THE INEQUITY OF DIGITAL ENGAGEMENT: EXAMINING STRATEGIES TO SUPPORT EDUCATORS IN DELIVERING ONLINE STUDENT LEARNING IN PUBLIC SCHOOLS

A thesis presented to the faculty of the Graduate School of
Western Carolina University in partial fulfillment of the
requirements for the degree of Doctor of Education in Educational Leadership

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March 2022

ACKNOWLEDGMENTS

I would like to thank my committee members and chair for their guidance and support throughout the disquisition process. Your leadership helped to guide my work and produce an initiative that has aided teachers in practice with students to deepen their understanding of online engagement.

To my design team members and colleagues in Rowan-Salisbury, I cannot thank you enough for your support and words of encouragement during the entirety of my doctoral program. You all played a critically important part of helping to lift my spirits and to embolden me to keep going. I cannot thank you all enough.

Finally, I want to thank my husband and best friend Zackary Hubbard, without whom I would be lost. Zack, I love you deeply, and I know I would not have succeeded in this endeavor without your love and support. You have always been there for me, and I know that we are going to do great things to change education for the better together. I am so thankful for you, and I am looking forward to seeing all that we will accomplish.

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ABSTRACT

THE INEQUITY OF DIGITAL ENGAGEMENT: EXAMINING STRATEGIES TO SUPPORT EDUCATORS IN DELIVERING ONLINE STUDENT LEARNING IN PUBLIC SCHOOLS

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The need for educators to have reliable professional development on refining their online teaching skills became evident during the Coronavirus pandemic. Student learning should be engaging in both in-person and online settings. Having access to trained professionals in online teaching strategies creates a learning environment that is equitable and desirable for students. This improvement science initiative seeks to examine the root causes of a lack of student engagement in online learning by providing professional development and building teacher capacity to create engaging online learning environments. Working with a district and school leadership design team, we implemented a teacher professional development initiative targeting teachers working in a fully online K-8 public school with training and resources to curate engaging virtual lessons.

Introduction to the Inequity of Online Student Engagement

In education, we expect students to learn continually, grow, and adapt. We also must hold educators and educational leaders to the same standard. The need for online instruction in PK-12 education has dramatically increased in the last two decades (Gemin & Pape, 2017). During the Coronavirus pandemic, public school systems rapidly transitioned to remote or online instruction. School systems with access to technology or those that leveraged funds could provide students and teachers with resources to continue learning outside the physical classroom. However, not all institutions were able to respond with equitable resources because this inability created inequity for students who did not have reliable access to the Internet at home, posing a real problem for many school leaders and teachers (Diallo, 2020). Additionally, since most PK-12 students and teachers did not receive any formal guidance on the most effective online teaching and learning strategies, many educators and students struggled to adjust learning strategies and pedagogy to align with this new medium for learning.

With educators and learners cast into the throws of online learning, many struggled to conduct learning and communicate effectively. The lack of in-person interaction caused many students to disengage from their education. The disparity between those students of color and economically disadvantaged students during remote learning was even more apparent. "[Data]…suggest that only 60 percent of low-income students are regularly logging into online instruction; 90 percent of high-income students do. Engagement rates are also lagging in schools serving predominantly Black and Hispanic students; just 60 to 70 percent are logging in regularly" (Dorn et al., 2020, p. 5).

Therefore, we must examine the factors that impact a student's engagement level in online learning and strategies teachers can use to influence learner engagement. Educators desire

their students to experience learning in a fun and meaningful way. This improvement initiative aims to determine techniques that can be explored, refined, and applied to in-service educational professionals to build the capacity at impacting the level of online engagement their students experience. The overall goal of the following work will be to increase engagement for online learning by providing professional development to a group of educators at a fully online public school. All students must have the opportunity to experience an engaging education, not just those physically in a classroom.

Synthesis of Relevant Literature

The Traditional view of the "Digital Divide"

The creation of the term "Digital Divide" occurred not long after the inception of the Internet itself. Several reports produced by different government agencies and universities gave birth to the "Digital Divide." One such example is a report produced by the National Telecommunications and Information and Administration (NTIA) in 1998 under the U.S. Department of Commerce. The development of this report was at the request of the Clinton/Gore Administration.

The administration instructed NTIA to conduct this study after examining their similar 1995 report; *Falling Through the Net: A Survey of the "Have Nots" in Rural and Urban America,* which at a surface level showed that more rural areas and regions of less economical/educational advancements, the fewer numbers of homes had access to the Internet (National Telecommunications and Information Administration, 1995). The design of the 1998 report was to ascertain a more accurate and updated number of specifically Internet-connected homes in the 1990s. At that time, an Internet-connected home definition consisted of having a

desktop computer, modem, telephone connectivity, and Email (National Telecommunications and Information Administration, 1998).

Although much of the data within this report is no longer relevant due to technological advancements and how Internet connectivity is defined today by the Federal Communications Commission (FCC), the NTIA 1998 report began a dialog still going today. The question of where Internet access is and is not available to individuals, how we define adequate access to the Internet, and should the Federal government get involved?

Researchers will often use technical solutions to address the "Digital Divide" rather than examine necessary social changes. Information and Communications Technology (ICT) should serve as a tool to facilitate change, not a solution (Servon, 2002). The FCC has made it very clear that they intend to support an open and unrestricted market to spur competition between Internet Service Providers (ISPs) and thus benefitting the average consumer (*47 U.S. Code § 1302(a) - Advanced Telecommunications Incentives*, n.d.). However, others view the FCC's stance on Internet access issues as an opportunity for the Federal Government to pass the problem of Internet access onto those of the private sector and philanthropic works (Stevenson, 2009). Whether it is the Federal Government's responsibility to provide Internet access to everyone has yet to be challenged. However, one fact is inevitable; only providing students with Internet access or devices is not enough to meet their educational needs in the world we live in today.

Online Learning Currently in PK-12 Schools

Although critical for online learning, having access to the Internet is merely the foundation for online instruction. Online learning has seen rapid growth in higher education and PK-12 institutions since the inception of the Internet (Picciano et al., 2010). However, students' and teachers' needs in an online environment are not the same as those of a traditional face-to-

face setting. Nevertheless, typically online institutions focus their time and research on learner satisfaction surveys and other post-learning processes that minimally impact the pedagogical complexities of learning in a digital platform (Rice et al., 2008).

In virtual learning, both the student and teacher need to understand that the amount of self-discipline required is more than in-person learning. Given that the teachers and the students are not physically in the same place when learning occurs, both need the intrinsic motivation to succeed, sometimes learning in complete solitude. Additionally, online learning requires additional support and skillsets for guardians, school administration, using multiple communication methods, and technical abilities to be successful (Rice et al., 2008). However, many teacher preparatory programs and school district professional development departments do not focus on online teaching strategies (K. Kennedy & Archambault, 2012). Given that there is a need for teacher professional development in online learning, it is clear to understand why some students struggle to be successful online with inexperienced educators.

With the lack of support and training for educators and even more minor supports in place for the learners, online classes in K-12 will often see higher numbers of students dropping the class than face-to-face instruction (de la Varre et al., 2014). In higher education studies, some researchers have indicated that despite the popularity of online courses, there is a lower retention rate of students and a high dropout percentage than traditional in-person learning (Clay et al., 2008; Morris et al., 2005). Students often have previous knowledge and experience when it comes to in-person learning. However, learners seldom have an accurate concept of what to expect in online learning with online classes. Students and the school having mismatched expectations for virtual learning often lead to frustrations, and the student becomes dissatisfied with their learning experience. If the disjointed views of expectations are left unaddressed, it can

lead to students being unsuccessful within a course or choosing to withdraw from the class entirely (Levy, 2007). It is essential for any organization that offers online courses to set clear expectations for all stakeholders before starting.

Theories in Adult Learning

Supporting educators in their professional development requires examining how adults learn and the importance of considering those learning theories when developing educator training. Exploring the available research, there are several categories in which adult learning can be categorized. It is important to identify how adults learn, specifically examining strategies that are effective in curating professional development for educators. The Learning Forward organization groups adult learning into seven standards; Learning Communities, Resources, Learning Design, Outcomes, Leadership, Data, and Implementation (*Standards for Professional Learning | Learning Forward*, 2011). From the standards, Table 1 contains each of the seven standards, a summary of that domain, and the research supporting Learning Forward aligned to their criteria.

Each of the seven learning standards focuses on essential areas of professional learning for educators. Incorporating these principles supports deeper understanding and relevance for educators as they participate in continual learning. Additionally, the Outcome standard works explicitly too, "increase educator effectiveness and results for all students…" (*Standards for Professional Learning | Learning Forward*, 2011). The approach of increasing students' outcomes by building the teacher's capacity is in direct alignment with the goals of this improvement initiative. However, not all of the Learning Forward standards could not be addressed by this initiative. These will be discussed in the Implications and Recommendations section of this paper.

Table 1. ***Adult Learning Standards and Research from Learning Forward***

Standard	Summary	Supporting Research
Learning Communities	Professional learning that increases educator effectiveness and results for all students occurs within learning communities committed to continuous improvement, collective responsibility, and goal alignment.	Bolam et al., 2005; Hord, 2005; Lieberman Miller Lynne, 2008; McLaughlin Talbert Joan E., 2001; Saunders et al., 2009
Resources	Professional learning that increases educator effectiveness and results for all students requires prioritizing, monitoring, and coordinating resources for educator learning.	Abdal-Haqq, 1996; Chambers et al., 2008; Haslam, 1998; Odden Archibald et al., 2002; OECD, 2012
Learning Design	Professional learning that increases educator effectiveness and results for all students integrates theories, research, and models of human learning to achieve its intended outcomes.	Croft et al., 2010; Dede, 2006; Garet et al., 2001; Joyce & Showers, 2002; Penuel et al., 2007
Outcomes	Professional learning that increases educator effectiveness and results for all students aligns its outcomes with educator performance and student curriculum standards.	Blank et al., 2007; Borko, 2004; Cohen & Hill, 2000; M. M. Kennedy, 1998; Shulman, 2000
Leadership	Professional learning that increases educator effectiveness and results for all students requires skillful leaders who develop capacity, advocate, and create support systems for professional learning.	Knapp et al., 2003; Leithwood et al., 2004; Spillane et al., 2001; Waters et al., 2003; York-Barr & Duke, 2004
Data	Professional learning that increases educator effectiveness and results for all students uses a variety of sources and types of student, educator, and system data to plan, assess, and evaluate professional learning.	Datnow, 1999; Desimone et al., 2002; Griffith et al., 2010; Reeves, 2012; Torgesen et al., 2006
Implementation	Professional learning that increases educator effectiveness and results for all students applies research on change and sustains support for implementation of professional learning for long-term change.	Bandura, 1995; Fullan NetLibrary Inc., 2007; Hall Hord Shirley M., 2011; Huberman Miles Matthew B., 1984; Supovitz Turner Herbert M., 2000

Note: Adapted from Standards for Professional Learning | Learning Forward, 2011

Supporting Teachers through online Professional Development

In addition to students needing support in online learning, teachers need training on how to deliver online learning. Many university programs do not offer classes or field experiences for future educators in online education (K. Kennedy & Archambault, 2012). Additionally, most educators who transition to online learning often receive little training or ongoing professional development from their school system before being asked to teach online (Moore-Adams et al., 2016). A lack of experience often encourages classroom teachers to transfer their working knowledge of in-person instruction delivery to a fully online classroom. However,

> "synchronous technologies, including videoconferencing, change the nature of communication between the teacher and students more than if they were physically in the same classroom. Anyone who is working with virtual schooling needs to understand and experience these differences" (Davis & Rose, 2007).

Therefore, school system leaders must train and support educators who teach hybrid or fully online classes within the PK-12 setting with targeted and ongoing professional development.

During the Coronavirus pandemic, education shifted to online learning with little to no training for educators and students. However, once the pandemic is over, that does not mean online learning for both teachers and students will return to entirely in-person experiences. The realm of PK-12 schooling, through a trial by fire, has built up structures and resources in a way that now can offer an entirely new method for content delivery which the professional world and higher learning institutions have already embraced. Ensuring that public education maintains relevancy and modeling real-world learning experiences for students should always remain a top priority. Educators need to learn how to navigate the online learning environment, but they also need to keep students engaged and interacting in their own learning.

What is Learner Engagement?

Numerous definitions exist for what researchers categorize as student engagement. The literature review conducted by Yang et al. demonstrates that many papers do not explicitly define the term engagement but rather cite two main works, Fredericks, Blumenfeld, and Paris (2004) and Kuh (2008). Fredericks et al. focus on behavioral, cognitive, and emotional engagement. Essentially how do students act, think, or feel about their learning.

Going deeper into Fredericks' definition of engagement, behavioral engagement is how students conduct themselves concerning course rules, academic effort, and involvement in class or school-related activities (Fredricks et al., 2004). Just as behavioral engagement is vital to the physical classroom, these same traits are essential in the virtual world. How does the student navigate the online learning platform(s)? Are students successfully submitting work and receiving feedback from the teacher? Is there active dialog with the teacher and others within the class? All are essential questions in ascertaining behavioral engagement in online learning.

The second tine of Fredricks' definition of engagement is cognitive engagement. Cognitive engagement pertains to the student's desire to master course content and overall effort within the course (Fredricks et al., 2004). Naturally, each student's cognitive engagement level will vary depending on the course subject or lesson content. Some students will enjoy math courses, while others prefer literature or history. Therefore, as educators work with students, they need to understand which students have natural cognitive engagement and those who require additional support. Knowing these student traits in an online classroom can be challenging to understand. Educators need to work harder with virtual students to identify areas of interest and ways in which the teacher can relate course content to learner interest when feasible.

How a student responds to the learning environment is an example of emotional engagement. A common term used to discuss emotional engagement would be the student's attitude. "Liking or disliking school, the teacher, or the work; feeling happy or sad in school; or being bored or interested in the work" (Fredricks et al., 2004, p. 63). Understanding student emotional engagement can be challenging in both in-person and online learning. Nevertheless, it is crucial to recognize that the learner's emotional state impacts their engagement. Reactions from students cannot be simply overlooked or treated as the student just being moody.

