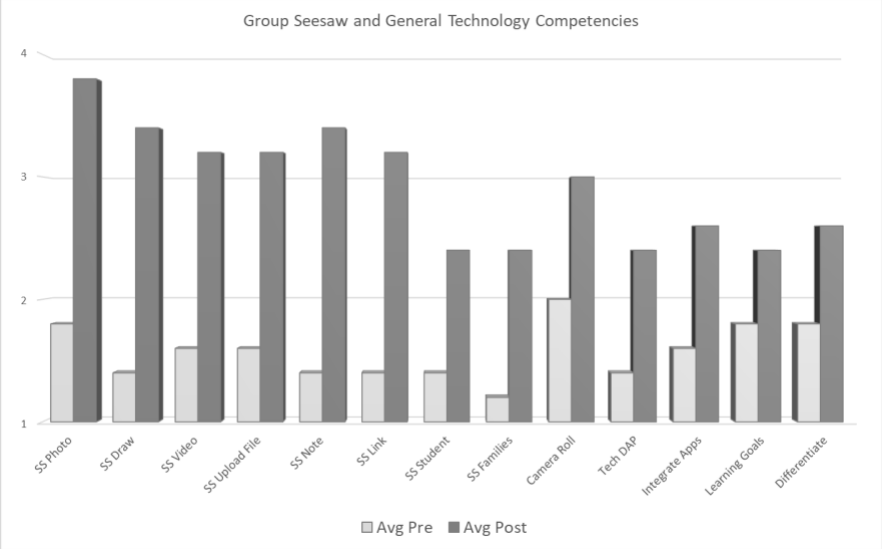
- Professional development with a focus on pedagogy, online, and face-to-face elements proved to be beneficial [PoS-all; FG-all].
- The elements with the most importance for all teachers included 1) personalization, 2) scaffolding, 3) learner-centeredness, 4) ongoing face-to-face support, and 5) ongoing one-to-one, online support [PoS-all; FG-all].
- Modeling and linking familiar apps with new apps and the use of stations, in practical application of the teachers' authentic classrooms, provided the scaffolding they needed to adopt a new digital learning tool [PoS-all; FG-A;RN; personal communication Gwen].
- Most teachers believed there was added benefit in seeing peer examples of technology integrated activities in the PLN [PoS- K,T, C, A; FG-K,T, C, A] .

Whole Group Technology Adoption

A comparison of whole group averages in the pre- and post-intervention survey data showed an increase in all teachers' self-reported Seesaw and General Technology Competencies (described on page 62). The complete data set for these whole group averages can be found in Appendix K. The technologies examined included accessing the camera roll and integrating the Seesaw (SS) photo, drawing, video, file, note and link tools in developmentally appropriate ways to enhance and extend learning goals and for communicating with students and their families. This increase shows the teachers' growth towards learning and adopting technologies as shown in Figure 32 [PreS-all; PoS-all].

Figure 32

Whole Group Seesaw and General Technology Competencies



Prior to this professional development (PD) experience, pre-intervention survey data revealed the teachers use of devices and apps. The grades K-1 teachers reported having access to Chromebooks and iPads and using a variety of apps, such as Teach Your Monster to Read,

Handwriting Without Tears, RAZ kids, and Seesaw [PreS-T; PreS-J]. The grades 2-3 participants reported that they only had access to Chromebooks, and they primarily used Class Dojo, a parent communication app; they also reported using websites such as National Geographic, and skill building software such as Xtra Math, and Freckle [PreS-C,K,&A]. While all K-3 teachers agreed that Seesaw was beneficial, findings revealed that prior to coming to the professional development, the grades 2-3 teachers had not been using the app and the grades K-1 teacher were not using the features of Seesaw to the fullest potential or in purposeful ways as prescribed by SAMR (PreS-all, personal communication, Gwen).

Most of the participants were hesitant to try a new, time-consuming technology; the grades 2-3 teachers were content with the use of their current technology in the classroom. Kain stated, "I prefer the Class Dojo tool as it also adds a parent communication and behavior management function" [PreS-K]. Yet after the professional development, the participants reported that they liked the expansive and full use of Seesaw, and were willing to learn even more about the app. Ayla stated that this experience "introduced me to a powerful teaching tool…It got me started on exploring Seesaw. I probably wouldn't have tried it had it not been for this professional development. If you want to integrate Seesaw, this is a great way to start" [PoS-A]. Kain expressed his satisfaction in integrating Seesaw by stating,

> I was pleased with the students' engagement in the activity. Had it been a paper pencil worksheet, students likely would have completed the work in a few minutes and turned it in. With Seesaw, they explored the content using several tools. The recording tool especially was beneficial. They explained their thinking out loud which is an excellent way to solidify and internalize what you have learned. I think at this point the biggest benefit is having the students able to watch videos of the lessons [TRB1-K].

When asked if they felt there were added benefits in using the technology with their students, Ayla stated, “Many of us are teaching small groups or one-on-one Google Meet lessons to differentiate” [TRB2-A]. Tia recognized the benefits as well, saying, “I was able to see how the students had ownership with what they created. Their eyes would light up when they were able to hear their own voice!” [TRB1-T]. Celeste found that “the kids were having a blast. They were so engaged and willing to help each other out” [TRB1-C]. Following the professional development, all teachers believed there was added benefit in using the Seesaw app with their students because it aligned with best practice; they also felt positive about adopting the Seesaw application and envisioned using the app for future instruction [PreS-all; PoS-all].

Whole Group Technology Integration

Use of SAMR

Prior to the professional development, I gathered information regarding the teachers’ use of SAMR for higher levels of learning. Two teachers reported prior use of substitution and four reported prior use of augmentation. Only one of the teachers reported their use of modification and redefinition prior to the professional development. Following professional development, three teachers reported using modification and two educators reported using redefinition. This increased use in SAMR is shown in Table 10 [PreS-all; PoS-all].

Table 10

Number of Participants Pre-Post- Use of SAMR

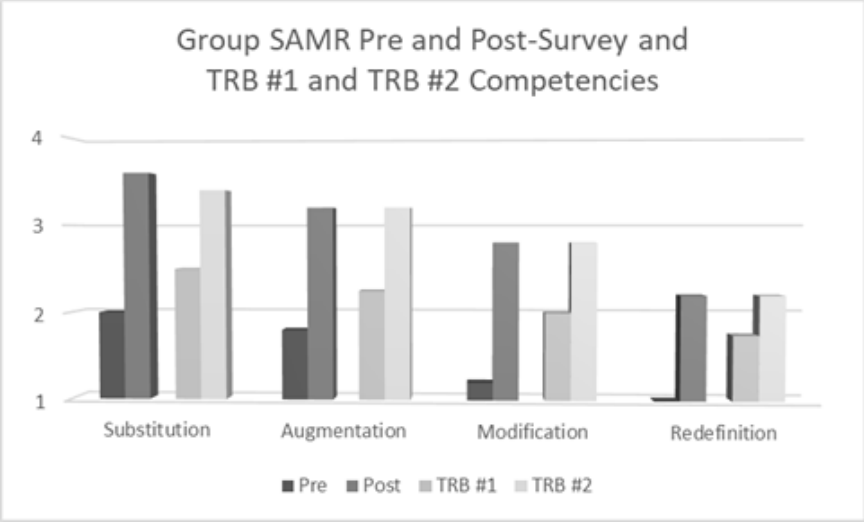
Use of SAMR	Yes Pre-	Yes Post-
Substitution	2	5
Augmentation	4	5
Modification	1	3
Redefinition	1	2

SAMR Competencies

A comparison of whole group averages in the pre- and post-intervention survey data and the Teacher Reflection Benchmarks 1 and 2 showed an increase in the teachers' self-reported SAMR competencies (described on page 62). The complete data set for these whole group averages can be found in Appendix K. This increase provided further evidence of all teachers' growth towards their awareness and ability to purposefully integrate technology into their digital teaching practices as depicted in Figure 33 [PreS-all; PoS-all].

Figure 33

Whole group SAMR Competencies



Prior to the professional development, many of the teachers did not feel that they had adequate time, training, or support that they needed for applying SAMR to the digital learning tools [PreS-T,C,A,&K]. Kain stated, "I feel I need more training and support to accomplish these levels. Also, it is challenging to find the time to create and then implement new things" [PreS-K]. After learning about SAMR, the teachers expressed their concern regarding the amount of time it would take to align activities with the SAMR levels [PoS-all]. Despite these concerns,

they were all using SAMR after the professional development and felt more confident in integrating technology more intentionally [TRB2-all; PoS-all]. For instance, Kain noted, he felt much more confident in alignment and application [PoS-K].

Overcoming Perceived Challenges

Evidence of change was captured in a comparison of the teachers' pre- and post-intervention survey responses regarding their perceptions related to the integration of technology, pedagogy, school leadership, and teacher confidence level.

Perceptions of Integrating New Technologies

Prior to the professional development, all five teachers agreed that they would use a new technology if they knew the tool would benefit their students and had professional development to support them in the integration of the tool. Most of the teachers agreed that they would integrate a new digital learning tool if it was first proven by their colleagues. While four of the teachers initially agreed that they rarely resisted technology, after the professional development, that number decreased to two indicating an increase in self-awareness regarding their personal openness to new technologies. Following the professional development, a significant change was elucidated in teacher perceptions regarding their likelihood of integrating new technologies for instructional purposes as shown in table 11.

Table 11

Pre- Post- Agreement Numbers for Teacher Perceptions of Technology

Integration of Technologies Perceptions	Pre-Agree	Post-Agree
Likely to use a new tool if it benefits students	5	5
Likely to use a new tool with PD support	5	5
Integrate new tools for instructional purposes	3	5
Likely to use a new tool if proven by colleagues	4	4
Rarely resist integrating new technologies	4	2

Perceptions of Pedagogy

Prior to the professional development, all five teachers believed technology could be used to extend and differentiate the curriculum if used in developmentally appropriate ways. But only four teachers reported that technology could motivate and engage students. Three teachers felt that teacher reflection could improve their technology integration practices. Following the professional development, all five teachers were in agreement for each pedagogical construct under investigation as noted in Table 12.