In addition to Fredricks' definition, Kuh adds a layer of the institution itself, setting the importance of online learning on more than just the teacher and student. Stating, "student engagement represents both the time and energy students invest in educationally purposeful activities and the effort institutions devote to using effective educational practices" (Kuh et al., 2008, p. 542). The quote by Kuh addresses that engagement is not the sole responsibility of the learner. However, instead, the institution needs to use successful practices in delivering online learning. If an instructor only provides content in a lecture-based approach and then suddenly switches to online content, the professor will continue to use the same instructional method they are most comfortable with and simply record their lectures. Without addressing engagement from both perspectives, the learner and the instructor, researchers are only examining one-half of the equation.

However, in the existing research, these definitions of student engagement are only about traditional in-person learning. There is no consistent definition of online student engagement or how to quantify it. "The truth is, many theories, or experiments that have been applied or conducted in traditional classrooms, need to be adjusted to fit the online learning environment" (Yang et al., 2018, p. 16). Lacking a clear definition of online learning engagement allows for a

wide array of interpretations and leaves school systems to develop their understanding. This inconsistency further demonstrates the need to define online student engagement and create support structures for educators and students. Determining the standard for online engagement in PK-12 learning needs to occur before evaluating the level of engagement with the instructional material, peer to peer, and the instructor can happen. Understanding how to engage learners in an online setting is just as critical, if not even more vital, than in a physical one.

Inequity in PK-12 Online Learning

Despite the infusion of technology into classrooms over the past decades, there are still disparagers between engagement and the level of access that varies across student demographics. The paper's introduction indicates how online learning can have a more significant consequence for students of color and students of lower socioeconomic status (Dorn et al., 2020). The prior section, the Digital Divide, demonstrates the exclusion of entire demographic groups from the online learning revolution that is taking place. Because there are groups of students, who do not have the same level of access to technology or the Internet, those same students do not have the opportunity to participate in online learning opportunities.

Suppose the parent of a student believes technology to be beneficial to learning. In that case, they will also see the need for their child to access technology and online learning opportunities. These are typically parents of affluence and are usually college-educated (Ortiz et al., 2011). However, not all students can live in a home that values or can financially support online learning and refinement of their technical skills. Therefore, the school system as an equity instrument needs to offer all students access to resources, opportunities, and help to access and be successful in online learning experiences.

In addition to inequities that students experience in in-person learning, due to a lack of teacher training and experience in online instructional design, students who participate in fully online instruction are more likely to have a less engaging learning experience than compared to their in-person peers (Dwivedi et al., 2019; Moore-Adams et al., 2016). Having inexperienced teachers in best practices in online instruction creates a new form of inequity for students that needs to be addressed.

Theoretical Framework in ICT Initiatives

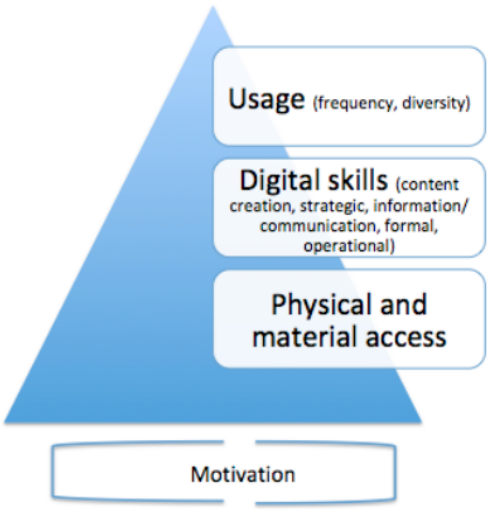
Levels of "Digital Divide"

Traditionally, information and communication technologies (ICT) implementations solely focus on gaining access to technology or the Internet. However, for an ICT initiative to be effective, those conducting the undertaking should use a multifaceted approach. Van Dijk titles an intricate ICT initiative should be the modernization approach. Van Dijk's modernization method uses ICT to support and bridge social differences and act as an instrument to facilitate change rather than being the change itself (van Dijk, 2006). For the modernization approach to be practical, there are four levels in which a change must occur: motivation, physical and material access, digital skills, and usage. Figure 1 is a graphical representation of the change areas necessary for an effective ICT initiative.

At the foundation is the idea of motivation. Without initial motivation, the individual or community will not see any value or desire to change. Secondly is access to physical materials. Most ICT initiatives solely focus on access to the hardware, providing the users with Internet access or devices like tablets and computers. Although this is an essential aspect of ICT initiatives, it is only one part of the system. This is where most ITC within PK-12 organizations end. There is a desire to provide devices for every student and teach, creating a one-to-one

environment. In the beginning, there is usually professional development for users on how to technical use these new devices. However, as time goes on, the support and training fade away, and there is seldom discussion on the pedagogical implications of these devices in the classroom.

Figure 1. *The levels of the Digital Divide.*



Note: Adapted from "Digital means for reducing digital inequality: Literature review," E. Maceviciute, T. Wilson, 2008, Informing Science: the International Journal of an Emerging Transdiscipline, 21, p. 272.

The next level stage in an ITC initiative is honing digital skills. The digital skills section entails the training, creation of content, strategy, and communication of the ICT initiative. In the PK-12 domain, we again see the digital skills referred to when new programs or hardware come out, but not in the conversation of ongoing classroom instruction or diver into a deeper level of understanding digital learning schooling. The last section of Figure 1 is entitled usage. Usage pertains to the frequency of device utilization and the Internet connection. The more time spent learning, growing, and processing, the more proficient the user will become and become more comfortable using the Internet (Maceviciute & Wilson, 2008). The assentation through the levels of the Digital Divide within Figure 1 showcases how a scaffolded approach can address

inequities and help teachers and students acquire new digital knowledge. However, when it comes to the work of instructional practices and the incorporation of technology in the classroom, another model should be used.

Conceptual Framework for Instructional Technology Integration

Technological Pedagogical Content Knowledge (TPACK)

The work of online instruction is profoundly different from that of face-to-face instruction. Educators and students must know how to use the tools for teaching, access to said tools, and the capability to communicate effectively with one another, all within a virtual environment. The Technological Pedagogical Content Knowledge (TPACK) framework visually represents the balance between content, pedagogy, and technology knowledge teachers need to succeed in online teaching (Mishra & Koehler, 2006). Figure 2 gives a visual representation of the triple Venn diagram of the TPACK model.

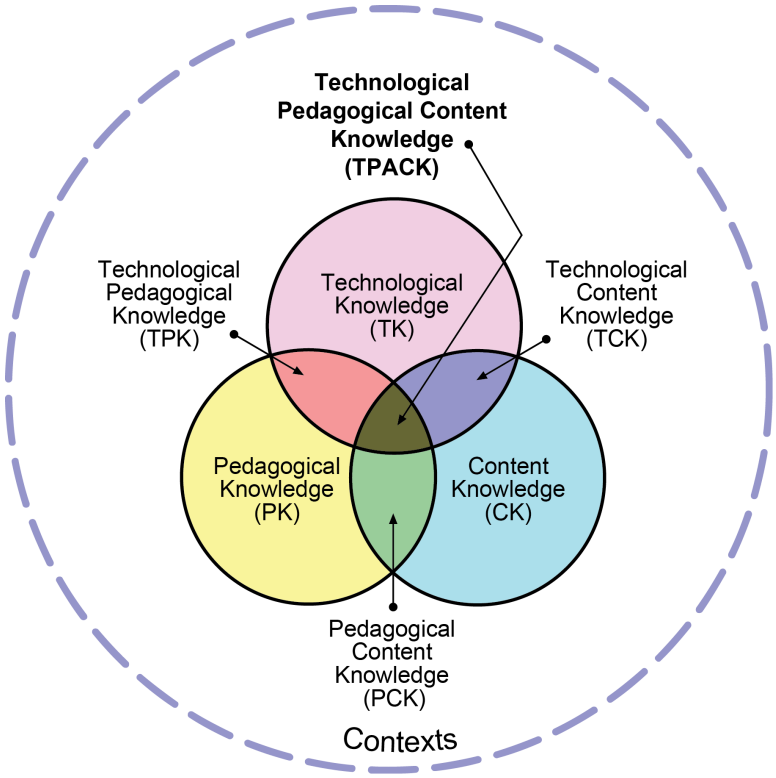
Pedagogical Knowledge (PK) is how learning occurs specifically for the learner. Within PK-12 education, standard references are made to Bloom's Revised Taxonomy or Marzano's New Taxonomy when referencing pedagogy frameworks. In essence, the educator's ability to scaffold the learning for their students.

Technological Knowledge (TK) is an educator's ability to use technology within an educational setting effectively. An educator's TK knowledge relates to instructional software like a Learning Management System (LMS), content-specific software, and relevant hardware such as teacher and student devices used within the learning environment.

Content Knowledge (CK) is understanding the discipline or subject area in which an educator works. For example, a high school science teacher has a foundation in Chemistry, Physics, Biology, and Earth sciences. In contrast, an elementary teacher understands concepts

such as handwriting, order of mathematical operations, phonics, and literary devices. Educational preparatory institutions typically center much of their work on preparing future educators within the PK and CK regions of the TPACK model (K. Kennedy & Archambault, 2012).

Figure 2. *The TPACK framework.*



Note: Reproduced by permission of the publisher, © 2012 by tpack.org

Additionally, many teachers receive continued content and pedagogical knowledge training through their institution. Thus, many educators in the PCK region of the TPACK model lack adequate technological knowledge (TK). However, some educators take the time to learn the technology and their content area, but their Technological Pedagogical Knowledge (TPK) and training only apply to face-to-face instructional strategies. Therefore, most classroom teachers do not have the necessary knowledge to be effective educators in a fully online learning environment.

Determining Causal Analysis in Improvement Initiatives

Foundation in Improvement Science

Both ITC initiates, and the TPACK framework requires a thorough understanding of a problem if there is any chance of a solution. Utilizing a methodology like that of improvement science to identify foundational causes and seek solutions is gaining popularity as a practice amongst educational researchers (Crow et al., 2019). Improvement science uses models like the Plan, Do, Study, Act (PDSA) and Root Cause Analysis (RCA), sometimes called a Fishbone Diagram, to identify root causes of a problem (Langley et al., 2009). In performing an RCA, there are four significant steps to follow, the first being to quantify the main issue to address.

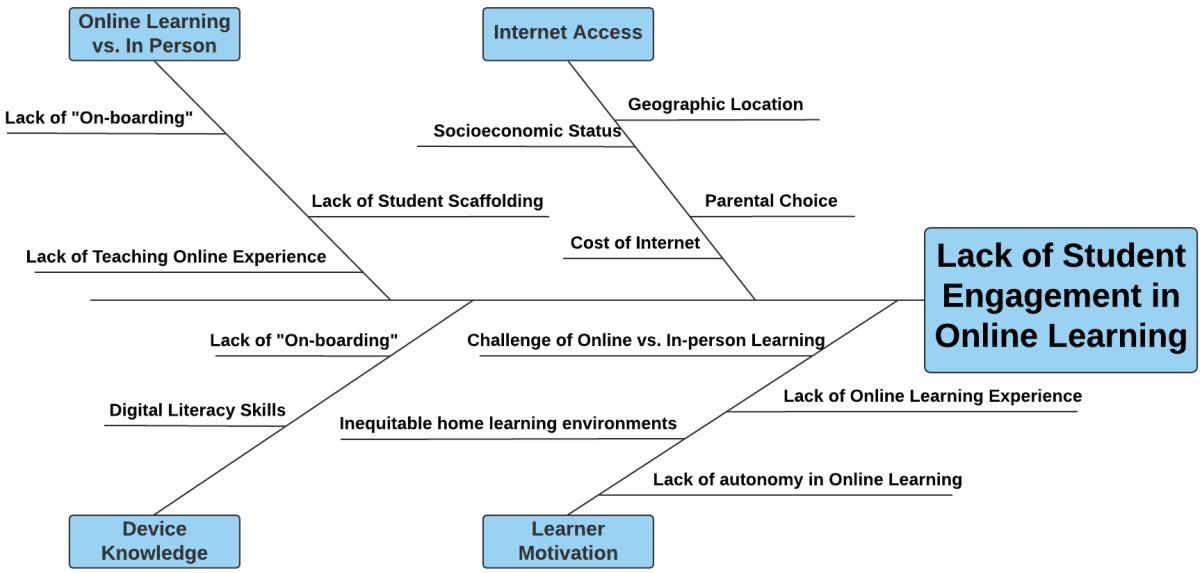
Conducting a Root Cause Analysis (RCA)

Determining the topic of an RCA places those within the study on the same track and helps identify the research's desired outcome. Ensure that each member of the initiative understands the leading cause attempting to address fosters unity and alignment from the beginning. The second phase of an RCS is to identify branches off from the main problem as core influences that cause the problem to exist. Typically, one offshoot from the central topic research team will examine potential resolutions. The next phase of an RCA identifies more specific details beneath each of the main categories impacting the main problem. These are smaller supporting structures or obstacles that can be isolated. Lastly, the researcher repeats the process until all potential causes and supporting details are identified. Therefore, researchers conducting an RCA should review their diagram multiple times to ensure that all aspects of the problem are adequately identified and categorized as either a core influence or supporting ideas (Doggett, 2005). These steps' importance allows educational researchers to determine the true causes of the problem they attempt to address.

Student Online Engagement RCA

Often, many educational leaders look for solutions to their problems without spending an adequate amount of time examining an issue's underlying causes. Figure 3 contains an RCA examining the potential factors that impact student engagement in online learning. Although this diagram does not identify all possible reasons why students struggle with online learning, it recognizes several possibilities. Again, using an RCA method like the fishbone diagram investigates the genuine cases of an issue and prevents the human desire to create immediate solutions.

Figure 3. *Root Cause Case Analysis for Lack of Student Engagement in Online Learning*



Online Learning vs. In-Person

From the examples provided in this paper's literature review, many students and teachers struggle with engagement in an online environment. Therefore, both teachers' and students' skills to succeed within an online course are different and need centering around the virtual classroom (Borup et al., 2019). This disquisition focus will be supporting educators in delivering online

instruction with a specific emphasis on factors that impact student engagement. However, to adequately explain the RCA, each of the main ideas has an explanation in the following paragraphs.

The areas of root causal analysis under the section of online learning vs. in-person instruction are where this improvement initiative is aimed at addressing. In the subsequent sections of the paper, readers will learn about an intervention that works to build teacher capacity in their online course development as well as an increased understanding of the importance of high-quality online instructional design.