Table 12

Pre- Post-Intervention Agreement Numbers for Pedagogical Beliefs

Pedagogical Beliefs About Use of Technology	Pre-Agree	Post-Agree
Can be used in developmentally appropriate ways	5	5
Can be used to extend and differentiate learning	5	5
Can be used to motivate and engage students	4	5
Reflection improves my tech integrated instruction	3	5

Perceptions of School Leadership

The teachers level of agreement varied prior to the professional development regarding their perceptions of school leadership in technology integration. Most agreed that the school expected them to integrate technology into their instructional plans. There was no change, with two of the teachers, who reported that their environment was conducive to technology integration.

Prior to the professional development, four of the teachers agreed that there was a sound policy for privacy, etiquette and equity in their school, but this increased to all five teachers following the professional development. Only two teachers initially believed the school had a sound policy for access and selection of digital learning tools, but after learning more about these policies, this number decreased to only one teacher. Following the professional development,

there was an increase by one teacher who agreed the school provided adequate professional development, and by two teachers who believed the school provided adequate on-going support. These numbers are reflected in Table 13.

Table 13

Pre- and Post-Intervention Agreement Numbers for Perceptions of School Leadership

School Leadership Perceptions	Pre-Agree	Post-Agree
Policy for privacy, etiquette, and equity	4	5
School expects tech	4	4
School provides ongoing support	0	3
School provides adequate professional development	1	2
Physical environment conducive to tech integration	2	2
Policy for access and selection	2	1

Teacher Confidence Levels for Technology Integration

Prior to and following the professional development, all five teachers reported that they felt confident in using technology for formative assessments and to foster collaboration and communication amongst the students and families. Four of the teachers agreed they were confident that they could meet the learning objectives when integrating technology into their instructional plans, but this increased to all five teachers. There was no change in the four teachers who felt confident integrating technology to meet the needs of their special education students, or the two teachers who agreed they could integrate technology beyond the classroom. There was however, an increase from three teachers to four teachers who felt they could successfully integrate technology with their English Language Learners. The teachers' confidence levels of agreement are shown in Table 14 [PreS- all; PosS-all].

Table 14

Pre- Post-Intervention Agreement Numbers for Teacher Confidence Levels of Technology Integration

Teacher Confidence Levels for Technology Integration	Pre-Agree	Post-Agree
Student collaboration and communication	5	5
Family collaboration and communication	5	5
Formative assessment	5	5
Meet objectives with technology	4	5
Special education	4	4
English language learners	3	4
Beyond the classroom	2	2

Several barriers surfaced throughout the study and contributed to the negative teacher perceptions toward technology adoption and integration. This included external issues such as poor internet connection, log-in issues, and difficulties with the mouse trackpads. Celeste was disillusioned with her outdated device and lack of iPads [RN, PreS-C]. Kain referenced his difficulties with students' logging in and using the mouse trackpads on their Chromebooks, as well as poor internet connection [PoS-K].

Covid-19 distance learning brought about new challenges. The teachers felt overwhelmed by having to sift through numerous tools and resources available to them [RN]. Celeste stated, "I know there is SO much out there but I have not tried it!" [PreS-C]. The teachers were challenged by how rapidly digital learning tools change or become obsolete and the lack of time to learn these tools [PreS-C; Pos-C,A,K,T; FG-T]. All five teachers express their concerns regarding the assessment of online student work [PoS-all]. The grades 2-3 teachers had concerns regarding access and parent connections, and they did not want to overwhelm their students' families [PoS-C,A,&K]. Kain stated, "I did not want to overload my families with another communication

tool" [PoS-K]. Despite these negative perspectives, all five teachers persisted in completing their Teacher Reflection Benchmark tasks for integrating technology into their instructional plans.

One of the consistent admissions from the participants was the value in continued learning and support. Jory expressed that he wanted to "have someone who has expertise on the subject who is able to answer the questions …having more than person who kind of knows what they're doing" [FG-J]. This was a valid point as continual learning was not only necessary, but for pertinent technology issues that would certainly occur, there needed to be someone on hand to assist.

Most teachers' concern for incorporating the concepts learned in this professional development was based on time constraints. The participants were concerned about the time it took to learn the technology, and because of the pandemic, all of their spare time was spent on preparing for Covid-19 distance learning [ProS-all; personal communication, Gwen]. Kain stated, "Time and practice on my part are the main things I need to successfully integrate Seesaw and SAMR. Technology is very similar to learning and speaking a foreign language. In the same way, I can only expect to be successful using Seesaw by using it on a consistent basis" [TRB2-K]. Agreeing with Kain, Jory stated, "It can be hard to engage in a PLN when I feel that my time/attention is limited" [PoS-J]. Despite these time constraints, the teachers still believed there was merit in learning to integrate technology in purposeful ways [PoS-all; FG-all;].

By corroborating the each teacher's perception data and self-reported competencies with the overall whole group data, I identified changes in the teachers' perceptions, as well as their awareness, acceptance, and ability to adopt and purposefully integrate technologies to enhance their digital teaching practices. These changes imply that the teachers in this study overcame

their negative perceptions, challenges, and barriers as a result of a combination of effective elements designed into this professional development experience.

Effective Elements of Professional Development

The next set of data is related to the participants' perceptions of the effectiveness of the professional development experience and the elements that facilitated changes in their digital teaching practices. The face-to-face, online, and pedagogical elements designed explicitly into the professional development experience included personalization, scaffolding, learner-centeredness, an in-house technology coach, applying SAMR levels to digital tool use, a focus on developmentally appropriate practice, opportunities for reflection, one-to-one, face-to-face support, face-to-face workshop, face-to-face peer support. one-on-one online support, an online Personal Learning Network offering peer support, an online course that served as the presentation during the workshop, access to the online course for future reference, access to on-demand resources, and digital badge micro-credentialing.

In the post-intervention survey, the teachers were asked to respond to the importance of each professional development element designed into the study. A three-point Likert scale was to signify 3- very important, 2- somewhat important, and 1 - not at all important. The elements that the teachers rated as "very important" are presented in the next few sections that follow.

Important Pedagogy Professional Development Elements

The pedagogy professional development elements under examination included- SAMR to tool use, a focus on Developmentally Appropriate Practice, personalized, opportunities for reflection, scaffolded, learner-centered, and an in-house technology coach to facilitate on-going learning. The majority of the teacher responses for each pedagogy element were important. Four teachers claimed the use of the SAMR tool and a focus on Developmentally Appropriate Practice

(DAP) were very important. Table 15 shows the "very important" pedagogy professional development elements identified by the teachers.

Table 15

Pedagogy Professional Development Elements of Importance, Post-Intervention Survey

Elements	Said Very Important
Personalized	5
Scaffolded	5
Learner-Centered	5
In-House Technology Coach	5
SAMR to Tool Use	4
Focus on DAP	4
Opportunities for Reflection	3

Important Online Professional Development Elements

The online professional development elements under examination included one-on-one online support, online peer support, online-demand resources, the online course, access to the online course for future reference, and digital badging. These online tools were of less importance than the pedagogy elements, with online one-on-one support being very important to all teachers. While the micro-learning elements of the online course were very important to one teacher, and somewhat important to the other four teachers, the digital badge component was not at all important to any of the teachers. Table 16 shows the "very important" online professional development elements identified by the teachers

Table 16

Online Professional Development Elements of Importance, Post-Intervention Survey

Elements	Said Very Important
Online One-on-One Support	5
Online Course	3
Online Peer Support	2
Online Course for Future Use	1
Digital Badge	0

Important Face-to-Face Professional Development Elements

The face-to-face professional development elements under examination included the face -to-face workshop, one-on-one face-to-face support, and face-to-face peer support. All teachers considered the one-on-one, face-to-face support to be a very important element of the professional development experience. Four teachers claimed the workshop was very important, and three of the teachers considered peer-support to be very important as shown in Table 17.

T**able 17**

Face-to-Face Professional Development Elements of Importance, Post-Intervention Survey

Elements	Said Very Important
One-on-One Face-to-Face	5
Workshop Face-to-Face	4
Peer-Support Face-to-Face	3

Prior to this professional development experience, all teachers that participated in this study were using technologies that they were initially content with. But during the professional development workshop, their perceptions shifted because they had an opportunity for hands-on learning. This first became evident when the teachers were at stations where they had the opportunity to explore the Seesaw activities at their own pace with step-by-step instructions, and one-on-one guidance as needed [RN; FG-A]. Kain noted, "I thought the stations were engaging. Seesaw is quite user friendly and sometimes you just need time to play with the tools" [PoS-K]. This small group and individual support during stations met the teachers learning needs, and according to Celeste "it gave me the nudge to go for it and try it" [PoS-C]. In terms of improvement, Celeste noted: "I really appreciated the one-one help. I learn best by doing, so the step-by-step guidance and then trying it again in the break out stations" [TRB1-C]. The teachers

also noted that they were aware of high levels of technology use and that they had been attempting to integrate technology more intentionally. Kain stated,

> I like what I'm doing already, and the more I learn about new ideas, the more confident I feel in what I'm doing with technology… the biggest thing the professional development has changed is how I think about analyzing my technology use. I'm becoming more aware of the need for integration and how to use it in my lessons" [PoS-K].

All teachers accredited positive changes in their perceptions, as well as their awareness and ability to integrate technology more intentionally to the professional development [PoS-all; personal communication Gwen].

The teachers' benchmark reflections and focus group responses provided evidence that they especially valued the practical application of learning the Seesaw application. Ayla expressed her appreciation: "I could take back and use in my classroom right away" [FG-A]. As Kain put it, the use of Seesaw offered the ability to provide "best practice[s] to give students multiple ways to take in new information" [TRB1-K]. Jory believed there were practical applications that were obvious, such as how Seesaw "provided an easy way for students to share their work with others including parents" [TRB1-J]. Jory also felt an added benefit to the practical application was that it allowed him to practice giving "verbal feedback more immediately, using voice recordings rather than written feedback, which is not as beneficial for first graders" [TRB1-J]. It was also noted by the participants, that the hands-on delivery was well received, as it had benefit for their students. Celeste claimed that while she had "heard about lots of great things you can do with it … there is an excitement about learning [from the students because it] provided hands on learning" [TRB1-C].

The teachers agreed that improvements for the professional development should include modeling, more stations, more time to learn by example, more time to create activities, and having an expert on hand after the professional development for troubleshooting and more

concentrated teaching [RN; PoS-all; FG-all]. Four of the five participants, at a point in their conversations, made a statement that one-on-one or face-to-face instruction would have been preferred [RN; PoS-all]. Yet overall, the participants were quite pleased with the professional development, and after the initial introduction of the importance of purposeful technology integration, the teachers recognized how technology could be advantageous in their classrooms and for Covid-19 distance learning (RN; PoS-all; FG-all].

In conclusion, this study was designed to understand what elements of professional development can facilitate K-3 teachers' changes in their adoption and integration of purposeful technology in their classroom teaching practices as a result of SAMR focused professional development. The identified themes were based on the reoccurring patterns found before, during, and after the professional development regarding the participant's perceived challenges and possibilities for overcoming those challenges in relation to the adoption and integration of technology for instructional purposes.

Identified barriers limited the teachers' confidence or success in integrating technology . These barriers included rapidly-changing tools, the quality of the technology, -such as track pad/mouse issues and Chromebooks vs. iPads, lack of time, training, troubleshooting assistance, or too many tools and resources. However, the combined elements applied to the design of the intervention helped the teachers' overcome their perceived challenges, and ultimately facilitated positive changes. The pedagogical focused elements such as personalization, scaffolding, and learner-centered support from an in-house technology coach, in conjunction with ongoing, one-on-one online and face-to-face support proved to be most valued by all of the teachers in this study.

CHAPTER 5: DISCUSSION AND CONCLUSION

Early grade teachers need and deserve high quality technology professional development to meet the learning demands of their students in the digital age (Luckhardt, 2018). The aim of this qualitative study was to identify effective professional development elements that facilitated positive changes in the teachers' adoption and integration of technology. Data from one technology coach and five in-service teachers were gathered to answer to the research questions: What elements of a SAMR focused professional development experience facilitate K-3 teachers' change in their 1) adoption of technology, and 2) purposeful integration of technology into their classroom teaching practices?

In this chapter, I first summarize the findings from my study. Next, I present how these findings contribute to both theory and practice relative to the literature reviewed. I then address the limitations and delimitations of the study. Last, I conclude this chapter with my recommendations for future research.

Summary of the Findings

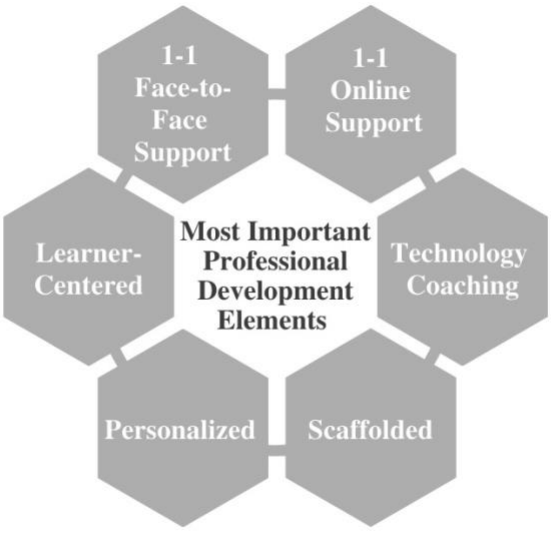
Findings revealed positive changes in the teaching practices of the participants as a result of the SAMR focused professional development. The intervention which included sixteen elements explicitly designed into a professional development experience proved to be effective. The data depicted an overall improvement in the teachers' 1) use of Seesaw, general use of apps and mobile devices, 2) use of SAMR, 3) perceptions of technology integration, 4) confidence around use of learning technologies, 5) technology adoption, and 6) purposeful technology integration teaching practices.

I sought to understand the relative impact of the face-to-to face, online, and pedagogical elements designed into the professional development to facilitate change in the K-3 teachers' adoption and purposeful integration of technology as defined and measured by the teachers' self-reported competencies (page 62). The sixteen elements under investigation included: 1) personalization, 2) scaffolding, 3) learner-centeredness, 4) an in-house technology coach, 5) applying SAMR levels to digital tool use, 6) a focus on developmentally appropriate practice, 7) opportunities for reflection, 8) one-to-one, face-to-face support, 9) face-to-face workshop, 10) face-to-face peer support, 11) one-on-one online support, 12) an online Personal Learning Network offering peer support, 13) an online course that served as the presentation during the workshop, 14) access to the online course for future reference, 15) access to on-demand resources, and 16) micro-learning and digital badge credentialing.

The teachers' data revealed very important findings. While these findings may not represent the absolute truth, their perceptions of the truth have been represented (Ellingson, 2009). The teachers revealed the elements most important in facilitating their adoption and integration of technology into their classrooms and online environments. Although the digital badge component of micro-learning was not a contributing factor, all other elements built into the professional development were of benefit in overcoming their barriers and in helping them to adopt and integrate technology into their instructional plans more purposefully. Five out of five teachers expressed that they especially valued the pedagogical focused elements of personalization, scaffolding, learner-centeredness, and in-house technology coaching, as well as the one-to-one, face-to-face support in the workshop, and the one-to-one online support in the PLN as shown in Figure 34.

Figure 34

Most Effective Professional Development Elements



Several findings emerged throughout the study. The teachers expressed their appreciation for having time to collaborate with peers. They also appreciated having time to explore the new digital learning tools with guidance of knowledgeable experts through practical application. This increased their confidence for taking on the integration of new technologies. The teachers with a growth-mindset readily accepted, adopted, and aimed to integrate technology more purposefully. These collaborative individuals were also positive influencers, which in turn had a positive impact on the whole group adoption and integration process. A sense of urgency and accountability were also contributing factors. The teachers thrived when they had a reason to use and reflect upon the technology through their Teacher Reflection Benchmark tasks and during Covid-19 distance learning. Although they grew in their Seesaw, general technology, and SAMR competencies, they wanted to learn even more after the professional development. They also wanted more time to explore and play with the tools. The teachers expressed their concern

regarding the time it would take to align the digital learning tools with both SAMR and the current curriculum standards. Their instructional plans mirrored the scaffolding presented during the workshop, which implies that the scaffolds built into this professional development impacted teacher change. Most of the teachers embraced the PLN. However, they did not necessarily thrive in technology integration without a variety of other resources readily available, such as in-house experts and multi-modal learning opportunities to meet their unique individual teaching and learning needs. Another emergent theme involved the teachers concerns regarding assessments of activities and communication issues with the students and families during Covid-19 distance learning.

Elements identified by participants beyond those generated from the literature review included varied pacing according to needs of participants, alignment between best-practices and technology integration, modeling, opportunities for practice at stations, Teacher Benchmark Reflection tasks, practical application, time to explore, and their empathy for my own prior technology reluctance. The practice of modeling apps in practical application is a noteworthy finding that emerged. This affirms one of Merrill's first principles (2013b): Learning is promoted when new knowledge is demonstrated to the learner. The teachers' benchmark reflections and focus group responses evidenced that they especially valued the practical application of learning the Seesaw app.

During Covid-19 distance learning, the large volume of resources and tools overwhelmed most of the teachers. Therefore, they believed it was essential to start small by prioritizing the resources and learning the new technologies in chunks. All teachers embraced SAMR and the pedagogical elements of professional development designed into the study. The developmental appropriateness of the technology and the ability to foster student feedback and parent

communication apps, such as Seesaw, Class Dojo, and Google Meets were seen in a favorable light.

This research context reflected the authentic voices and experiences of the teachers who volunteered to come to this professional development. With adequate support, the teachers moved from resistance to adoption of Seesaw, as well as other innovative digital learning tools during Covid-19 distance learning (Rogers, 1962, 2003). They also were able to conceptualize how to integrate technologies more purposefully and in developmentally appropriate ways. They overcame challenges and grew in their digital teaching practices. The experience provided hands-on learning and was socially situated, personalized, scaffolded, learner-centered, with one-on-one online and one-to-one face-to-face supports provided by an expert technology coach.

Limitations and Delimitations

The scope of this study lies within the varied experiences of the volunteers examined through a constructivist lens. With multiple layers of support, they were motivated to learn, felt that their concerns were addressed, and they overcame their challenges. This was the case, even during Covid-19 distance learning. To address the limitations within my study, I considered the research tenets of Herr and Anderson (2015) and Creswell and Creswell (2018).

The appointed technology liaison in the study was an instructional coach in the district. To ensure that the participants did not feel their positions would be threatened, the superintendent set the criteria for tenured teacher participants only. This was a limiting factor because many of the participants had prior technology integration workshops. Also, the outcomes did not include any perspectives of new teachers. There were differentials of power present through the hierarchical levels of the participants and myself as the researcher. To

counter this limitation, I leveraged the democratic nature of Participatory Action Research (Jacobs, 2016).