Access to the Internet

Many PK-12 public school systems attempt to create equity for their students by giving out devices and making an appearance of integration of technology into the educational environment. Such programs marginalize students who do not have access to the Internet at home (Salemink et al., 2017). Students who go without access to the Internet at home miss out on resources and support structures that their peers with the Internet can take advantage of. Thus creating inequitable learning outside of the physical classroom.

Ability to use Technology

There is a generalization that students, because they grow up with technology, are more adept at using technology for learning, referred to as digital literacy. However, the opposite is true. Often students can struggle to use technology to promote understanding and critical thinking skills (Moore et al., 2018; NC Broadband Infrastructure Office, 2019). Additionally, many educators do not take class time to explain foundational technology usage leading to frustration on both the teacher and students.

Learner Motivation

There is are some similarities between learner motivation and online vs. in-person learning. However, the response of the learner does warrant a specific notation. There is a stigma for online learning; a student is sitting in front of a computer receiving a monotone lecture. Unfortunately, sometimes the stigma is all too close to reality. Often schools will only recommend students for online classes if they are self-motivated (Curtis & Werth, 2015). Therefore, it is crucial to note that the learning level correlates with their motivation to participate in the course.

Complexities of a Public School System

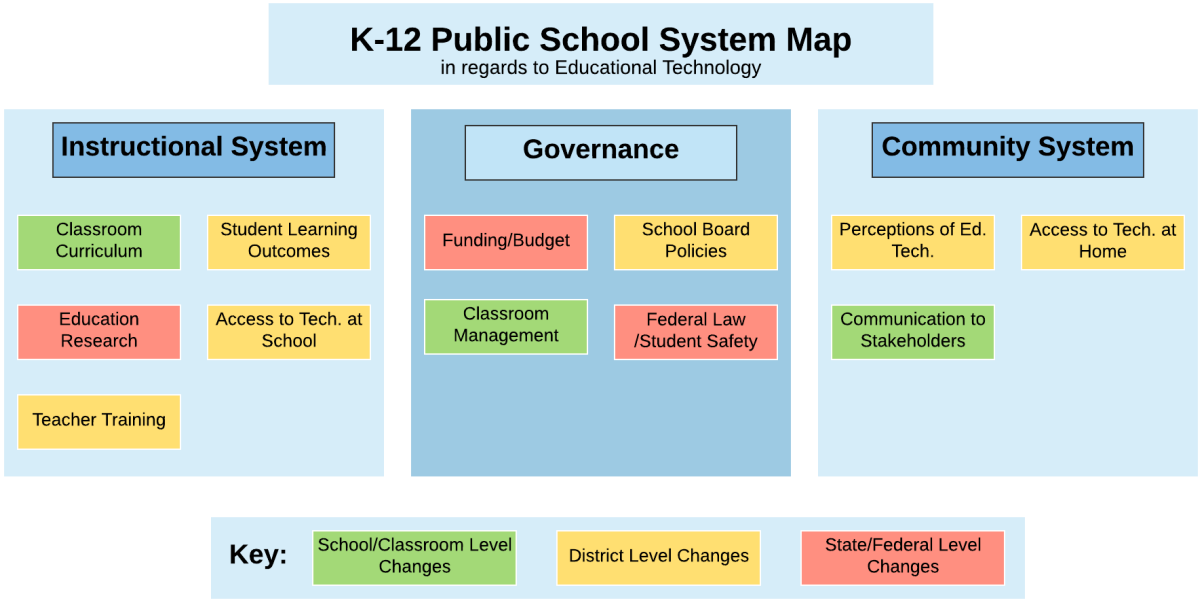
Overview of Public School Systems

Public school systems must ultimately answer to local and state boards of education. The local board members are elected officials who often have little to no experience as an educator. School board members' lack of knowledge and understanding of public-school policy can often impede initiatives and stifle creativity (Roberts & Sampson, 2011). Many public school boards desire schooling to be as it was for them. Sometimes leading to a mixed desire for more traditional education and initiatives that increase technology and Internet access without proper training and structures can often be a disaster. Ultimately, the superintendent's role is to balance the school board's desires, community, and necessary public education changes.

Another complexity of public-school systems resides around the needs of the students themselves. No two students come from the same background unless they are related. This diversity creates schools that are vast in their makeup and needs. Despite this diverse school population, many students of color and economically disadvantaged students do not have access to the same resources as their peers. "Access to high-quality learning opportunities remains a

problem when Black and White students attend the same schools…" (Diamond, 2013). Like the one in this improvement initiative, many school systems fail students by continuing practices that result in society's reproduction. Slow-moving governing bodies and lack of adequate funding often leave public school systems trapped in a cycle of producing the same product of students that has been for the past fifty years.

Figure 4. *North Carolina Public School System Map of Internal and External Factors*



North Carolina Public Schools

Public school systems are complex entities. These systems serve a wide variety of families who have needs that reach both ends of the socioeconomic spectrum. Figure 4 outlines a system map of a typical public K-12 school system within North Carolina. System mapping identifies the structures within an institution or an organization and how they interact. Another use for system maps allows those external to the system to examine and understand how work occurs within the system (Bryk et al., 2015, p. 70). Our system map focuses explicitly on the topic of educational technology. Many factors of educational technology are within the control of

the local school system. School systems must not leverage this control without the involvement of various stakeholders. Many parents are apprehensive about increasing technology in their child's education (Ortiz et al., 2011). This apprehension can lead to anger when school systems attempt to provide students with technology or Internet access. If technology initiatives are successful, they need to include the community in conversations and decision-making processes.

Rowan-Salisbury School System Overview

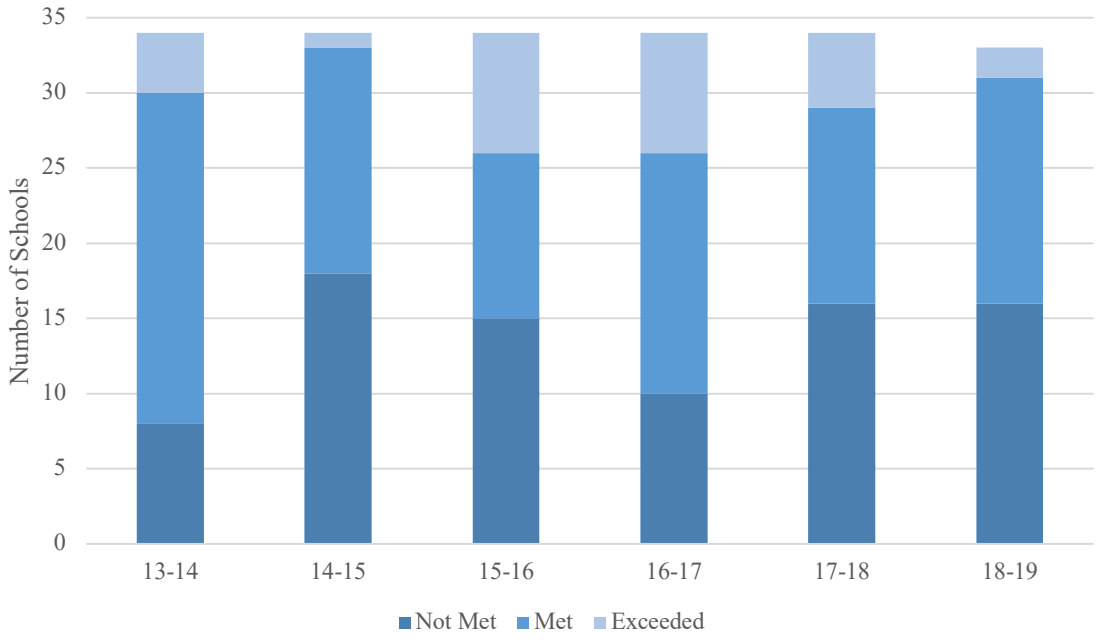
This improvement initiative centers around educator support in addressing engagement for online learners within an entirely virtual K-8 school. The Rowan-Salisbury School System (RSSS) comprises approximately 18,500 students and 3,000 staff members across 36 sites. The student population demographics are 74% White, 16% Black, 8% Hispanic or Latino, and 1% Asian (*School & District Navigator*, 2017). Over the last six years, RSSS schools were inconsistent in meeting standardized test score growth.

Figure 5 demonstrates the inconsistency in student performance in RSSS. The data represented in Figure 5 is a combination of pre-assessments, state benchmark assessments, and a final End-of-Course or End-of-Grade examination calculated using the Education Value-Added Assessment System (EVAAS). The school's aggregate EVAAS data places a school in one of three categories, Not Met, Met, and Exceeded growth (North Carolina Department of Public Instruction, 2018). Although student academic performance is not an element within this improvement initiative, a student's ability to be actively engaged in the learning process correlates with academic performance (Meyer, 2014).

Beyond basic district statists, there are a few other relevant facts about RSSS, the first being the district's one-to-one initiative. Since 2014 RSSS has supplied every student and teacher with a device for teaching and learning (*District Information - Rowan-Salisbury Schools*,

n.d.). The well-established program allows for equality for all students in the device used for their education. Although having a one-to-one program does not address online engagement, it does address the hardware aspect of the “Digital Divide” that does exist for many students (Maceviciute & Wilson, 2008). Because RSSS has a well-established student device program, this improvement initiative will assume that students and teachers have access to technology and will work to address the upper levels of the Maceviciute & Wilson diagram, specifically the Digital Skills and Usage categories found in Figure 1.

Figure 5. *EVAAS Growth data for Rowan-Salisbury Schools*



Besides RSSS's device program, the district is the only one in the state to receive special fixability from N.C. General Assembly. House Bill 986 named RSSS a "Renewal School System," giving the district charter-like flexibility (The General Assembly of North Carolina, 2018). The Renewal legislation explicitly provides the school system with greater freedoms in four main categories: curriculum, personnel, financial, and calendar flexibilities. The Renewal

system's goal is to "…empowers schools to create an engaged learning environment, so students enjoy learning and teachers enjoy teaching" (Rowan-Salisbury School System, 2020).

RSSS Response to the COVID-19 Pandemic

In March of 2020, when the COVID-19 pandemic was just beginning to impact public schools, RSSS quickly worked to determine how remote learning would affect the students and teachers. Due to the district's forwarding thinking by having a one-to-one program, issuing student devices was not an issue for RSSS. However, when discussions began on returning to the classroom in the fall of 2020, many educators and families were apprehensive about returning to in-person learning.

RSSS followed many other local school systems in developing a fully online school for students who wished to remain in online learning for the 2020-21 school year. The *Rowan Summit Virtual Academy* (SVA) initially had over 2300 students and 100 teachers. However, throughout the improvement initiative, the number of students and teachers at the school decreased due to a return to in-person learning within RSSS. The creation of the fully online school gave students and teachers the opportunity to participate in learning in a safer environment given the current pandemic. However some educators and students chose to transfer to Summit specifically for health reasons, not necessarily that they would be successful in an online learning setting. Given the short timeframe in which this district created the school, teachers, and students have received minimal training or support on strategies for effectively navigating the world of online learning. The combination of an expedited timeline and a lack of teacher a student preparation for online learning left many students struggling academically and teachers feeling as though they were as inexperienced as a first-year teacher.

The work of this improvement initiative is to respond to the inevitable fate that pandemic expedited, the expanding of online learning within the PK-12 public school system. Working with teachers to better understand online education, make content engaging, communicate with students, and promote class unity are learning objectives for the teachers participating in the improvement initiative. In the subsequent sections of this paper, we will examine the actions taken and the data collection processes to assess if the work is successful.

Initiative to Increase Online Student Engagement

Developing a Design Team

The development of a design team is essential for the successful implementation of the improvement initiative. Including other members in forming a team helps analyze the identified problem, postulate potential solutions, and communicate to others within their network (Bryk et al., 2015, p. 159). A design team comprised of district-level and school-based employees will be the basis of the definition of a design team for the disquisition. The selection of these individuals will help identify, develop, implement, and evaluate the improvement initiative for impacting online student engagement.

The design team members will include Summit administration, district curriculum specialists, instructional technology facilitators, and the principal investigator. Each team member must bring their unique lens to the team to ensure that we include an array of perspectives and that the training they develop is targeted and meaningful to the staff at Summit. Including Summit administration will ensure that the design team's direction will align with the school's vision and that teachers will find the support beneficial. Leveraging a district curriculum specialist encompasses a lens inclusive of the district's overall learning goals for students, whether in-person or online. Finally, instructional technology facilitators on the design team are

experts in the technology teaching tools used within the district and deliver professional development to teachers. Coordination between Summit and central office administration on selecting these team members will yield the most impactful resources for Summit teachers. The Assistant Superintendent of Curriculum will oversee the design team as an added level of validity. The oversight of someone such as the Assistant Superintendent of Curriculum ensures that the design team aligns the work or the improvement initiative to the district's goals and is sound in accepted district policy and procedures for delivering teacher professional development.