It is important to note that I had no control over the teachers' and schools' schedules. Due to the Covid-19 pandemic, Minnesota governor Tim Walz mandated schools to close (Bierschbach, 2020). The teachers were to strictly plan for Covid-19 distance learning, for two weeks, which began the fourth week of the study. Gwen requested an additional one week extension for the Teacher Reflection Benchmark 2 so the teachers could acclimate to teaching remotely from home. At that time, I updated the participants' calendar to reflect this break and extended their Teacher Reflection Benchmark 2 accordingly (See Appendix F). Furthermore, I did not have control of many of the decision-making processes regarding technology integration or the online digital learning tools that the district encouraged the teachers to use. Primarily, grades K-1 teachers used Seesaw for Schools and Grades 2-3 teachers used Google Classroom.

The exploration was driven by the relationships established with the participants, and while I maintained availability via the PLN, text, phone, social media, and email outside of the professional development workshop, the teachers did not necessarily reach out for the individual sustained support they may have needed during lesson planning. But the teachers did access Gwen, the technology liaison in this study, as well as the district's innovation specialist to assist them as needed. Gwen kept me informed about what was happening daily throughout the study. Since this was second hand information, I conducted systematic, weekly check-ins to communicate with the teachers (or more if deemed necessary). This process also served as audit inquiries.

Methodological decisions were modified based on the participants needs and comfort levels. For instance, I checked in more often with participants who needed more guidance and

support. Also, during Covid-19 distance learning, I limited my Seesaw posts, shared resources, and individual check-ins to provide teachers with the planning time set aside by the district. Finally, I kept in mind the strengths and weaknesses of digital journal data. On the one hand, journals provided the thoughts of the participants in a convenient, unobtrusive manner and eliminate the need for transcription; on the other, the transparency of the participant was minimized at times (Creswell & Creswell, 2018).

Since I did not have first-hand experience using Seesaw in the younger grades, I relied on Gwen's expertise. Due to time constraints, rapport and a balance of power needed to be reached quickly with all involved to ensure a positive and supportive culture, and ultimately to glean quality research outcomes. A structured, yet non-rigid research design, clear communication, rapport building, flexibility, and a careful balance of power helped keep my study focused despite these limitations.

Contributions to Theory and Practice

The goal of Educational Design Research (EDR) is to bridge theory with practice by identifying solutions to real problems (McKenney & Reeves, 2015). Although a model for high quality technology professional development to meet early educators needs has not yet been realized, the combined elements designed into this professional development intervention facilitated positive changes in the teachers' digital teaching practices and may provide the beginnings of a model. This professional development experience offered a powerful combination of elements that a one-shot scenario could not have achieved. Based upon these findings and the literature that grounded my study, I have identified six principles relative to theory and practice. When professional development designers are creating technology

integration learning experiences for early elementary educators, these guiding principles call attention to the importance of:

1) adequate support to minimize anxiety, resistance, and negative teacher perceptions,

2) a constructivist learning design,

3) application of SAMR to conceptualize technology integration,

4) technology coaches to facilitate personalized, professional learning,

5) leveraging volunteers to positively influence peers, and

6) combining elements to maximize and sustain professional learning**.**

Minimizing Negative Teacher Perceptions

The first principal involves minimizing negative teacher perceptions to ensure success in their digital teaching practices, which runs parallel to recent work of Johnson, et al. (2016). Before teachers can purposefully integrate new technologies, they must first overcome their negative perceptions that hinder the adoption process of a new digital learning tool. In addition to the workshop, the ongoing, one-to-one online and face-to-face support provided by a knowledgeable technology coach addressed the teachers needs and facilitated change. This further substantiates Darling-Hammond, L., Hyler, and Gardner's (2017) elements of effective, on-going professional development to overcome barriers and facilitate positive changes in 21st century teaching practices. These finding also ring true with the work of Ertmer and Ottenbreit-Leftwich (2010), Blackwell, et al., (2014); and Barone, (2016).

Constructivist Professional Learning Opportunities

Constructivist professional learning opportunities are paramount to the adoption and integration process of digital learning tools (Johnson, et al., 2016). This justifies the NAEYC and the Fred Roger's Center (2012) and Guernsey and Levine's (2015) call for improving technology

professional development specifically with early educators and learners in mind. Modeling and linking familiar apps with new apps- in practical application - provides the scaffolding teachers need to integrate new technologies (Duffy & Jonassen, 2013; Merrill, 2013b; Kolb, 2017). This affirms the stance of Cifuentes, Maxwell, and Bulu (2011), Duffy and Jonassen (2013), Merrill (2013a) and Reiguluth, (2012, 2016) regarding the importance of a learner-centered, constructivist learning design to promote deeper learning. Furthermore, teachers mirror the type of professional learning modeled to them (Matzen & Edmunds, 2007). Therefore, a constructivist approach to professional learning is of great benefit to the teachers of young students.

Conceptualization with SAMR

Although technologies come and go, the SAMR model helps teachers prioritize the digital tools and conceptualize how to integrate the tools for deeper student learning (Terada, 2020). This enters into Hamilton, Rosenberg, and Akcaoglu's (2016) discussion that technology integration is a fluid process which therefore calls for more qualitative research regarding the application of SAMR through a learner-centered lens. The teachers in this study learned to apply SAMR through practical application. They also became more aware of aligning their pedagogical beliefs with the digital learning tool to benefit their students. This finding contributes to Green's (2014) assertion for keeping pedagogical beliefs at the forefront when applying SAMR. Despite ever-changing technologies, technology integration models such as SAMR, remain a constant. Therefore, SAMR will be applicable for years when introduced symbiotically with constructivism and best practices (Calvert, 2015).

The SAMR model is beneficial for guiding educators to integrate technology with intention and purpose (Puentedura, 2014; Inan, Lowther, Ross, & Strahl, 2010). When applied through a constructivist lens, this approach 1) helps teachers conceptualize how to integrate

technology with young children, 2) encourages the adoption and spread of innovative digital tools to facilitate deeper student learning, 3) ensures children and developmentally appropriate practices are at the forefront, rather than the novelty of the new tool, 4) provides a framework to envision how the digital tools may be used to teach children to responsibly share their voice, 5) connects students with classmates, families and others around the globe. When SAMR and constructivism are a built-in features of technology professional development, teachers will be equipped to foster not only the literacy development of young children, but digital citizenship as well. This will in turn develop cultural awareness, which is a benefit to society as a whole (National Council of Teachers of English, 2013; Barone, 2016; Flores-Carmona & Luschen, 2014; Cifuentes & Vilbert, 2014; Bradshaw, 2017).

Technology Coaches and Personalization

Fourth, to accurately identify and address the needs and concerns of each teacher, in-house technology coaches are essential to the adoption and integration process. It is equally as important for teachers to receive timely, meaningful feedback and encouragement, therefore mutual trust and transparency is a must (Blair, 2012; Flanigan, 2016; Ehsanipour & Zaccarelli, 2017; Harris, 2017; Quintero, 2019). In-house technology coaches are especially necessary for helping teachers overcome their perceived challenges associated with technology integration (Cviko, McKenney, & Voot, 2014).

Gamrat and Zimmerman (2015) discuss the importance of seeking teacher input to personalize professional learning so teachers will feel supported. Ultimately, teachers know and will express what type of personalized supports that they need to overcome their challenges. This further underscores the importance of volunteer piloting as suggested by Taylor (2019). Rather than imposing a one-size-fits-all professional development model onto the teachers, expert

instructional coaches can best support teachers in the context of their classrooms when the teachers volunteer.

Volunteers Facilitate Change

Volunteers and collaborative, positive influencers facilitate change because they have a contagious effect on their peers (Taylor, 2019). They also tend to be approachable, personable leaders with a growth-mindset (Harris, 2017). Teacher innovators can impact the spread of a new technology in schools, which validates Roger's (1962, 2003) Diffusion of Innovations (DOI) theory. Professional learning should therefore be situated within a social-constructivist environment with relevant tasks to benefit students (Cifuentes, Maxwell, & Bulu, 2011; Duffy & Jonassen, 2013; Merrill, 2013a; Reiguluth, 2012, 2016).

Schools are rarely afforded a professional development scenario with a ratio of five teachers to two, readily available, knowledgeable experts. Yet the teachers had a positive response to the experience because they volunteered rather than having the professional development imposed upon the them (Taylor, 2017). Volunteers can lead and improve school culture, which positively impacts communications and the spread of innovative and purposeful digital teaching practices.

Combined Elements to Maximize and Sustain Professional Learning

Although sustained professional development is effective, it is challenging for teachers to find time for on-going, professional learning and strategic planning. A combined approach, that includes on-demand courses, screen recorded tutorials, resources, and communication networks for online learning communities can provide convenient micro-learning opportunities for flexible, timely, personalized options to fit professional development into the teachers' already

packed schedules (Hug & Friesen, 2007; Green & Cifuentes, 2011; Richardson & Mancabelli, 2011; DeMonte 2017; McLoughlin & Lee, 2008; Delaney, 2011; Ryerse, 2020).

The combined elements in this tested professional development experience for teachers proved to benefit the young digital learners that they taught, especially due to the Covid-19 shut-down (NAEYC and the Fred Rogers Center for Early Learning and Children's Media 2012; Blair, 2012: Guernsey & Levine, 2015; Barone, 2016). However, the effective elements identified in this study involved an incremental learning process, which brings to question the issue of sustainability. This type of professional learning requires a significant financial commitment, time, access, adequate devices, tools, on-demand resources, and expert technology coaches (Porter, Desimone, Birman, and Yoon, 2001). To fully implement this approach, schools need the funding to do so. Schools need to investigate affordable options such as personalization of micro-learning opportunities through screen/video tutorials and online courses (Hug & Friesen, 2017). Other options might include leveraging an ambassador/train-the-trainer model (Seesaw Learning, Inc. 2020), PLNs (Delaney, 2011), and the contagious enthusiasm and knowledge of innovators found within and beyond schools (Rogers, 1962, 2003; Taylor, 2016).