Understanding and developing the Driver Diagram

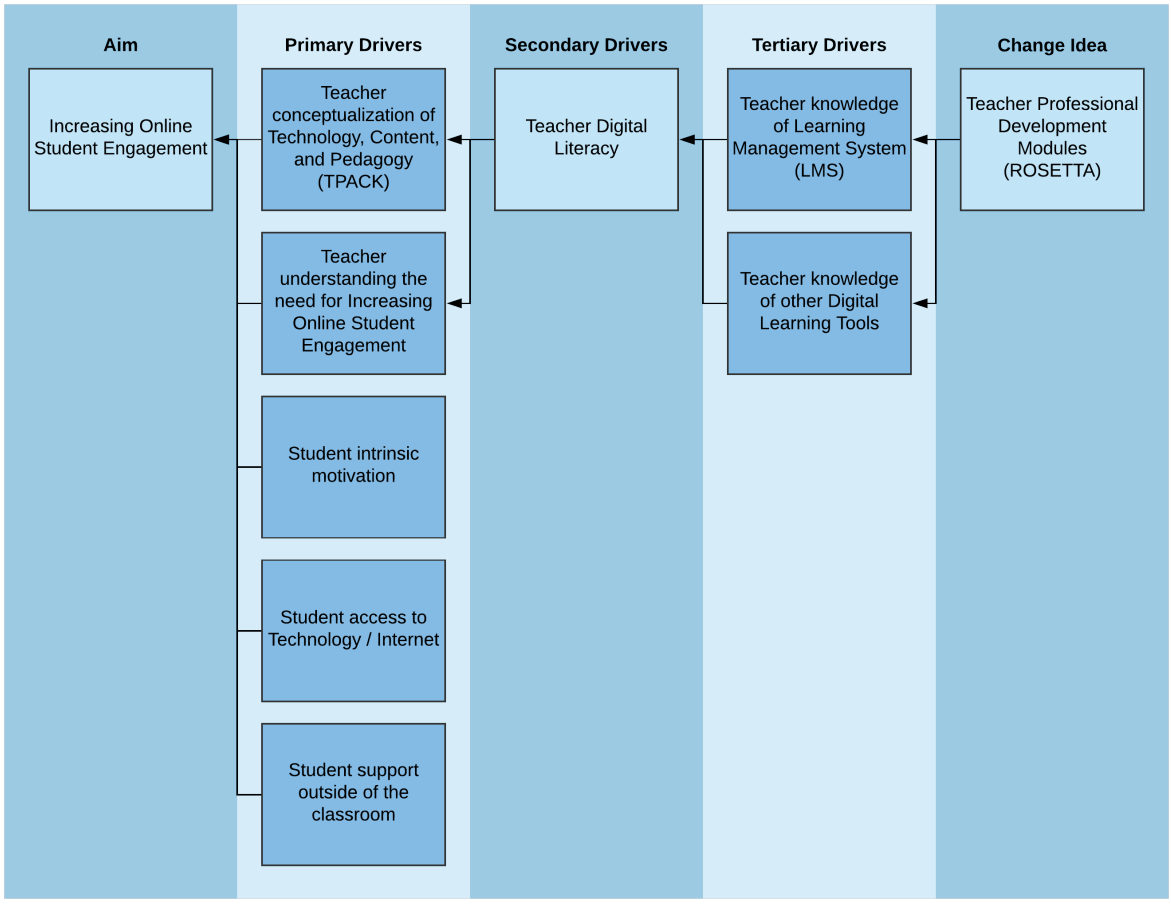
The newly formed design team will examine methods to support educators in understanding and developing engaging online learning. One of the first actions the team will take is creating a driver diagram. A driver diagram is a visualization of the steps in addressing a root cause or problem. The figure begins with an aim or goal directly related to managing a root cause identified by the RCA. To the right of the aim are then placed primary, secondary, and sometimes tertiary drivers to reach the desired aim. Lastly, the drive diagram contains a change idea on the far right. The change idea serves as the independent variable within the improvement initiative and will facilitate the drivers and ultimately the aim or goal (Crow et al., 2019).

Creating Interventions for Driving Online Student Engagement

Figure 6 is a driver diagram whose aim is to impact classroom teachers' ability to create engaging online content for students within a fully online public-school setting. The driver diagram's purpose relates to the RCA branch identified in Figure 3 of online vs. in-person learning. As previously stated, this improvement initiative is specifically developed to address the one area of Online vs. In-Person learning from the RCA. The challenges of an online classroom, as previously identified, are different for both the teacher and student. The

intervention plan will examine the current understanding that a specified group of teachers have and develop a professional development series based upon their identified needs. There are external factors identified in the driver diagram in Figure 6 outside the improvement initiative's scope. It is important to note that although the desired outcome is to increase online student engagement, we do not address any factors that directly contribute to the student's motivation, access to technology, or support structures at home.

Figure 6. *Driver Diagram on Student Engagement in Online Learning via Increasing Teacher Capacity*



Theory of Improvement for Increasing Teacher Capacity for Online Engagement

The design team will expand upon a theory of improvement that addresses two critical goals about increasing teacher capacity in relation to online student engagement. These goals derive from the main aim identified in Figure 6 of Increasing Online Student Engagement. Selecting two goals manages teacher comprehension of TPACK and online student engagement during the 90-day improvement initiative timeline. Our improvement theory is to work as a design team to; define online student engagement in RSSS, support Summit teachers to understand why online engagement is critical, and develop engaging online learning environments. Figure 6 gives a visual representation of how the design team's actions will work to build teacher understanding of the importance of online engagement and facilitate each of the driver phases of the initiative. However, before the team can begin to take any action, there must be a consensus on the definition of engagement. That is why the first goal is to define the term engagement of the improvement initiative. The purpose of engagement that the design team develops will only pertain to our current improvement initiative and the collection of possible data points within the implementation timeframe.

Creating a professional development (PD) curriculum will be the second goal once the design team has defined online student engagement and ascertained baseline data. The Redefining Online Student Engagement and Teacher Training Application (ROSETTA) will be the name given to our improvement initiative. ROSETTA will provide Summit teachers with experiences and information on research-based strategies that will increase teacher understanding of the importance of student engagement in an entirely virtual learning environment. The approach and resources that the design team will use to develop the ROSETTA content are in the *Cycle II* section of the paper. The goal of the ROSETTA training would seek to provide Summit

teachers with an ideal model of online course development and resources on how to replicate the same level of content development within their courses. The design team set a goal for at least 80% of the participants to find the PD meaningful and relevant within their subject area/grade level.

Utilization of the Plan, Do, Study, Act Cycle Method

A Plan, Do, Study, Act Cycle or PDSA is a cyclical framework utilized in improvement science work. The benefit of the cyclical progression of PDSA allows each cycle to facilitate and improve the next revolution for continual development (Langley et al., 2009, p. 145). Additionally, PDSA cycles enable modifications to the initiative and the design team to respond to the feedback provided throughout the process, making it ideal for developing our ROSETTA PD content (Bryk et al., 2015, p. 121). There are three critical questions that each PDSA cycle should address: the goals, how will any changes be monitored, and what modifications need to occur to reach the desired outcome (Langley et al., 2009, p. 24)? The improvement initiative's PDSA cycles address the main aim of working with classroom educators on increasing online student engagement.

ROSETTA Improvement Initiative Timeline

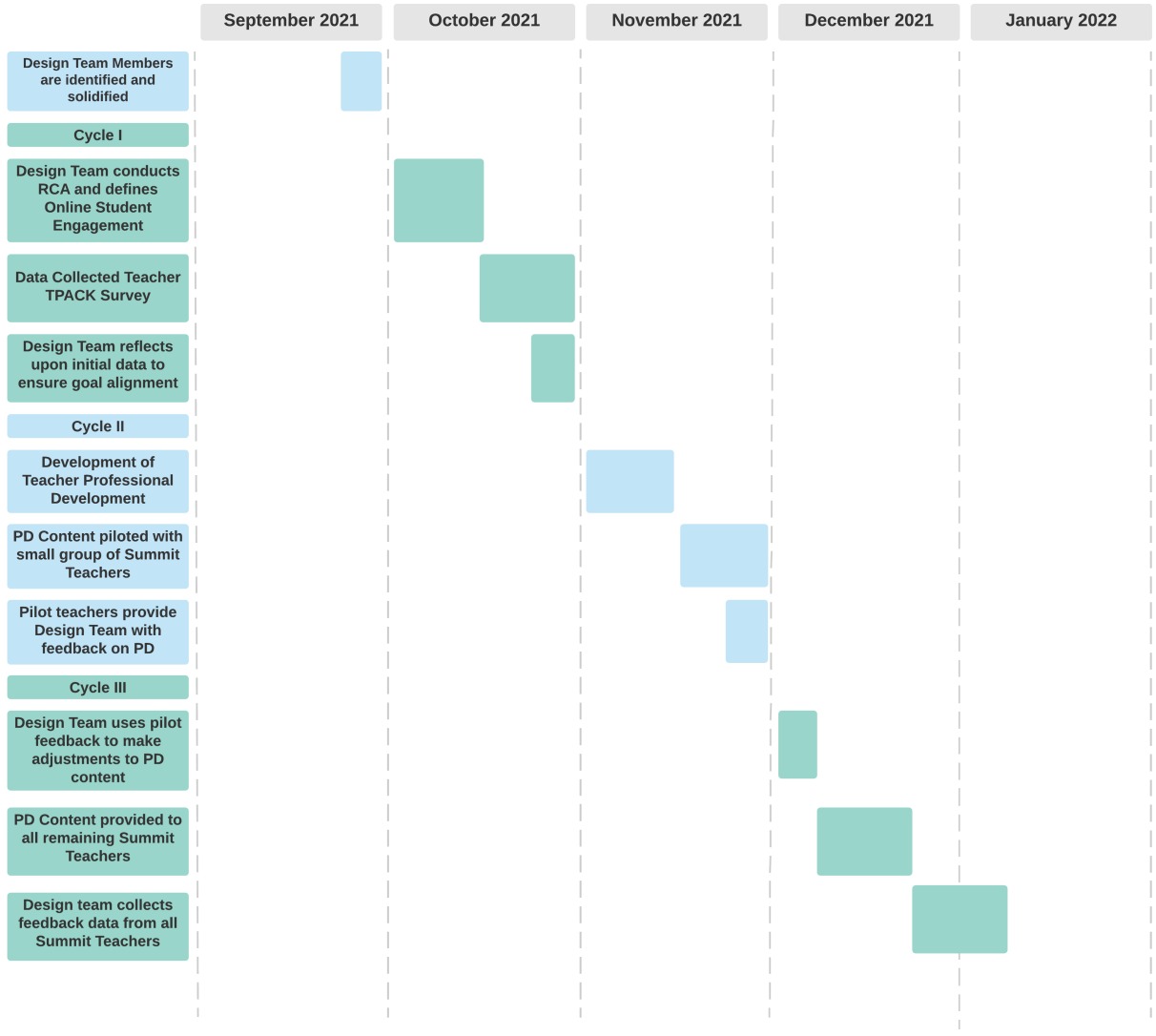
Figure 7 contains a visual representation of the implementation timeline for the design team's work. The three subsections that follow outline the three PDSA cycles that will occur as a part of the ROSETTA implementation framework.

Cycle I – Design Team Creation & Initial Data Collection

The initial PDSA cycle will involve developing the design team and initial data gathering. The design team will then conduct an RCA on identifying causes for lack of student engagement in online courses. The RCA will be like the one found in Figure 3 in that the design

team will assess core causes that impact student online learning engagement. Specific instructions will be given to the design team when conducting the RCA not to use deficit terminology or target vocabulary that implies that either students or teachers are at fault for lack of online engagement.

Figure 7. *ROSETTA Implementation Timeline*



Within Cycle I, data collection will occur from an initial survey to teachers. As the improvement initiative centers on the inequity of online engagement, we must examine data from those responsible for delivering instruction to students. The data collected from teachers will be a self-assessment aligned to the TPACK framework. The self-assessment will allow the design team to identify teacher professional development needs using a modified instrument developed initially by Denise et al. The modification to the original tool included relevant information about the school district and specifically focused on questions about the incorporation of technology into instructional practices. Appendix A contains the instrument in its entirety. The survey's distribution will be to the entire Summit teaching staff to achieve a 100% response rate. The delivery method will be via an email to all staff containing a link to a Qualtrics digital version of the questions. Data collected from the survey will be de-identified by the Summit administration not participating in the design team before any analysis occurs.

Cycle II – Developing ROSETTA & Piloting

The data collected in the first PDSA cycle will allow the design team to understand Summit teachers' current knowledge level related to developing online engaging learning experiences. Then the design team will create a specific professional development module targeted at addressing any knowledge gaps that exist for the teachers at Summit. The development of the learning module will follow the Instructional System Development (ISD), also referred to as the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model (Morrison et al., 2013). The ISD framework is like a PDSA cycle in that it is a cyclical improvement protocol specifically designed for the improvement of instructional content.

The development of Redefining Online Student Engagement Teacher Training Application (ROSETTA) will be the name given to the ISD improvement initiative the design

team will develop. The team will create the PD content for the Summit teachers within the LMS to allow the teachers to experience engaging online content through a learner's lens. Such examples include instructor-to-student communication strategies, learner-to-learner communications, and collaborative real-world learning opportunities (Bolliger & Martin, 2018).

Using these strategies supports the adult learning standards on Learning Designs and Learning Communities identified by Learning Forward, 2011. Table 2 outlines each of the seven learning standards from Table 1 and how ROSETTA will or will not address those domains. For example Table 2 shows that the initiative will work to address challenges in Learning Design as well as provide educators with resources aligned to online instructional design. However, the improvement initiative will not be able to measure any long-term changes outside of the ninety-day window or specifically align to educator performance outcomes.

After developing the ROSETTA learning modules, a small pilot consisting of three to five Summit teachers will review the content and provide feedback to the design team. The input will follow usability testing containing two open-ended questions from (Robinson et al., 2017) on online PD teacher course development. Reflecting on the course at this point, what is one thing you would have us not change, and what is one thing you would have us do differently? Usability testing is a methodology that allows an end-user to provide feedback on a product that is specific to the target audience (Rubin & Chisnell, 2008, p. 25). The pilot teachers will provide anonymous feedback using the feedback form found in Appendix B. Allowing teachers to provide anonymous feedback will encourage their responses to be as honest as they would like, without the fear of anyone knowing what they wrote. The data collected from this form will allow the design team to make necessary revisions to the professional development content before deploying it to the entire Summit teaching staff.

Table 2. ***Adult Learning Standards utilized within ROSETTA***

Standard	Alignment within ROSETTA
Learning Communities	• Participants will consist of the staff at one school within the identified district. • Participants will have access to asynchronous methods of communication and collaboration within the LMS.
Resources	• ROSETTA will showcase a variety of engaging resources that SVA teachers have access to within the LMS.
Learning Design	• ROSETTA will provide participants with best practices in designing online learning environments. • The learning content within ROSETTA will model effective online instructional design.
Outcomes	• ROSETTA will contain specific training on student learning outcomes and how those standards can be leveraged within the LMS. • ROSETTA will not address specific educator outcomes/standards.
Leadership	• Not directly addressed in ROSETTA.
Data	• During the PDSA Cycles, the Design Team will review feedback provided by the pilot teachers to adjust the ROSETTA training.
Implementation	• Educators will be encouraged to implement ROSETTA learning into their own instructional design. • The scope of the improvement initiative is not capable of measuring any long-term changes.

Note: Adapted from Standards for Professional Learning | Learning Forward, 2011

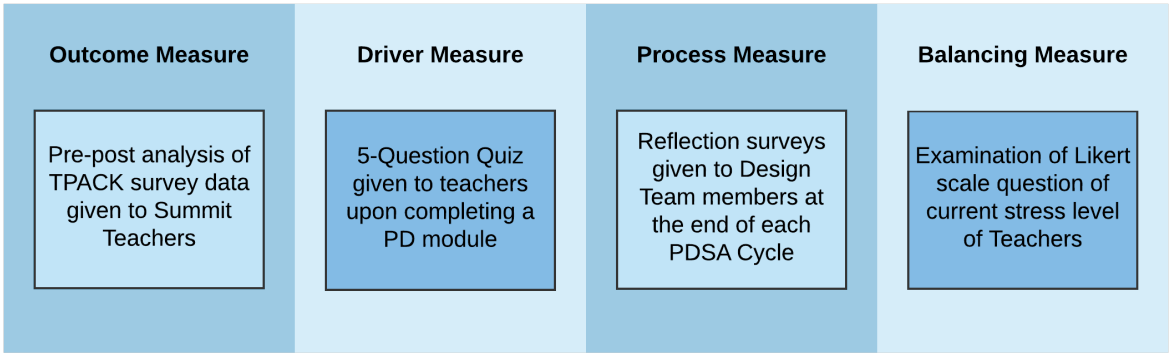
Cycle III – Deploying Training to Summit Staff & Collecting Feedback

Cycle III will begin with the design team determining any changes that need to occur to the professional development content based upon the pilot group of educators' feedback. Upon completing any modifications, the design team will work with the Summit Academy administration to deploy the professional development to the entire staff. Referring to what is

known about adult learning, using the data from the pilot teachers to modify ROSETTA supports the work of the Data standard from Learning Forward, 2011, as seen in Table 2. The delivery system for the PD content will be through the district's LMS and will be asynchronous instructional content. The reasoning for using an asynchronous learning approach is to ensure adequate time for completion of the PD with the timeline of the improvement initiative timeline.

At the end of each module, teachers will briefly reflect on the module's content. These assessments will allow the design team to understand how well we drive our change and if teachers comprehend the PD instruction. Figure 8 shows the driver measure of the module quizzes and the other measures the design team will use. The modules will begin with a 5-point Likert-based question asking them about their current stress level to ensure adequate teacher support and serve as a balancing measure. This data will assist the design team by serving as the pulse check on the amount of stress placed upon teachers by the training and their current workload.

Figure 8. *Multiple Measures utilized by the ROSETTA Design Team*



After completing the PD content, teachers will take the survey in Appendix A for a second time. The one change between the two instances will include two open-ended questions for Summit staff to provide feedback on the ROSETTA training to the design team. Comparing

the pre and post-surveys will allow the design team to determine if the improvement initiative effectively obtains our outcome measure of educating and supporting teachers in growing their ability to create engaging online lessons.

Compensation for Participation in ROSETTA

For participants in ROSETTA, each who completes the training entirely will receive one Continuing Education Unit (CEU) in the Digital Learning Competencies (DL) subject within North Carolina. These CEUs are how educators renew their teaching credentials within the state. Each time an educator continues their licensure, they must have two DLC CEUs (*North Carolina State Board of Education Policy LICN-005: Licensure Renewal Requirements*, 2021). Therefore, participants will receive half of what is needed to satisfy the DLC requirements for licensure renewal by completing the ROSETTA training.

Examining the Impact of ROSETTA

Defining Online Student Engagement for the scope of the Improvement Initiative

The design team began their work by determining the examining the ways in which their own professional experiences define the term student engagement. All of which were previous practices as classroom teachers, instructional coaches, and administrators with the lens of in-person PK-12 instruction. Referring to the theories of engagement in the literature review, most of the design team aligned with statements from Kuh's indicating that there are responsibilities on both the part of the student as well as the institution for authentic student engagement to occur.

The task then for the design team was to craft a relevant definition that supported the work of online learning at SVA as well as supporting teachers in creating engaging online instruction. Given the timeline of the initiative and the fact that there were not sufficient

resources to collect data directly from students, the team decided that the best method for impacting student engagement would be to build up and measure the capacity of the teachers at Summit to understand best practices in online course development and their wiliness to implement these strategies into their own instruction. Therefore, for the purposes of this improvement initiative, the definition of online engagement is; Applying research-based strategies that increase student interaction, collaboration, and curation within the digital learning environment. Using this definition, the design team applied the same requirements to the ROSETTA PD experience to model this definition of online engagement that eventually would become the expectation for SVA online learning.

Processing the Design Team's formative feedback

Throughout the implementation of the design team's work, the collection of several formative data points took place. After each cycle, the design team completed an anonymous reflective survey regarding their thoughts on the process throughout the improvement initiative. The survey asks about the activities conducted during the cycle and what improvements can occur before moving into the next cycle. The instrument is included in Appendix C of this paper. The following is the examination of the design team's feedback on the improvement initiative.

ROSETTA design team feedback on team cohesion

The design team's data analysis allows the project leader to measure the improvement initiative's process and make any necessary adjustments during the project. One such measure was the cohesiveness of the design team throughout the initiative. Table 3 contains the data from each design team member on rating their comfort level with working with the team and their impressions on the atmosphere when meetings took place. As the improvement initiative for ROSETTA took place, the data indicates that the design team grew more comfortable and

positive in their working together. The data began with Cycle I with a mean of 9.40 and standard deviation of .80 and ended with 9.80 and .40, respectively. There was an increase in the mean throughout the work and a decrease in the standard deviation, indicating that respondents were in alignment with their answers. Given the high mean and low standard deviation, the data concludes that the design team worked well together and that the team members supported the decisions made throughout all three of the PDSA cycles.

Table 3. ***Design team feedback working with one another during the PDSA cycles***

PDSA Cycle	n	μ	σ	σ^2
I	5	9.40	.80	.64
II	4	9.50	.47	.75
III	5	9.80	.40	.16

Likert scale, 0-10

Design team views on PDSA alignment to the project goal

In addition to understanding team cohesion, the design team members also reflected upon the decisions made during the cycles and how they felt those decisions aligned to the initiative's overall aim. The subsequent quantitative questions in the design team reflection instrument asked members to rate the alignment of each of the PDSA cycles to the overall objective of the initiative on a Likert scale of one to ten. To ensure that team members remembered the project goals, they were referenced at the beginning of each meeting. All the data within Table 4 shows that the design team members felt as though the goals of each of the three PDSA cycles were making progress towards the overall aim of the initiative. There is a decrease in the mean from Cycles I to II; however, that is corrected in Cycle II with a final mean of 9.80. Despite the fluctuations in the mean, the standard deviation does decrease through each of the three cycles. The decrease in the standard deviation indicates that the design team understood the overall goals

of the initiative and that they were in alignment in understanding how each of the data from the three cycles helped to inform the next and in reaching the overall outcome.

Table 4. ***Design team feedback on the PDSA process in addressing the primary goal***

PDSA Cycle	n	μ	σ	σ^2
I	5	9.60	.80	.64
II	4	9.00	.71	.50
III	5	9.80	.40	.16

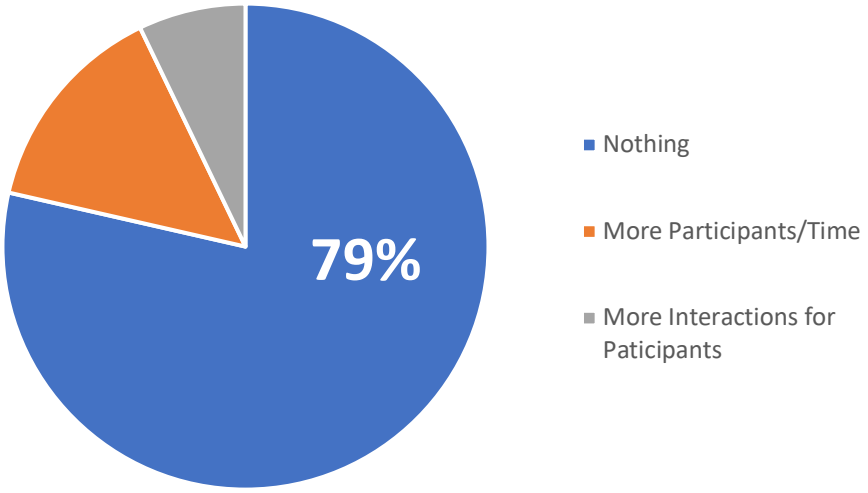
Likert scale, 0-10

Reflective thoughts from design team members on changes to the initiative

The last question asked of the design team for feedback was open-ended and asked what they would do differently or change to improve the work of the cycle they just completed. The submissions from the three cycles were coded and are compiled in Figure 9. The responses from participants were categorized into major themes through a qualitative data process called coding. "Codes are primarily, but not exclusively, used to retrieve and categorize similar data chunks so the researcher can quickly find, pull out, and cluster the segments relating to a particular research question"(Miles et al., 2014, p. 72). Following standard qualitative coding practices, the data was coded twice. Given that these submissions were from the design team members, the principal investigator coded the data in this section independently.

Overall, the figure shows that the team believes the tasks throughout the initiative were meaningful and would not recommend further changes. The only improvements recommended by the design team were three submissions indicating that they desired more time and participants to take place in the process and that there were more assignments in the training that allowed for participants to interact with one another. However, despite those feedback aspects, with a near eighty percent favorable comment of no changes needed, the design team believes in the ROSETTA and the quality of the work done.

Figure 9. *Qualitative design team reflections on changes to ROSETTA. n=14*



In addition to the design team data, data collection from teachers happened in two significant occurrences. The initial TPACK survey allows the design team to craft an initial draft of PD for staff to review. The second round of formative feedback from teachers occurs once the pilot teachers examine the PD content. The design team analyzed the anonymized versions of these data points and used that information to facilitate the initial creation and revision of the course content.

Collecting Data from Teachers

Determination of ROSETTA Learning Content

To craft the learning content for ROSETTA, the design team decided to derive the learning topics from the Pre-Survey, discussed later in this section, from participants to ensure the content was as relevant as possible. After examining the survey's data, the team identified three areas in which the ROSETTA learning encompass: Content and Technology Utilization, Online Course Development, and Assessing and Evaluating Online Learning. Within each of the three areas, the design team worked to craft learning experiences for the participants. Table 5

contains the three modules and the design team's learning outline. The outline served as a guide for creating the ROSETTA content that the design team would review once completed and then to the pilot teachers during the second PDSA cycle.

Table 5. ***ROSETTA Learning Modules and Outline***

Module Title	Learning Outline
1 – Content & Technology Utilization	Understanding NC Standards Importance of Standard Alignment Importing Standards into the LMS Utilizing Standards & Rubrics within the LMS
2 – Online Course Development	Understanding Online Lesson Development – Analysis – Design – Development Acquiring Lesson Resources Formatting Lessons in the LMS
3 – Assessing & Evaluating Online Learning	Back to Standards – Implementation – Evaluation Ways to Assess in the LMS

Balancing Stress and Professional Development

Throughout the ROSETTA training, teachers took part in three modules within the LMS to understand the importance of online instructional design and student engagement. Before beginning each module, teachers took a one-question Likert-based assessment about their current stress level on a scale ranging from one to five, with one being extremely stressed and five being extremely happy. Participants complete the form by sliding an indicator along a line in which an image of a mad, sad, neutral, or happy face would appear corresponding to the scaled choice. As stated within Cycle III of the PDSA section of this paper, the purpose of the stress-level assessment was to account for the impact stress may have on the professional development and the overall outcome of the improvement initiative itself.

The balancing measure data collected from the Summit teachers from both the pilot teacher group and the remaining staff are in Table 6. The high number of responses for the survey is because each teacher completed the form at least three times throughout their ROSETTA training. From the data (μ= 3.43, σ= 0.82), the staff overall was either at a neutral stress level or not stressed when completing the survey. Additionally, a conclusion could also be that the addition of the ROSETTA PD did not adversely impact the stress level of the Summit staff members.

Table 6. ***Balancing Measure for ROSETTA Professional Development***

Stress Level Indicator	n
1	0
2	9
3	13
4	27
5	2

n=51. μ=3.43. σ=0.82 In which, 1 – Extremely Stressed and 5 – Extremely Calm

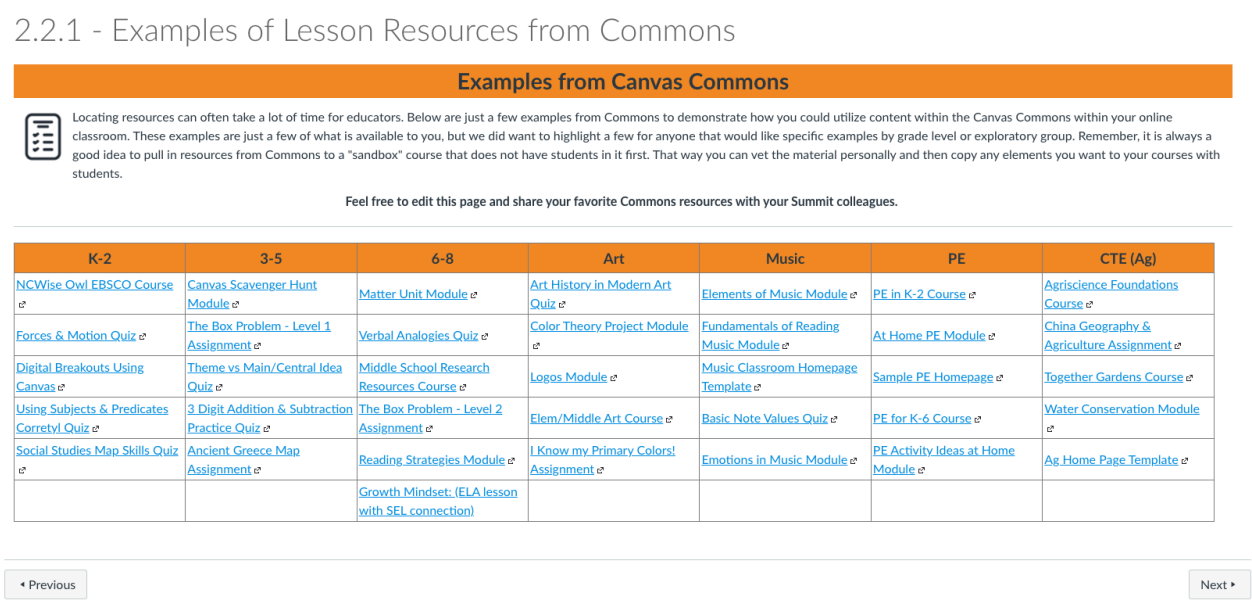
Pilot Teacher Feedback

As stated in the design of the improvement initiative, it was essential to the design team that the ROSETTA training receive feedback from a group of participants before rolling it out to the entire SVA staff. Therefore, four teachers volunteered to be the pilot group for the initiative from the SVA staff. After the ROSETTA training, the pilot teachers completed the feedback survey in Appendix B, in which they answered questions about the PD and offered their ideas as to ways in which the training could improve.