Future Directions

Educational Design Research (EDR) is an iterative, cyclical process of analysis, design, construction, evaluation, and reflection, with one iteration informing the next (McKenney & Reeves, 2015). Due to the emergence of communicative technologies, constructivism has resurfaced and is challenging the status quo of traditional instructional design principles (Duffy & Jonassen, 2009). Constructivism was at the very heart of this professional development experience. Therefore, this intervention was just one iteration that may provide future direction in the development of constructivist professional learning experiences to encourage technology

integration in the early elementary grades. Technology integration models are an important feature of professional development (Green, 2014). This is especially true regarding the need for more equitable digital learning environments and need for policies to address these concerns (Zielezinski & Darling-Hammond, 2016). Examining the perceptions and experiences of educators as they strive to align formative assessments and curriculum standards with SAMR would be beneficial (Vrasidas, 2015; Johnson, et al. 2016). The next possible iteration for a study such as this, could involve professional development in project-based app smashing and reflective engagement aligned with SAMR for the production and sharing of digital stories and for formative assessments (Brenner & Hauser, 2015; Fahrenbruck, Froemming, & Rutledge, 2019).

This study was unique in that it was conducted at the onset of a global pandemic. The teachers had two major concerns during Covid-19 distance learning. Their first concern involved the challenges they faced for assessing technology integrated activities (Vrasidas, 2015). The other concern involved communication issues with their students and families (Johnson, et al. 2016). They were overwhelmed by having too many tools and resources. These findings are a stark contrast to Collins' (2020) report, claiming that nearly 2,000 teachers were actually needing more resources to keep their students engaged and to ensure their online practices were safe, ethical, and equitable during the pandemic. Much research is needed to understand 1) how to support online teaching methods, 2) the type of materials, tools and platforms that may be needed, and 3) assessing students' online technology integrated activities (Vrasidas, 2015).

In addition, the digital learning divide is understudied (Zielezinski & Darling-Hammond, 2016, Office of Educational Technology, 2017; Collins, 2020). There are several reasons why Seesaw may be a useful application to ensure equitable learning for the good of all.

First the makers of Seesaw serve a broad audience and provide a wide range of tools for young children, families, and professional educators. Seesaw provides an abundance of activities and formative assessments. This digital portfolio and parent engagement tool holds much promise, especially regarding the need to assess digital assignments. Finally, the Seesaw Learning company envisions an inclusive and more socially just world and provides a translation feature for many different languages. Much can be learned about how educators are leveraging Seesaw to amplify student voices, foster digital citizenship, grow cultural awareness, and ensure equity. Given the current political climate, the pandemic, and racial unrest, these goals are more important than ever before.

Finally, in regard to the design of professional development to bolster early educators' digital teaching practice repertoires, my evidenced-based recommendations would be to provide teacher-volunteers with opportunities to 1) explore, reflect upon, and identify elements of professional development that enhance their technology integration practices, 2) examine their role in shaping a dream professional development experience, and 3) investigate the diffusion of their professional learning, adoption, and purposeful integration of new digital tools to their peers. A better understanding of these unknowns may hold the key to a new technology professional development model to better support early educators and pave the way for future journal contributions.

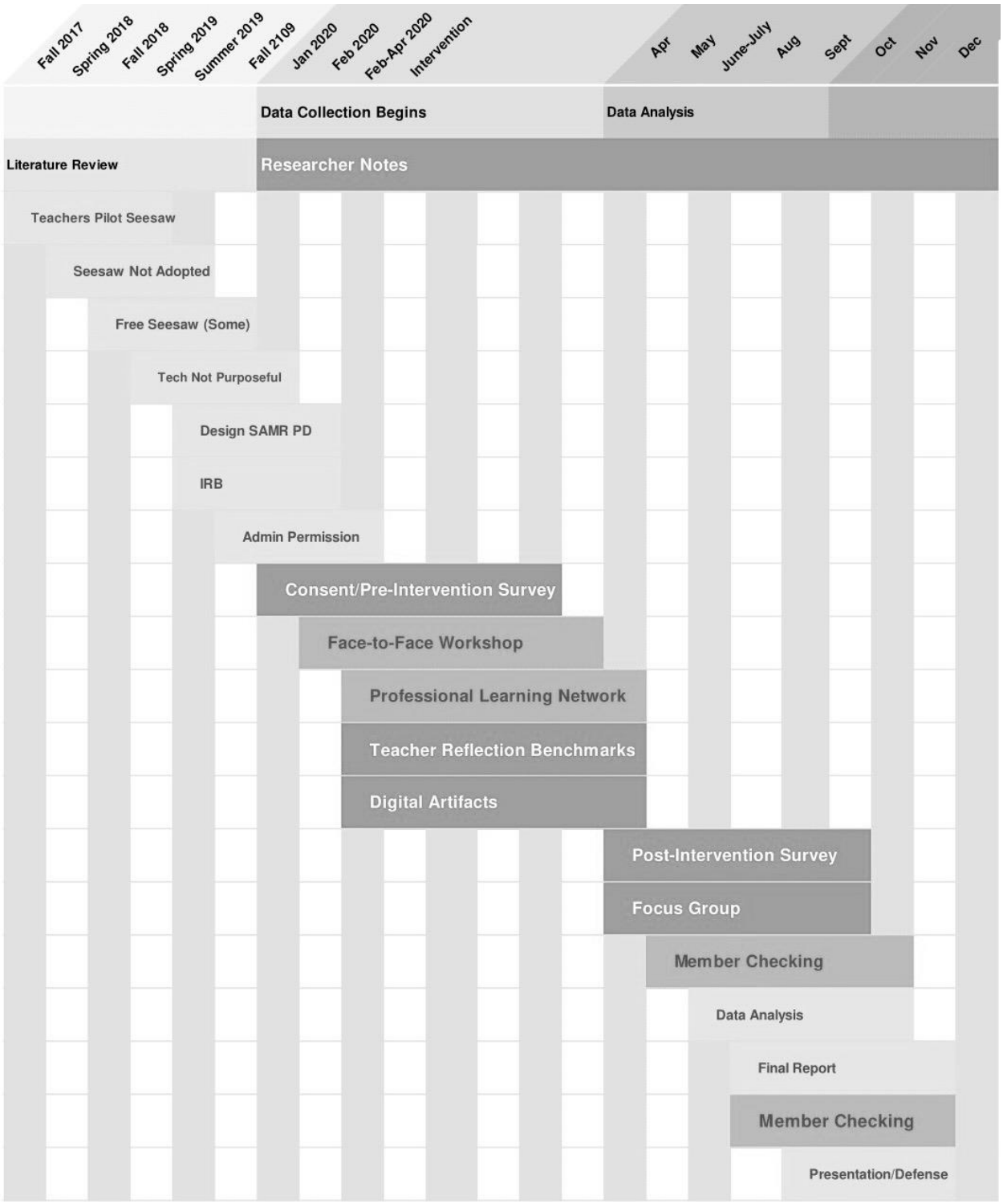
Conclusion

In conclusion, identifying and developing high quality professional development to support early educators is a worthwhile endeavor because young children, and our society as a whole, will reap the benefits. The combination of supports in this study were effective, such as the constructivist learning experiences with on-line and face-to-face positive influencers,

professional development designers/facilitators, and expert coaches to pave the way. These findings align with the theory of social-constructivism because of the positive impact of social interaction among the participants, as well as the supports provided by the researcher and the technology coach. The teachers learned to integrate technology in developmentally appropriate ways, therefore, this study informs developmentally appropriate practices and sheds light on literacy development strategies for young children. Finally, the combination of effective elements identified edifies the diffusion of innovations theory, volunteer piloting, and technology professional development practices. The guiding principles that transpired from this study are my contribution toward the search for high quality technology professional learning that early elementary educators seek…and that their students deserve.

APPENDIX A

Research Procedures and Timeline



APPENDIX B

Informed Consent

Purpose of the Research

Cassie Froemming, a Ph.D. candidate at New Mexico State University, is investigating elements of effective professional development that supports early elementary teachers in the integration of purposeful technology in their teaching. She requests your participation in her dissertation research because you are a classroom teacher in grades kindergarten through third grade for Hutchinson ISD 423.

What Your Participation Involves

You must be a K-3 tenured classroom teacher or an instructional coach to participate in this study. If you agree to participate, you will fill out a pre-intervention survey that will take approximately 15 minutes to complete and a post-intervention survey that will take approximately 25 minutes to complete. All questions require an answer. You will participate in a one-day, six-hour face-to-face workshop on a Saturday and be expected to implement educational technology in your classroom in the subsequent 6 weeks with online support from an instructional coach and your colleagues. During the professional development experience, you will share reflections and digital artifacts. Following the professional development, you will attend a focus group that will take at least an hour, but may go longer if you feel you have more to share. You will likely discuss elements of your professional development experience. During the study, your confidentiality will be protected by your use of an avatar and a pseudo name that only the participants and researcher will know. Prior to final data analysis, Cassie will replace any identifiable information with a coding system that only she will have access to.

Cassie will audio and video record the 6-hour workshop and the focus group. She and/or a note taker will take notes with a laptop throughout the study. She will then draft her report on the impact of the professional development experience on the groups' integration of technology in their teaching based on your responses to survey questions, your reflections, digital artifacts, the focus group, and her notes throughout the professional development experience. Before she publishes or shares information, she will ask you to review a transcription of the focus group, as well as a written report that summarizes what she has learned. You will then be able to delete or edit any information she has collected if it is inaccurate. Her publications or presentations will only include information shared in the study she asks you to review.

Participation is voluntary. You may withdraw at any time without penalty. If you withdraw from the study, Cassie will delete any data that includes you and will not use your information in any publications or presentations.