Overall, the only feedback item that the pilot teachers provided centered around examples of how ROSETTA's content related to the subject area/grade level taught by the SVA teachers. Therefore, the design team took this feedback and incorporated references on all the possible grades and disciplines at SVA. These examples were categorized and added to the ROSETTA

training within the second module. They were references on various resources within the LMS platform for participants to find and bring into their courses to diversify their learning experiences within the digital classroom. Figure 10 is a screenshot of the resources page added within ROSETTA. Participants can simply click on a resource by grade/topic to learn more about it or pull it directly into one of their courses for implementation with learners.

Figure 10. *Pilot Teacher Feedback Addition to ROSETTA*



2.2.1 - Examples of Lesson Resources from Commons

Examples from Canvas Commons

Locating resources can often take a lot of time for educators. Below are just a few examples from Commons to demonstrate how you could utilize content within the Canvas Commons within your online classroom. These examples are just a few of what is available to you, but we did want to highlight a few for anyone that would like specific examples by grade level or exploratory group. Remember, it is always a good idea to pull in resources from Commons to a "sandbox" course that does not have students in it first. That way you can vet the material personally and then copy any elements you want to your courses with students.

Feel free to edit this page and share your favorite Commons resources with your Summit colleagues.

K-2	3-5	6-8	Art	Music	PE	CTE (Ag)
NCWise Owl EBSCO Course	Canvas Scavenger Hunt Module	Matter Unit Module	Art History in Modern Art Quiz	Elements of Music Module	PE in K-2 Course	Agriscience Foundations Course
Forces & Motion Quiz	The Box Problem - Level 1 Assignment	Verbal Analogies Quiz	Color Theory Project Module	Fundamentals of Reading Music Module	At Home PE Module	China Geography & Agriculture Assignment
Digital Breakouts Using Canvas	Theme vs Main/Central Idea Quiz	Middle School Research Resources Course	Logos Module	Music Classroom Homepage Template	Sample PE Homepage	Together Gardens Course
Using Subjects & Predicates Corretyl Quiz	3 Digit Addition & Subtraction Practice Quiz	The Box Problem - Level 2 Assignment	Elem/Middle Art Course	Basic Note Values Quiz	PE for K-6 Course	Water Conservation Module
Social Studies Map Skills Quiz	Ancient Greece Map Assignment	Reading Strategies Module	I Know my Primary Colors! Assignment	Emotions in Music Module	PE Activity Ideas at Home Module	Ag Home Page Template
		Growth Mindset: (ELA lesson with SEL connection)				

Previous Next

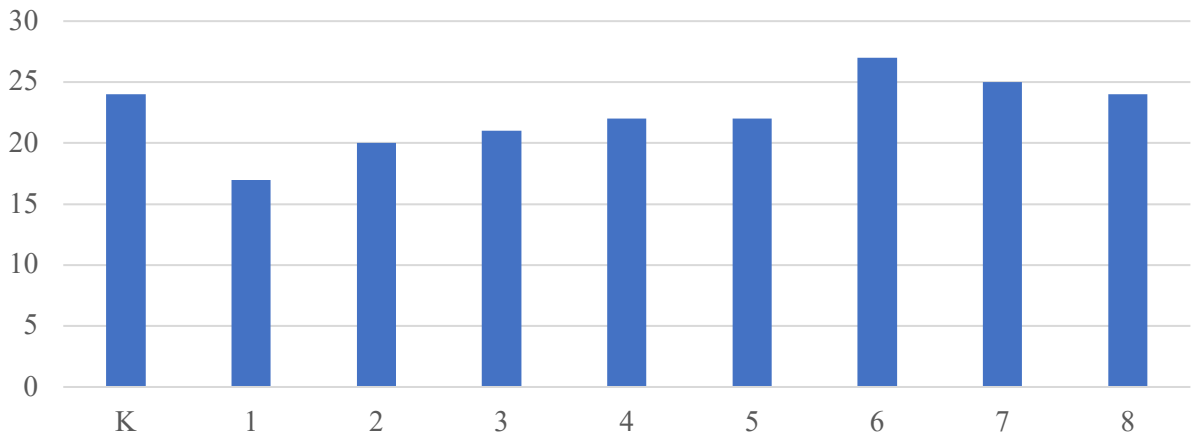
ROSETTA Module Reflections

After each module, the learners answered a five-question form to assess and reflect upon their learning. These five questions can be found in Appendix D of this paper. Data collected from these module assessments served to help the design team determine if the improvement initiative effectively addresses the primary driver of increased teacher knowledge of the TPACK model and understands the importance of online student engagement. The development of the module reflection occurred during the first PDSA cycle for the design team and was reviewed by the team again after the pilot teacher feedback during the second PDSA cycle. In addition to their

name and grades currently taught, teachers reflected on the ROSETTA PD experience itself how the PD compared to previous learning experiences, both of which are Likert-based questions. The last three questions are open-ended on their knowledge gained, challenges they still have, and any recommendations for further improvement of the PD.

Quantitative Analysis of Learning Module Reflections. Given that Summit is a K-8 school, it was essential to the design team that both the ROSETTA PD and the data collected were representative of the school staff throughout the grade levels. In the module reflection survey, there is an even distribution of participants throughout the grade levels, as illustrated in Figure 11. Like in the balancing measure survey, the same instrument was utilized for all three learning modules, thus accounting for many responses.

Figure 11. *Grade Levels for ROSETTA Module Reflections. n=202.*



The next item of the module reflection asks teachers to rate their overall impressions and experiences within the ROSETTA PD on; Ease of Use, Knowledge Gained, and Relevance to their teaching/career. Each component is a Likert-based question on a scale from one to five stars, with five being the highest/most beneficial. Table 7 shows the responses from the Summit teachers on each of the three areas of the question.

From the beginning, the design team was intentional on the look, feel, and functionality of the ROSETTA PD content. The team wanted to ensure that the participants could navigate the learning content with little prior LMS experience and find relevance in the learning content. Examining the first data point in Table 7, overwhelmingly, the participants found that the modules were easy to use, μ=4.73. Given the high mean and subsequent low standard deviation, .57, the data supports the design team's work in ensuring the ROSETTA training was, in fact manageable for participants to navigate and participate in.

With all forms of continual learning, the desired outcome is that participants learn something new, and of course, ROSETTA was no exception to that rule. Examining the data in Table 7 indicates that the participants did obtain new knowledge, μ=4.45. Although the mean for the Knowledge Gained section is lower than the Ease of Use, it is still well above the median and maintains a low standard deviation of 0.69. Again, the purpose of the improvement initiative was to impart new information to the Summit staff. Therefore, the design team anticipated and hoped for a high mean regarding the new information obtained by the participants.

Another important factor to the design team was that the training needed to be relevant for the participants. The Summit staff is the only fully virtual school within the district and has PD needs that in many ways differ from a traditional school. Therefore in developing ROSETTA the design team wanted to ensure that the learning content was specifically for online teaching and that the content was relevant to their career. Despite the data in Table 7 for Relevant to Career being a mean of 4.31, the standard deviation of 0.91 is the highest of the three categories. With a higher variance in the number of responses, the data suggest that the participants did not all agree that the PD was relevant. However despite the variance in these responses the design team still feels as though the training was pertinent to the realm of online PK-12 education.

Overall, the data within Table 7 supports the PD initiative of ROSETTA and provides the design team with feedback on the relevance and useability of the PD.

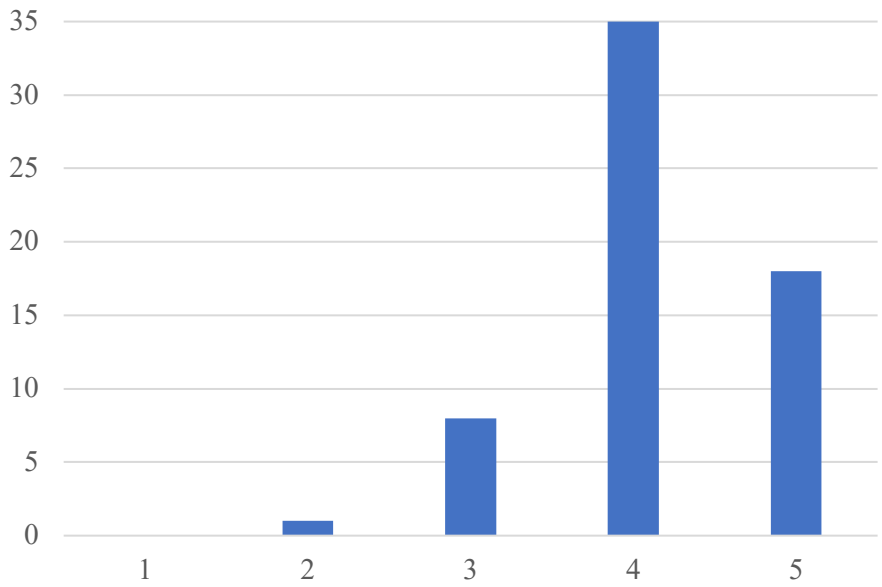
Table 7. ***Overall Impressions and Experience with ROSETTA Professional Development***

	μ	σ	σ^2
Ease of Use	4.73	.57	.33
Knowledge Gained	4.45	.69	.47
Relevant to Career	4.31	.91	.83

n=62. Star rating, 1-5 scale

When measuring how the PD experience of ROSETTA compared to previous professional learning experiences, the design team wanted to utilize the same Likert-based slider smiley face tool from the balancing measure. Using the same instrument item for the module reflection as the balancing measure ensured that participants understand how to interact with the item given their previous experience. With over sixty respondents the data in Figure 12 indicate that the participants found the learning modules more beneficial than previous PD experiences despite the ROSETTA training being fully online and asynchronous. Knowing that the PD experience was better than prior learning opportunities speaks to the design of the learning content, the delivery method, and the design within the LMS. Having a positively shifted distribution like the data within Figure 12 speaks to the dedication of the design team and Summit administration having a deep understanding of the optimal modality of PD in which the participants preferred and could succeed.

Figure 12. *ROSETTA PD Comparison to Previous Experiences. n=62 μ=4.13. σ=.68*



Qualitative Analysis of Learning Module Reflections. The last three questions of the module reflections were "What is the most important element you learned in this module, what is still challenging about the topic covered, and is there any additional information that you might recommend we spend more time upon?". Including open-ended questions allowed participants to share and elaborate on what they learned the most and any feedback for future PD development. These data were coded using the same coding procedure described previously with a modification. The first coding was done by the principal investigator and a second time with the entire design team. To familiarize the design team with qualitative coding processes, the principal investigator provided the team with an overview of the protocol by explaining the first coding data while comparing it to the raw participant submissions. Seeing the raw data next to the first round coding gave team members the opportunity to ask questions and see tangible examples of how to conduct qualitative coding before working as a time to perform the second round of coding. These two coding events were an attempt to reduce any bias by the principal

investigator as well as alleviate the workload of the design team by only participating in the second coding of the responses.

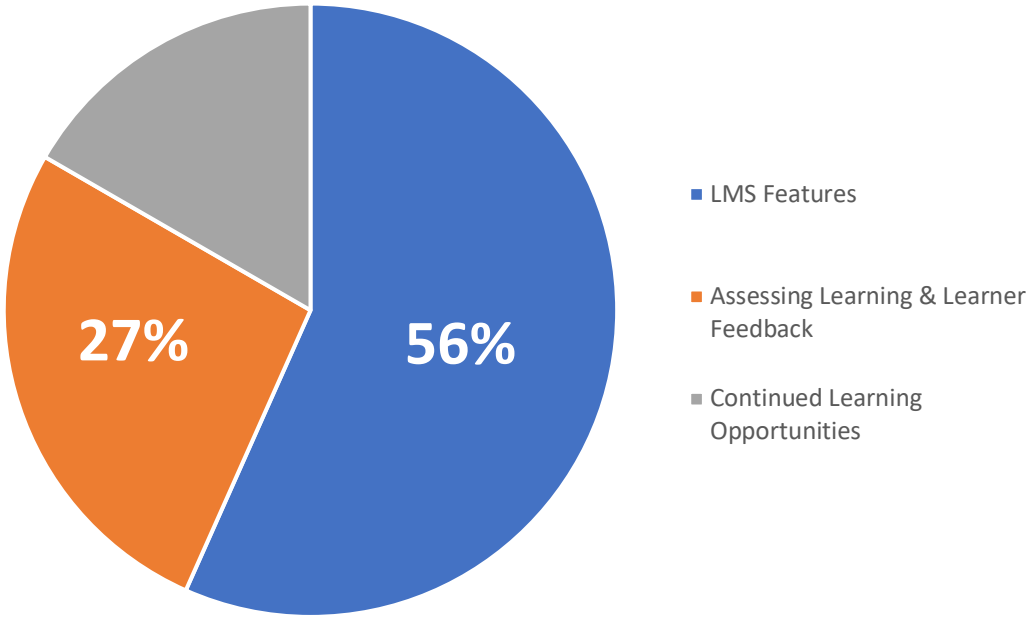
Analysis of New Features Learned from ROSETTA in Module Reflections. After coding the responses of what the teachers understood the most, two themes arose. Figure 13 contains a pie chart of the coded responses. Using a pie chart to visually display the coded data set shows the percentage and mass occupied by the various identified themes. One such theme was that the Summit teachers learned the most about how to leverage many of the tools within the LMS that they were either unaware of or did not know how to use. An example of a tool within the LMS is the ability for instructors to link assignments, assessments, and rubrics to specific academic standards. These standards are those identified by the North Carolina General Assembly and the State Board of Education Given and are broken down by grade level and subject area to guide educators in the delivery of student learning. Given that one-third of the ROSETTA training was on standards and how to incorporate them into rubrics within LMS, it is reaffirming that the design team decided to incorporate that content into the learning content. In the LMS utilized by RSSS, rubrics can be used with any assignment, assessment, or discussion and are visible to the learner before and after grading. Having the standards linked to rubrics and other elements empower the educator and student to better understand how a learner might be struggling with a particular domain of the content in a deeper way than simply grades in a grade book.

Another LMS feature of greater understanding for participants was their ability to understand and utilize a feature within the LMS referred to as the Commons. The Commons is an internal collaborative repository in which instructors can search, share, and download content that can be directly imported into their own courses. Using Commons saves teachers time in

curating online materials and allows them a much larger networking opportunity that goes beyond their school or district. Specifically for ROSETTA, in the learning modules, a page was dedicated to sharing content and grade-level specific resources from Commons so that the participants could see relevant examples and learn more about what types of resources are at their disposal within Commons. These responses in Figure 13 show that ROSETTA participants not only learned about features within the LMS itself but also ways in which they can assess and provide learner feedback.

Methods to Assess and Provide Feedback from ROSETTA in Module Reflections The second-highest theme indicated in Figure 13 was twenty-seven percent of respondents indicated that they gained a deeper understanding of new ways to assess and provide learner feedback. Although the previous section of this paper addresses the functionality of ways in which LMS tools can be used to provide feedback, several responses mentioned the pedagogical benefit of using these tools in reference to providing student feedback and understanding of content. Working in online learning like Summit, communicating clear teacher expectations can be difficult. By leveraging rubrics and Outcomes, standards within the LMS, the SVA staff can outline to students the key aspects of an assignment while also being able to give them targeted feedback on areas of growth or excellence. Therefore, the design team chose to code these responses separately from those that only referenced the tools within the LMS.

Figure 13. *Trends in Knowledge Gained from ROSETTA. n=62.*



Also, the course provided participants with a space to collaborate as a staff and re-reference the training modules should they wish to come back to them beyond the window of the ROSETTA training. Choosing to house the ROSETTA training within the district's LMS gives the participants an anchoring point for which they can return to the learning modules or collaborate with another staff member at any point in the future. In addition to the knowledge gained, participants were also given the opportunity to share challenges experienced during each of the learning modules.

Participant Challenges from ROSETTA Modules. It was essential to the design team that each of the PD participants would have the opportunity to identify challenges they encountered within learning modules in addition to the pilot group. The last two questions of the module reflection, "what is still challenging about the topic covered, and is there any additional information that you might recommend we spend more time upon?" address these two areas. The

data for these two open-ended questions were coded using the same two rounds of qualitative analysis previously discussed in this paper. The findings of which are outlined in the next few paragraphs.

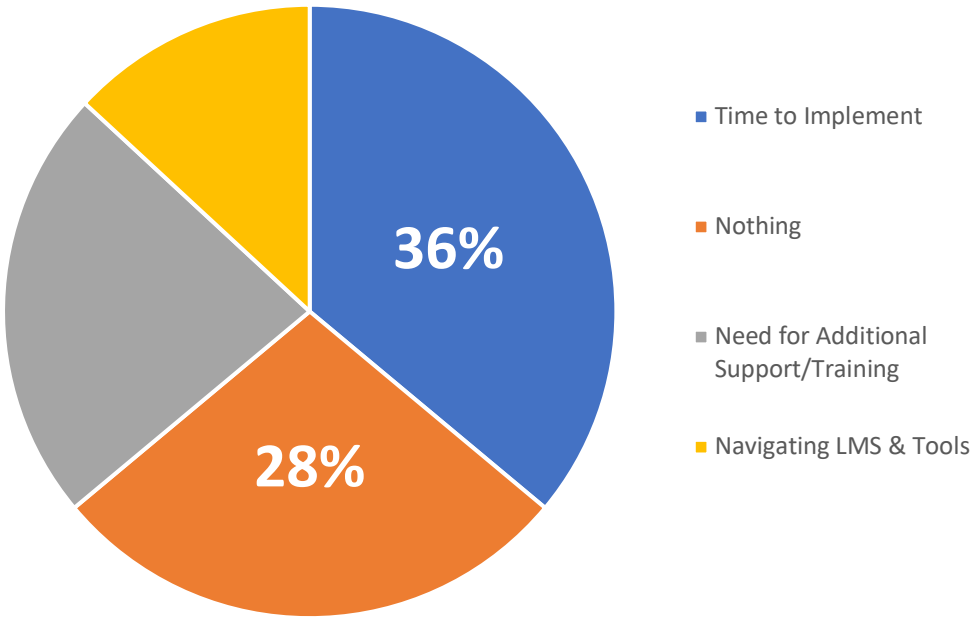
There were two main categories that arose from the coding of the challenges participants indicated in reflection of the PD, nothing and time to implement. In Figure 14, twenty-eight percent of participants indicated that completing the ROSETTA modules did not leave them with any remaining questions or need for further understanding. The design determined that the familiarity with the LMS and comprehensive design of the PD as rational for over a quarter of the participants not needing any additional follow-up information or support.

The teachers also indicated that from the learning modules they simply need time to implement the new knowledge. Even at a virtual school, teachers need time to incorporate new strategies and resources into their classrooms. With a topic as new and abstract of online instructional design in the PK-12 domain, it was evident to the design team that the staff needed time to process the new information. A recommendation was made to the Summit administration to provide teachers with some additional planning time or possibly a dedicated teacher workday so that the staff could both receive additional support and work on implementing aspects of the ROSETTA training.

The remaining data in Figure 14 both reference a need for additional training and support on the utilization of the LMS. When examining the raw data, the design team noted that some participants desired to know more about ways to design their courses to support specific students in grades K-2. Although the ROSETTA training did not specifically reference K-2 design, the learning content did include some examples on ways to use the LMS in those grade levels. The design team did make a recommendation to the Summit administration on potentially future PD

opportunities for those grade spans to address the need in addition to the ROSETTA improvement initiative.

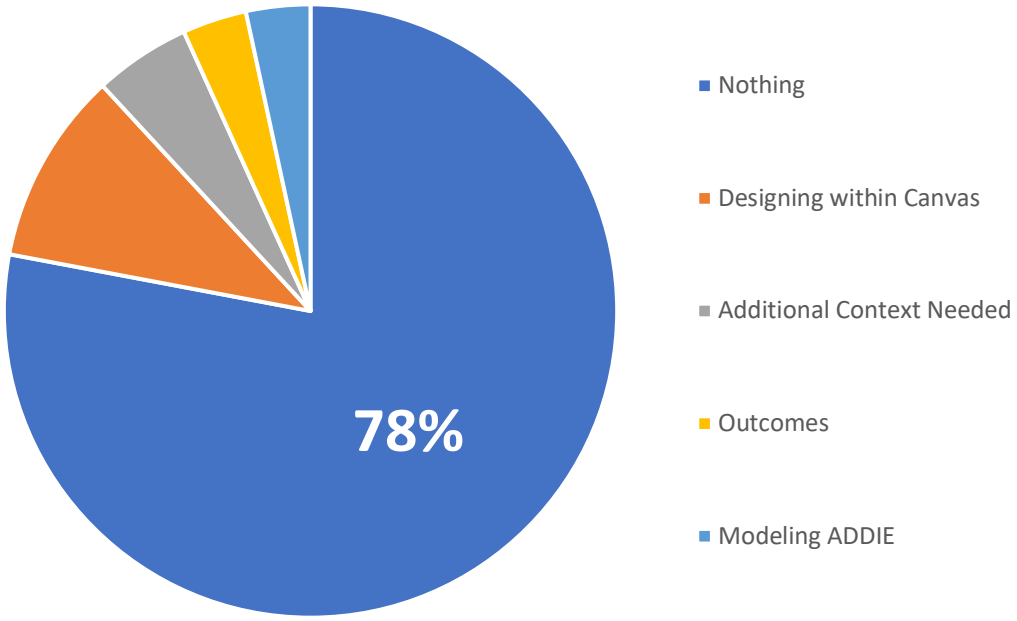
Figure 14. *Challenges from ROSETTA. n=61.*



Participant Recommendations for Changes to ROSETTA Modules. The final question in module reflections allowed participants to give feedback and recommendations for future changes, "is there any additional information that you might recommend we spend more time upon?". Figure 15 shows that over three-quarters of the participants recommended no change to the ROSETTA instructional content. A possible rationale for the high number of participants indicating no necessary changes is due to the work of the design team in the development of the learning modules as well as the feedback that was incorporated by the pilot teachers. Both aspects occurred due to the intentional design of the improvement initiative and the execution of the three iterative PSDA cycles.

Taking the time the conduct a pre-survey in the first cycle allowed the design team to understand the needs of the participants. The ROSETTA learning was developed from the pre-survey data and then given to pilot teachers for their feedback in the second cycle. Culminating in the third PDSA cycle in which the remaining staff had the opportunity to experience the PD and provide additional feedback. The amount of work and emphasis on revising the ROSETTA training through the PDSA cycles helped to ensure the final round of participant feedback would be minimal. Overall, the design team was pleased with the data from this reflection section, given the amount of work that went into creating and refining the learning content.

Figure 15. *Recommended changes for ROSETTA. n=61.*



Summative Data Collection

After completing ROSETTA, the Summit staff took the survey in Appendix A for a second time. Using the same instrument provides the design team with pre-post data to compare the knowledge gained and subsequent action steps for further revisions to the ROSETTA

instructional content. At the end of the post-survey, there are three additional questions asking teachers-"what is one thing you would have us not change, what is one thing you would have us do differently, and how likely they are to use at least one aspect of the ROSETTA training in their classroom/instruction (on a Likert scale from 1-10)?" The design team also captured teacher impressions of the learning content and any improvements to the modules for subsequent teacher training by asking these questions.

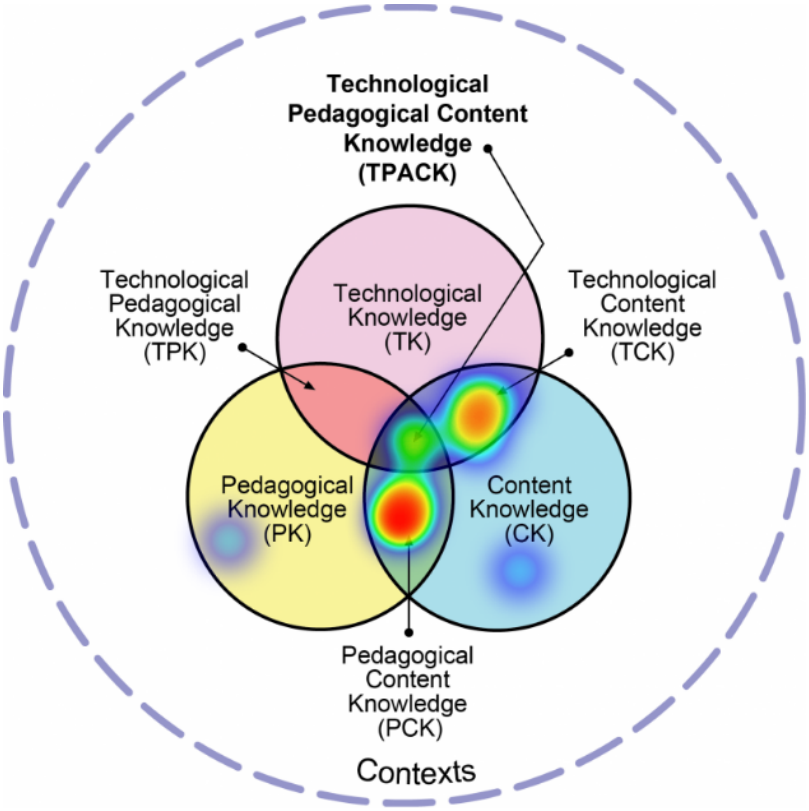
Quantitative Data from Pre- and Post-Surveys

Using Heat Maps to demonstrate TPACK Expertise. The content within the ROSETTA derived from the pre-survey assessment of the Summit staff. For the training to be relevant and aligned to the needs of the teachers, the design team first needed to understand the strengths and growth opportunities related to online instructional design. As stated previously in this paper, the framework for the pre-and-post surveys from the TPACK model. A critical component of the instrument was an interactive image of the TPACK model, as seen in Figure 2. For this question, participants were able to select one of the regions within the model that aligned with their current online instructional design understanding. The responses were taken by the instrument software and depicted as a heat map. A heat map is a way of visually displaying data to indicate trends by using a spectrum of color (Evergreen, 2019, p. 237). For the purposes of this improvement initiative, the heat maps in Figures 16 and 17 show the responses of participants in one of the TPACK regions. The redder section indicates a higher concentration of data while more blue indicates fewer responses.

Pre-Survey TPACK Heat Map for ROSETTA. The data in Figure 16 shows a heat map of the respondents primarily identified in the PCK region of the diagram followed by the TCK region. Having a visual representation of the participants' level of understanding overlayed on

the TPACK model provided the design team with areas of strength and growth. Knowing the areas of learning opportunities allowed the design team to develop the learning domains and instructional content of ROSETTA. With most respondents in the PCK area, this indicates a growth opportunity in Technological Knowledge. Therefore, the design team focused on the technical understanding of the LMS on how to utilize the tools, resources, and best practices. The next most populated area is the TCK region, indicating a growth opportunity in the Pedagogical Knowledge region. After viewing the data in Figure 16, the design team chose to incorporate the ADDIE online instructional design framework by modeling ADDIE in the delivery of the PD content and informing the participants of an online instructional design framework for iterative course development. The same TPACK heat map was incorporated into the post-survey to compare the two diagrams.