She will keep these recordings and notes for a minimum of three years and for the duration of her career. Research data will be stored securely in a locked drawer or password protected computer at all times.

Incentives and Benefits

The following incentives will be offered to encourage your participation: The district will offer six Continuing Education Units. Also, if you participate and complete the study you will receive an Amazon gift card for up to $15, depending on how many teachers participate. You will also receive a professional development digital badge based upon your individual learning goals. Breakfast, refreshments, and lunch will be provided during the professional development workshop. Refreshments will also be served during the focus group.

You will benefit by learning how to better serve your students by integrating learning-technologies. Your learning will be supported in a face-to-face workshop, followed by on-going, on-line support throughout the duration of the study.

Risks

Risks and benefits include exposure of your work to the larger community; however, your participation is confidential and your name will not be used in any publications or presentations Cassie gives as part of this research.

Consent

If you have read and understand this consent form, and if you agree to participate in the research, your consent will be given by completing the electronic consent form and taking the pre-intervention survey that follows. You will be prompted to download and print this information upon submitting your electronic consent.

If you have any questions about your rights as a research subject, please contact the Institutional Review Board (IRB) Chair through the Office of Research Integrity and Compliance at New Mexico State University (575) 646-7177 or ovpr@nmsu.edu.

You may contact the researcher, Cassie Froemming to tell her about a concern or complaint about this research at [insert email] or [insert phone number]. You may also contact the chairperson of this study, Dr. Lauren Cifuentes at [insert email] or [insert phone number].

APPENDIX C

Pre-Intervention Survey
Technology Teaching & Learning, Needs, and Perceptions

The purpose of the pre-intervention survey is to gain insight into the state of teachers' technology integration in their classroom teaching practices prior to the intervention. Data collected will also inform the researcher of teachers' needs so that the professional development facilitator/researcher can personalize the technology professional development experience. The survey will take approximately 15 minutes to complete

DEMOGRAPHICS
Name _____ **Age _____** **Gender _____** **Ethnicity _____** **Grade level _____** **Number of years teaching experience _____** **Established tenure in the district_____** **Year of tenure _____** **If you do not have tenure, please do not continue in this survey and workshop.**
TECHNOLOGY ADOPTION
1. Do you integrate mobile devices into your classroom instruction? a) If yes, what are you using and what for? b) If no, why not?
2. Do you integrate apps into your classroom instruction? a) If yes, what are you using and what for? b) If no, why not?
3. Have you used Seesaw with students? a) If yes, what features are you using and what for? b) If no, why not?
4. Have you used Seesaw with parents? a) If yes, what features are you using and what for? b) If no, why not?
5. What would you like to learn about Seesaw?
6. Do you believe there is a benefit to using Seesaw? a) If yes, what?
7. Do you believe that Seesaw aligns with what you know about best teaching practices? a) If yes, what about Seesaw aligns with best teaching practices? b) If no why not?

8. Have you ever participated in Seesaw professional development?

a) If yes, check those that apply:

___Face-to-face
___Online PD in Your PJs
___YouTube resources
___Ambassador Training Online Course
___Twitter or Facebook PLN
___Other

b) If yes, how have professional development experiences facilitated your integration of Seesaw?

9. Rate your Seesaw skill level: Beginner, Developing, Proficient, Advanced

a) Take a photo in Seesaw
b) Use the drawing tool in Seesaw
c) Make a video in Seesaw
d) Upload a file (i.e. Word, Google doc, PDF) in Seesaw
e) Write a note in Seesaw
f) Share a link in Seesaw
g) Integrating Seesaw with students
h) Integrating Seesaw with families

10. Rate your general understanding of technology integration skill level using the scale: Beginner, Developing, Proficient, Advanced

a) Use the camera roll on mobile devices
b) Apply a method to determine if apps are developmentally appropriate
c) Integrate apps to engage children in classroom activities and lessons
d) Integrate technology to enhance learning goals
e) Integrate technology to extend and differentiate learning goals
f) Apply the SAMR model for purposeful, higher levels of technology integration

TECHNOLOGY INTEGRATION

11. Have you used Substitution?

a) If yes, how?
b) If no, why not?
c) Rate your skill level: Beginning, Developing, Proficient, Advanced

12. Have you used Augmentation?

a) If yes, how?
b) If no, why not?
c) Rate your skill level: Beginner, Developing, Proficient, Advanced

13. Modification?

a) If yes, how?
b) If no, why not?
c) Rate your skill level: Beginner, Developing, Proficient, Advanced

14. Have you used Redefinition?

a) If yes, how?
b) If no, why not?
c) Rate your skill level: Beginner, Developing, Proficient, Advanced

PERSPECTIVES: ***TECHNOLOGY INTEGRATION, PEDAGOGY, SCHOOL LEADERSHIP, & CONFIDENCE***
15. Respond to the following questions about your perceptions. Use the rating scale: strongly agree, agree, neither agree nor disagree, disagree, strongly disagree b) I integrate digital learning tools for instructional purposes.
c) I am likely to integrate a new digital tool when I am certain it will benefit my students.
d) I am likely to integrate a new digital tool when it has been proven to be effective by my colleagues.
e) I am likely to integrate a new digital tool when I am provided with high quality professional development and on-going support.
f) I rarely resist the integration of new technologies.
g) My school expects me to integrate technology into instruction.
h) My school provides adequate professional development for technology integration.
i) My school provides ongoing support for technology integration.
j) My school provides a clear policy for appropriate selection of and access to technology.
k) My school provides ongoing support for technology integration.
l) My school provides a clear policy for appropriate selection of and access to technology,
m) My school provides a clear policy that addresses digital privacy, etiquette, and digital equity.
n) Technology motivates and engages children in classroom activities.
o) Technology can be used to extend and differentiate learning goals.
16. I am confident that I can integrate technology: a) in developmentally appropriate ways. b) to encourage collaboration and communication with my students. c) to encourage collaboration and communication with my students' families. d) to connect my students with others beyond the classroom. e) with English Language Learners f) with children with Special Needs g) as a formative assessment
17. I am confident that I can evaluate and assess whether my students are meeting expected objectives when integrating technology into my lessons.
18. I believe that reflecting on my technology integrated lessons helps me to identify areas needing change or improvement.
19. The physical environment in my classroom is conducive to accommodate technology integration.
20. Final thoughts, comments.

APPENDIX D

Online Professional Development Course

"K-3 Tech Pd"

In this course, we will explore purposeful integration of technology through the use of Seesaw activities and the SAMR Model.

- Welcome
- Before You Start
- Purpose of the Research
- Researcher Rapport
- Purposeful Technology Integration
- App Inspiration
- Seesaw
- SAMR
- Objective 1: Accessing Seesaw Tools
- Objective 2: Posting Student Work in Seesaw
- Objective 3: Sending a Private Message in Seesaw
- Objective 4: Preparing Students to Use Seesaw
- Objective 5: Designing Seesaw Activities with SAMR
- Objective 6: Teaching Seesaw Activities with SAMR
- The Next Steps
- Q&A and Final Thoughts
- Thank You
- References

APPENDIX E

Digital Artifacts Gathered

1. Seesaw Demonstration Classroom During the Face-to-Face Workshop:

Basic features of Seesaw:

- take a photo
- use the drawing tool
- make a video
- upload a file (i.e. Word, Google doc, PDF)
- write a note
- share a link

SAMR task and Seesaw integration:

- Substitution Activity
- Augmentation Activity
- Modification Activity
- Redefinition Activity

2. Seesaw Demonstration Classroom During the PLN:

- Use private messaging to upload a file of two Guided Reflection Rubrics (including teacher self-report of competency level)
- Teacher-created example of two SAMR activities integrated with Seesaw
- Participant interaction (i.e. comments/likes)

APPENDIX F

Guided Reflection Rubric
Using SAMR for Purposeful Technology Integration

Teachers will:

1. Complete template for the rubric for SAMR, checklist for purposeful use of technology for early learners, and prompts for reflection below.
2. Upload the document file to the PLN.
3. Post a teacher-created example of the activity in the Seesaw Demonstration Classroom.
4. Respond to your colleagues' posts (i.e. questions, something interesting/funny/unique, encouragement, etc.)

Competency Rating Scale

Beginner - *You have not heard of or only have basic familiarity of SAMR model, Seesaw, other apps, and/or general technologies. You will need to learn about these features before you can integrate these into your lessons.*

Developing- *You have experience gained in a professional development but have not fully integrated the SAMR model, Seesaw, other apps, and/or general technologies with your students. You will need help integrating these features into your lessons.*

Proficient- *You have integrated* SAMR model, Seesaw, other apps, and/or general technologies *into your lessons with minimal guidance. You can do this independently but may use resources or need help from time to time. You understand and can discuss these features.*

Advanced- *You have consistently integrated SAMR model, Seesaw, other apps, and/or general technologies into your lessons successfully and can do so independently. You are capable of discussing/helping others with these features and feel comfortable finding/ using outside resources if necessary.*

Competency Scale retrieved and adapted from: https://hr.nih.gov/working-nih/competencies/competencies-proficiency-scale)

TEACHER'S (PSEUDO) NAME:

SAMR (Puentedura, 2014)	Definition	Student Learning Objective(s) & Description of Activity	Teacher Competency Beginning Developing Proficient Advanced
Substitution	*Involves the student **doing the same thing as you would do without technology** and without modification of the task.*	**Objective(s):** Students will write adjectives to describe the main character of the book. **Activity:** • take a picture of the main character in the book • use the Seesaw text tool to type adjectives to describe the main character in the book • post to Seesaw for others (student and family)	
Augmentation	*Involves the student using **some functional improvement** but is still a direct tool substitute. Again, the task is not changed, but **perhaps use of features of the technology are incorporated.***	**Objective(s):** Students will write a reflection about the main character of the book and record themselves reading the words. **Activity:** • take a picture of the main character in the book • use the Seesaw text tool to type a reflection about the main character in the book • use the audio tool to record their voice reading the reflection • post to Seesaw for others (student and family)	
Modification	*The outcome is still the same but **the tool allows the student to enhance the product.** Involves giving a different kind of assignment.*	**Objective(s):** Students will write a retelling of the story about the main character in the book. They will create a digital story in one or more digital medias, then app smash into Seesaw. **Activity:** • create a retelling of the story by taking a picture of the main character in the book • apply App Smashing using Chatterpix and Seesaw features to retell the story • post to Seesaw for others (student and family)	

Redefinition	*The student is doing **something that is inconceivable without technology.***	**Objective(s):** Students will create a digital story using a variety of different apps and share it in a blog (app smashing) for others beyond the classroom to comment upon.	
		Activity: • create a digital story by taking a picture of the main character in the book • apply App Smashing using Chatterpix and seesaw features to retell the story • share the digital story in a classroom blog • share to school website for others outside of the classroom to comment upon.	

Puentedura's SAMR Model Rubric retrieved and modified from: https://www.midwayisd.org/cms/lib/TX01000662/Centricity/Domain/278/SAMR%20Lesson%20Examples.pdf

CHECKLIST FOR PURPOSEFUL USE OF TECHNOLOGY FOR EARLY LEARNERS

SELECTION

- ☐ ***Intentional***
  - Appropriate for the need
  - Supported the learning goals/objectives were met
- ☐ ***Developmentally Appropriate***
  - Age-appropriate, stereo-type free, clear instructions, ad free.
  - Meet instructional goals for the developmental needs of the child (cognitive abilities, motor skills, social-emotional needs, interests.
  - Playful and open-ended, encourages creativity, pretend/active play
  - Scaffolded
  - Differentiated to meet various student needs
- ☐ ***Well-Planned***
  - Cost effective, resources provided, effective for young children.

Comments:

USE

- ☐ ***Physical Environment***
  - Accommodated individual/small/whole group instruction
  - Infused into multiple areas of the classroom
- ☐ ***Joint Engagement***
  - Provided opportunities for collaboration, communication (i.e. with peers, families, other educators)
- ☐ ***Connected to Non-Digital World***
  - Beyond the classroom

- *Real-world issues*
- *Expands access to new content and experiences such as creative play, physical activity, outdoor experiences, conversations, or social interactions*

☐ ***Strengthens Home-School Connections***
- *Can be used to share resources, educate, and communicate*

☐ ***Inclusive of English Language Learners/Special Needs***

Comments:

INTEGRATION/SUPPORT

☐ ***Access to Learning Communities and Professional Development*** *(i.e. online courses, tutorials, webinars)*

☐ ***Leadership/ Support***
- Clear policy for access, digital privacy/etiquette/equity
- Training/maintenance/resources provided
- Empowers teachers to effect change

Comments:

EVALUATION

☐ ***Assessment***
- Formative/tracking of student progress
- Use of interactive media (i.e. pictures/audio/video) for documentation that can be shared with families

☐ ***Reflection***
- Teacher identified strengths/areas needing improvement
- Teacher identified what needs to be changed

Comments:

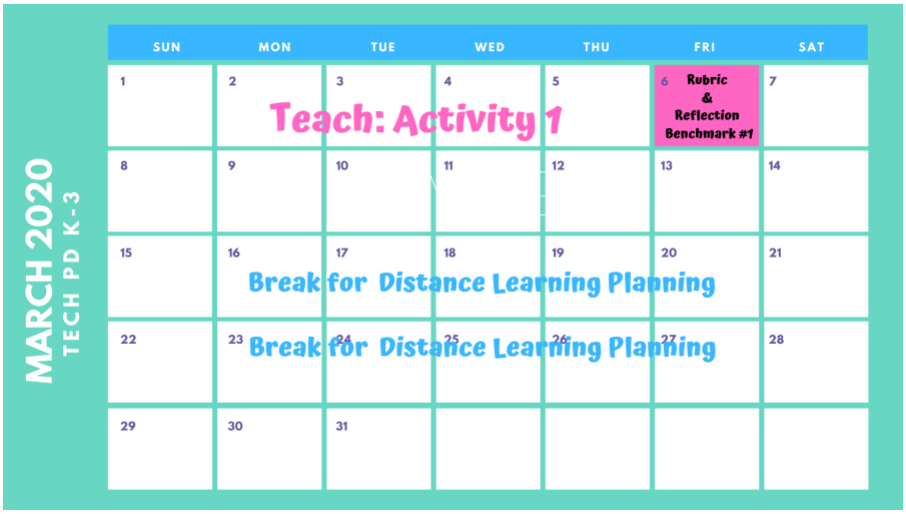
Checklist retrieved and adapted from:
https://www.fredrogerscenter.org/wp-content/uploads/2015/09/Tech_Integration_Checklist_-_Final.pdf

REFLECTION PROMPTS

1. What resources were used for this activity?
2. Were the learning objectives met?
3. Was your technology integrated lesson differentiated? If yes, please explain.
4. Were your students engaged in the activity? If yes, please explain.
5. Did you find there was an added benefit in using Seesaw with your students? If yes, what was the benefit?
6. Was your activity developmentally appropriate/purposeful for early learners?
7. What (if any) challenges did you encounter?
8. What elements of the professional development (workshop and/or PLN) did you find to be effective throughout your planning and instruction of this activity?
9. How could the professional development (workshop and/or PLN) be improved upon?
10. What else might you still need to successfully integrate Seesaw and SAMR for purposeful technology integrated instruction?

APPENDIX G

Calendar: Professional Development



APPENDIX H

Post-Intervention Survey
Technology Teaching & Learning, Needs, and Perceptions

The purpose of the post-intervention survey is to identify changes in teachers' integration of technology in their classroom teaching practices as a result of the professional development and to identify elements of the professional development that facilitated such changes. The survey will take approximately 25 minutes to complete.

Name of participant:

TECHNOLOGY ADOPTION
1. Do you integrate mobile devices into your classroom instruction? c) If yes, what are you using and what for? d) If no, why not?
2. Do you integrate apps into your classroom instruction? c) If yes, what are you using and what for? d) If no, why not?
3. Have you used Seesaw with students? c) If yes, what features are you using and what for? d) If no, why not?
4. Have you used Seesaw with parents? c) If yes, what features are you using and what for? d) If no, why not?
5. What would you like to learn about Seesaw?
6. Do you believe there is a benefit to using Seesaw? b) If yes, what?
7. Do you believe that Seesaw aligns with what you know about best teaching practices? c) If yes, what about Seesaw aligns with best teaching practices? d) If no why not?
8. Have you ever participated in Seesaw professional development? **c)** If yes, check those that apply: ___Face-to-face ___Online PD in Your PJs ___YouTube resources ___Ambassador Training Online Course ___Twitter or Facebook PLN ___Other **d) If yes, how have professional development experiences facilitated your integration of Seesaw?**
9. Rate your Seesaw skill level: Beginner, Developing, Proficient, Advanced a) Take a photo in Seesaw b) Use the drawing tool in Seesaw c) Make a video in Seesaw d) Upload a file (i.e. Word, Google doc, PDF) in Seesaw

e) Write a note in Seesaw
f) Share a link in Seesaw
g) Integrating Seesaw with students
h) Integrating Seesaw with families

10. Rate your general understanding of technology integration skill level using the scale: Beginner, Developing, Proficient, Advanced

a) Use the camera roll on mobile devices
b) Apply a method to determine if apps are developmentally appropriate
c) Integrate apps to engage children in classroom activities and lessons
d) Integrate technology to enhance learning goals
e) Integrate technology to extend and differentiate learning goals
f) Apply the SAMR model for purposeful, higher levels of technology integration

TECHNOLOGY INTEGRATION

11. Have you used Substitution?

a) If yes, how?
b) If no, why not?
c) Rate your skill level: Beginning, Developing, Proficient, Advanced

12. Have you used Augmentation?

a) If yes, how?
b) If no, why not?
c) Rate your skill level: Beginner, Developing, Proficient, Advanced

13. Modification?

If yes, how?
If no, why not?
Rate your skill level: Beginner, Developing, Proficient, Advanced

14. Have you used Redefinition?

d) If yes, how?
e) If no, why not?
f) Rate your skill level: Beginner, Developing, Proficient, Advanced

PERSPECTIVES:
TECHNOLOGY INTEGRATION, PEDAGOGY, SCHOOL LEADERSHIP, & CONFIDENCE

15. Respond to the following questions about your perceptions. Use the rating scale: strongly agree, agree, neither agree nor disagree, disagree, strongly disagree

a)I integrate digital learning tools for instructional purposes.
b) I am likely to integrate a new digital tool when I am certain it will benefit my students.
c) I am likely to integrate a new digital tool when it has been proven to be effective by my colleagues.
d) I am likely to integrate a new digital tool when I am provided with high quality professional development and on-going support.
e) I rarely resist the integration of new technologies.
f) My school expects me to integrate technology into instruction.

g) My school provides adequate professional development for technology integration.
h) My school provides ongoing support for technology integration.
i) My school provides a clear policy for appropriate selection of and access to technology.
j) My school provides ongoing support for technology integration.
k) My school provides a clear policy for appropriate selection of and access to technology,
l) My school provides a clear policy that addresses digital privacy, etiquette, and digital equity.
m) Technology motivates and engages children in classroom activities.
n) Technology can be used to extend and differentiate learning goals.
16. I am confident that I can integrate technology: a) in developmentally appropriate ways. b) to encourage collaboration and communication with my students. c) to encourage collaboration and communication with my students' families. d) to connect my students with others beyond the classroom. e) with English Language Learners f) with children with Special Needs g) as a formative assessment
17. I am confident that I can evaluate and assess whether my students are meeting expected objectives when integrating technology into my lessons.
18. I believe that reflecting on my technology integrated lessons helps me to identify areas needing change or improvement.
19. The physical environment in my classroom is conducive to accommodate technology integration.

Professional Development Follow-Up

RPROFESSIONAL DEVELOPMENT SATISFACTION
20. Did the professional development experience meet your teaching needs? 21. What elements of the professional development worked? 22. What elements of the professional development didn't work? 23. How could the professional development experience be better? 24. What about the professional development kept you engaged? 25. What about the professional development did not interest you? 26. Did the professional development facilitate the integration of Seesaw with your students? 27. Have you used SAMR to integrate any technology other than Seesaw? 28. Has the professional development changed your teaching practices? 29. If yes, how? 30. What might you still need in order to integrate Seesaw to the fullest potential with students? 31. Would you recommend the professional development face-to-face workshop to another teacher?

32. Would you recommend a Professional Learning Network to another teacher? 33. How likely are you to continue engaging with your colleagues in this Seesaw PLN? 34. Was the professional development facilitator knowledgeable and resourceful? 35. How clearly did the professional development facilitator explain the material presented to you? 36. Was the information presented to you at a speed that was too fast, ___, too slow,___ or about right___? 37. How helpful was the professional development facilitator in the planning and execution of technology integrated activities with your students? 38. Are there any areas where the professional development facilitator was especially helpful? Please explain. 39. Are there any areas that the professional development facilitator could improve upon? 40. Is there anything else that you would like the professional development facilitator to know**?**
RQ2: PROFESSIONAL DEVELOPMENT ELEMENTS: FACE-TO-FACE, ONLINE, & PEDAGOGY
41. SAMR to tool use/purposeful technology integration
42. A focus on Developmentally Appropriate Practices
43. Personalization
44. Face-to-face workshop
45. One-to-One, Face-to-face
46. One-to-One, online support
47. Face-to-face peer interaction and support
48. Online peer interaction and support
49. Anywhere, anytime, on-demand resources
50. Anywhere, anytime, on-line course for learning in small chunks
51. Anywhere, anytime, on-line course available following professional development (as a future resource)
52. Opportunities for guided reflection
53. Scaffolding (modeling, examples, step-by-step instructions)
54. Learner-centered approach (differentiation, meets needs)
55. In-house technology coach
56. Micro-Learning/Digital badge
57. What if any other elements are important for a successful technology professional development experience?
58. What are the top 3-5 elements essential to your learning
59. Final thoughts, comments

APPENDIX I

Focus Group Protocol

Thank you for your participation in this focus group. This session will be video and audio recorded and I may be taking written notes as well. Our session will take approximately one hour. I will be facilitating the discussion by asking you several questions as they relate to the research questions and encourage each of you to share your thoughts.

1. Do I have your permission to audio and video record this focus group?
2. What elements of the professional development experience have worked?
3. What elements of the professional development experience have not worked?
4. What can make the professional development experience better?
5. How has the professional development, with a focus on SAMR tasks, facilitated your integration of Seesaw and other applications?
6. What might you still need in order to apply Seesaw to the fullest potential?
7. How have you applied SAMR with the integration of Seesaw?
8 Have you used SAMR to integrate any technology other than Seesaw?
9. Have your perceptions about using Seesaw changed as a result of the professional development experience?
10. If yes, how have your perceptions changed?
11. How has the professional development experiences impacted your teaching?
12. Do you endorse this structure of professional development (face-to-face and PLN) and would you recommend it to other teachers?
13.. Is there anything else that you would like to share or for me to know about?

The focus group is completed. Thank you for your time. Next I will transcribe the interview and email it to you so that you may check the transcription for accuracy.

APPENDIX J

Research Question Matrix

Research Questions	Data Sources					
	PreS	**RN**	**TRB**	**DA**	**POS**	**FG**
RQ 1: *USE OF TECHNOLOGY K-3*						
Do you integrate mobile devices into your classroom instruction?	X				X	
Do you integrate apps into your classroom instruction?	X		X		X	
RQ 1: *ADOPTION OF TECHNOLOGY*						
Have you used Seesaw with students?	X	X	X	X	X	X
Have you used Seesaw with parents?	X				X	
What would you like to learn about Seesaw?	X				X	
Do you believe there is a benefit to using Seesaw?	X				X	
Do you believe that Seesaw aligns with what you know about best teaching practices? If yes, what about Seesaw aligns with best teaching practices? If no why not?	X		X		X	
Have you ever participated in Seesaw professional development? If yes, check those that apply: ___Face-to-face ___Online PD in Your PJs ___YouTube resources ___Ambassador Training Online Course ___Twitter or Facebook PLN ___Other If yes, how have professional development experiences facilitated your integration of Seesaw?	X				X	
Rate your Seesaw skill level – • Take a photo in Seesaw • Use the drawing tool in Seesaw • Make a video in Seesaw • Upload a file (i.e. Word, Google doc, PDF) in Seesaw • Write a note in Seesaw • Share a link in Seesaw • Integrating Seesaw with students • Integrating Seesaw with families	X	X	X	X	X	X
Rate your general understanding of technology integration • Use the camera roll on mobile devices • Apply a method to determine if apps are developmentally appropriate • Integrate apps to engage children in classroom activities and lessons • Integrate technology to enhance learning goals	X	X	X	X	X	X

• Integrate technology to extend and differentiate learning goals • Apply the SAMR model for purposeful, higher levels of technology integration						
RQ 1: ***TECHNOLOGY INTEGRATION***						
Have you used Substitution? Rate your skill level.	X	X	X	X	X	X
Have you used Augmentation? Rate your skill level.	X	X	X	X	X	X
Modification? Rate your skill level.	X	X	X	X	X	X
Have you used Redefinition? Rate your skill level.	X	X	X	X	X	X
RQ 1&2: PERSPECTIVES						
Respond to the following questions about your perceptions: Rating Scale-strongly agree, agree, neither agree nor disagree, disagree, strongly disagree I integrate digital learning tools for instructional purposes.	X		X		X	
I am likely to integrate a new digital tool when I am certain it will benefit my students.	X				X	
I am likely to integrate a new digital tool when it has been proven to be effective by my colleagues.	X				X	
I am likely to integrate a new digital tool when I am provided with high quality professional development and on-going support.	X				X	
I rarely resist the integration of new technologies.	X	X		X	X	
My school expects me to integrate technology into instruction.	X	X			X	
My school provides adequate professional development for technology integration.	X				X	
My school provides ongoing support for technology integration.	X				X	
My school provides a clear policy that addresses appropriate selection of and access to technology.	X				X	
My school provides ongoing support for technology integration.	X				X	
My school provides a clear policy that addresses appropriate selection of and access to technology.	X				X	
My school provides a clear policy that addresses digital privacy, etiquette, and digital equity.	X				X	
Technology motivates and engages children in classroom activities.	X	X	X		X	
Technology can be used to extend and differentiate learning goals.	X				X	

I am confident that I can integrate technology: • in developmentally appropriate ways. • to encourage collaboration and communication with my students. • to encourage collaboration and communication with my students' families. • to connect my students with others beyond the classroom. • with English Language Learners • with children with Special Needs • as a formative assessment	X				X	
I am confident that I can evaluate and assess whether my students are meeting expected objectives when integrating technology into my lessons.	X		X		X	
I believe that reflecting on my technology integrated lessons helps me to identify areas needing change or improvement.	X				X	
The physical environment in my classroom is conducive to accommodate technology integration.	X				X	
RQ2: PROFESSIONAL DEVELOPMENT ELEMENTS						
SAMR to tool use/purposeful technology integration			X		X	X
A focus on Developmentally Appropriate Practices			X		X	X
Personalization					X	X
Face-to-face workshop					X	X
One-to-One, Face-to-face					X	X
One-to-One, online support					X	X
Face-to-face peer interaction and support					X	X
Online peer interaction and support					X	X
Anywhere, anytime, on-demand resources					X	X
Anywhere, anytime, on-line course for learning in small chunks					X	X
Anywhere, anytime, on-line course available following professional development (as a future resource)					X	X
Opportunities for guided reflection				X	X	X
Scaffolding (modeling, examples, step-by-step instructions)					X	X
Learner-centered approach (differentiation, meets needs)					X	X
In-house technology coach					X	X
Digital badge					X	X
What if any other elements are important for a successful technology professional development experience?					X	X
What are the top 3-5 elements essential to your learning					X	X
Final thoughts, comments					X	X

APPENDIX K

Group Competency Averages: Pre- Post-Intervention Comparison Data Seesaw, General Technology, SAMR Competencies

A comparison of whole group averages in the pre- and post-intervention survey data showed an increase in all teachers' self-reported Seesaw, General Technology, and Competencies (competency scale is described on page 62). This included accessing the camera roll and integrating the Seesaw (SS) photo, drawing, video, file, note and link tools in developmentally appropriate ways to enhance and extend learning goals and for communicating with students and their families. The data also includes each SAMR competency level. This change shows further evidence of the teachers' increase in overall growth towards learning and accepting technologies to adopt and integrate purposefully into their teaching practices.

Technology	**Pre-**	**Post -**
SS Photo	1.8	3.8
SS Draw	1.4	3.4
SS Video	1.6	3.2
SS Upload SS File	1.6	3.2
SS Note	1.4	3.4
SS Link	1.4	3.2
SS Student	1.4	2.4
SS Families	1.2	2.4
Camera Roll	2	3
Tech DAP	1.4	2.4
Integrate Apps	1.6	2.6
Learning Goals	1.8	2.4
Differentiate	1.8	2.6
SAMR	**Pre**	**Post**
Substitution	2	3.6
Augmentation	1.6	3.2
Modification	1.2	2.8
Redefinition	1	2.2

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