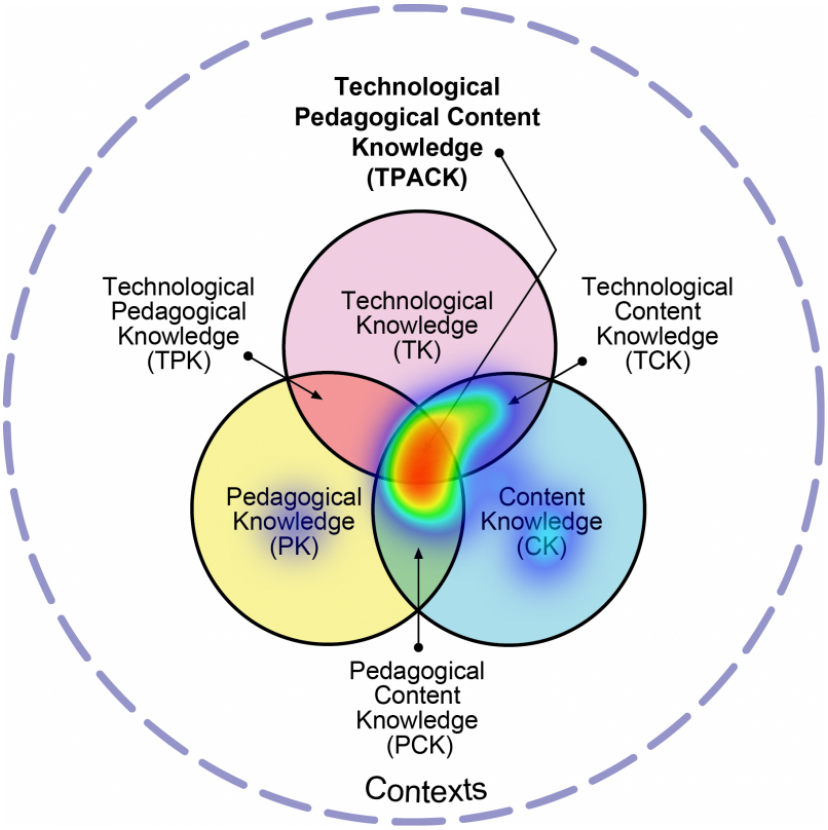
Figure 16. *ROSETTA Pre-Survey TPACK Heat Map. n=14*



Post-Survey TPACK Heat Map for ROSETTA. In contrast to the scattering in the pre-survey heat map, the post-survey, Figure 17, indicates a clear centering within the TPACK region. The ROSETTA learning content increased teacher understanding in all three regions of the TPACK diagram, allowing participants to self-identify more consistently in the center of the diagram than in the pre-survey. Comparing the two heat maps in Figures 16 and 17, a clear shift occurred from the PCK and TCK regions into the TPACK zone.

The shift in those two specific regions is evidence to support the alignment of the ROSETTA learning modules identified by the design team in the pre-survey. Responses in the post-survey in the TPACK region also support the design team's PD modality choice by utilizing the LMS in modeling high-quality online instructional design using the ADDIE model.

Figure 17. *ROSETTA Post-Survey TPACK Heat Map. n=16*



Technology Knowledge (TK) Matrices. The next set of questions for both surveys consisted of Likert-based questions. Participants indicated their level of understanding within each aspect of the TPACK framework. Table 8 contains the TK data of the surveys. For this section of the survey, there is little change between the pre-and-post data points. Examination of the mean values of the sets of questions in Table 8 shows a consistent level of understanding of TK between the two surveys. Given that the pre-survey did not indicate a high need in TK for the Summit staff, nor did the training contain a significant amount of TK material, it is logical to assume that this portion of the data would not show drastic change. Additionally, given the historical context of the school district being one-to-one with devices for the past several years could also be an indication as to why little changed was observed specifically within the TK region.

Table 8. ***Technology Knowledge (TK) for ROSETTA***

	Pre-Survey n=19			Post-Survey n=22		
	μ	σ	σ^2	μ	σ	σ^2
I know how to solve my own technical problems.	3.74	.85	.72	3.74	.99	.98
I can learn technology easily.	4.05	.89	.79	4.09	.88	.78
I keep up with important new technologies.	3.89	.79	.62	4.09	.72	.51
I frequently play around the technology.	4.26	.71	.51	4.04	.95	.91
I know about a lot of different technologies.	3.68	.92	.85	3.91	.83	.69
I have the technical skills I need to use technology.	3.89	.85	.73	4.14	.69	.48

1=Strongly Disagree to 5=Strongly Agree

Technological Pedagogical Knowledge (TPK) Matrices. As a review, TPK is about the ability to integrate technology and pedagogical practices within a classroom. Given that Summit is a fully online learning environment, TPK is critical to its success as a school. Table 9 contains the data of both surveys in which several of the means increase between the pre-and-post surveys

while a decrease in the standard deviation, indicating knowledge growth within the TPK, for several of the participants.

Table 9. ***Technology Pedagogical Knowledge (TPK) for ROSETTA***

	Pre-Survey n=19			Post-Survey n=22		
	μ	σ	σ^2	μ	σ	σ^2
I can choose technologies that enhance the teaching approaches for a lesson.	3.79	.41	.17	3.83	.56	.32
I can choose technologies that enhance students' learning for a lesson.	3.79	.41	.17	3.83	.56	.32
My teacher education program has caused me to think more deeply about how technology could influence the teaching approaches I use in my classroom.	3.26	1.12	1.25	3.23	.85	.72
I am thinking critically about how to use technology in my classroom.	3.79	.52	.27	3.91	.58	.34
I can adapt the use of the technologies that I am learning about to different teaching activities.	3.68	.65	.43	3.91	.58	.34
I can select technologies to use in my classroom that enhance what I teach, how I teach and what students learn.	3.79	.61	.38	3.83	.48	.23
I can use strategies that combine content, technologies and teaching approaches that I learned about in my coursework in my classroom.	3.47	.75	.57	3.73	.62	.38
I can choose technologies that enhance the content for a lesson.	3.79	.41	.17	4.00	43	.18

1=Strongly Disagree to 5=Strongly Agree

One example of such growth in Table 9 is the statement, "I can adapt the use of technologies that I am learning about to different teaching activities." For this question, there is an increase to the mean from 3.68 to 3.91 while maintaining a similar standard deviation. From that growth and maintenance of the standard deviation, the participants learned new ways to modify various forms of technology to their instructional practices. Additionally, "I can use strategies that combine content, technologies and teaching approaches that I learned about in my coursework in my classroom," there is an increase in the overall mean from 3.47 to 3.73. At the

same time, a decrease in the standard deviation occurs from .75 down to .62. Having a growth within this section of the post-survey along with the heat map in Figure 17 supports the learning that occurred because of the ROSETTA training. Targeting the PD to support the participants with resources and strategies to seamlessly integrate learning and technology together is supported by the increases found in Table 8. The data also further demonstrates the participant's ability to comprehend the various features of both online learnings through an LMS and how to interchange those aspects to meet the instructional needs of their students.

Feedback from Post-Survey

At the end of the post-survey, participants provided overall feedback on ROSETTA training like the module reflections. Three questions were asked, “What is one thing you would have us not change about the ROSETTA training, what is one thing you would have us do differently for this training, and how likely are you to use at least one aspect of the ROSETTA training in your classroom/instruction?”. The first two questions were open-ended responses, while the last was a Likert-based scale of zero to ten.

Summative Participant Recommendations for Changes to ROSETTA. The first two open-ended questions were coded using the same two-round method utilized in the module feedback section of this paper. When examining aspects that the participants would not like to change, many of them stated that they enjoyed the overall design and progression of the ROSETTA content. With the feedback from the pilot teachers, and the module reflections themselves, many of the ROSETTA participants enjoyed the content and did not have much to add in the form of changes to the content when asked. Additionally, participants were appreciative of the flexibility of the online asynchronous content to work at their own pace and take time to read articles, watch the videos, and participate within the modules. Some

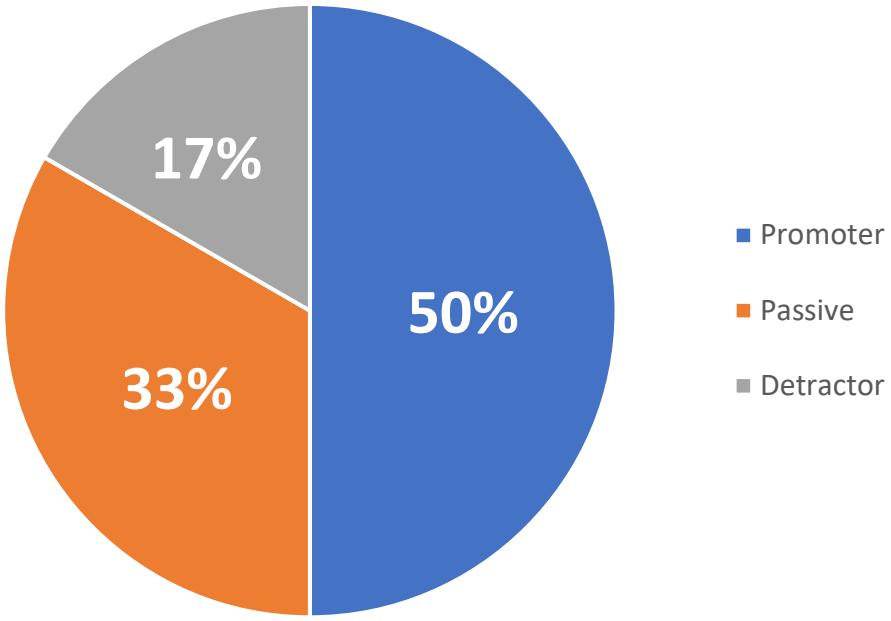
participants did indicate a desire for some form of synchronous components to the course. The design team did consider including a synchronous feature initially, but given the narrow window of the ninety-day PDSA initiative, the team chose to only focus on asynchronous learning. However, the addition of synchronous components to the ROSETTA training would be a consideration for future cohorts based upon the feedback provided by the Summit staff.

Calculating the ROSETTA Net Promoter Score. ROSETTA's last question of summative feedback, “how likely are you to use at least one aspect of the ROSETTA training in your classroom/instruction?” allowed participants to indicate how likely they were to take the knowledge obtained in the PD and infuse it into their classrooms. The Likert-based responses from zero to ten were grouped utilizing a ranking referred to as a Net Promoter Score (NPS). The NPS process is typically used when seeking customer feedback on a product or service. Therefore, the design team chose to utilize an NPS raking for the summative data point to understand the quality of the PD provided and the likelihood of future participants to find the content beneficial. The data points are grouped into one of three categories: Detractors, responses with a score of zero to six. Passives, responses with a score of seven or eight, and Promoters, answers with a score of nine or ten. The calculation of the NPS is then determined by subtracting the number or percentage of detractors from that of the promoters (*Your Guide to Net Promoter Score (NPS) in 2022 - Qualtrics*, 2022). The goal of an NPS is to calculate the percentage of participants that would still endorse ROSETTA despite any dissatisfied users.

Examination of Figure 18 shows that fifty percent of the participants rated as promoters, thirty-three as passive, and seventeen percent as detractors. Calculating the NPS for the ROSETTA training gives an NPS of thirty-three percent. Despite only having an NPS of thirty-three percent, the design team was pleased with fifty percent of respondents as promotes, with

eleven of the twelve submissions scoring the maximum of ten on the Likert scale. The data within the summative NPSs further support the conclusion that the participants did find value within the modules and were able to make connections from the PD content to the instructional needs of their online classrooms.

Figure 18. *NPS on Likelihood of utilizing ROSETTA learning in the classroom. n=24.*



Implications and Recommendations

Impact of ROSETTA and the Improvement Initiative

Because of the smaller samples size and the fact that the TPACK data was collected using heat maps rather than a numerical assessment the design team could not calculate if there was any statistical significance to the improvement initiative. However, when examining the heat maps and the other Likert data points, there is a clear shift in the teacher self-identification on the post-survey and the impact of the training on future teacher lesson development. With many PK-12 school systems responding to the COVID-19 pandemic by shifting to remote

learning, a vast number of teachers and students were not prepared for this new modality. Going into the digital classroom, many teachers struggled, and student engagement plummeted. The initiative's ultimate aim was to work towards increasing online student engagement by driving teacher understanding of the TPACK framework, the ADDIE model, and how to develop engaging content with an LMS. Therefore the obtainment of the ultimate aim will require additional studies that cover the collection of data that is beyond the scope of this singular improvement initiative. Despite the seeming success of the implementation of ROSETTA, there are a few areas for enhancement to consider.

One aspect that possibly impacted the study would be the number of staff at Summit. At the height of the pandemic, the team at Summit was well over 100 teachers and support staff. However, with the start of the 2021-22 school year, many students within RSSS chose to return to in-person learning and efficiently cut the staff almost in half at SVA. Therefore, reducing the sample size of the initiative before it ever truly began. Subsequently, the smaller sample size yielded fewer overall respondents to the surveys, training, and feedback of ROSETTA.

The participants' feedback indicates that the ROSETTA training was meaningful even with a smaller sample size. One of the initiative's goals was that at least eighty percent of the participants found the learning modules beneficial. Given the feedback, the team obtained over sixty percent of respondents who stated that they would not recommend any changes to ROSETTA. Therefore, it is possible that a larger group of participants would also find the PD beneficial in online PK-12 education.

Utilizing the iterative PDSA cycles process did allow for the rapid development and refinement of the ROSETTA training. Mainly regarding the feedback provided by the pilot teachers and the design team. Even though each cycle lasted about a month in time, they gave the

design team both an anchoring point for meetings to understand what was already accomplished and a launching point to discission where the initiative was going. One example was the rapid inclusion of content-specific examples within the ROSETTA modules. The feedback provided by the pilot teachers was brought to the design team and, through a discussion, led to the creation of resources referenced previously discussed and shown in Figure 10. Without the cyclical process of PDSA, the feedback and subsequent resources addition to ROSETTA would have left the PD less specific to the needs of the participants.

Anytime PD occurs, an educator wants to know that it is relevant to them and their work. By making ROSETTA specifically for SVA staff and then refining it with their feedback, the overall work resulted in high-quality staff resources that can undoubtedly exist beyond this improvement initiative. Although custom PD may not always be economical or affordable, even small acts of matching school colors to a slide deck and including the mascot can help leaders in encouraging teacher participation and fosters a sense of ownership in the learning.

Lessons for Leadership in Online Learning Engagement

Importance of Professional Development. Examining ROSETTA through the lens of an educational leader, it is easy to see the significance of the work in the continual growth of educators and ensuring that students in hybrid or online learning settings receive equitable learning experiences compared to those of in-person students. The professional development in the improvement initiative, for the participants that completed the modules, did find value in the learning and made correlations to their own teachings. Additionally, the understanding of online engagement as it relates to the initiative did work to build teacher capacity. As a leader in any capacity, it is vital to provide opportunities for and encourage your staff to participate in PD and work to break down barriers that may arise.

Overcoming Potential Barriers to PD Completion. With most initiatives, there are barriers that arise throughout the implementation, and ROSETTA was no exception. One of the main challenges was getting a significant portion of the Summit staff to complete the entirety of the learning. The communications from the design team to participants were either email messages or reminders from the Summit administration during staff meetings. The team chose these methods to reduce additional stress on the educators by not holding an initiative-specific meeting. Nearing the end of the third PDSA cycle, the team noticed that only a few participants had completed all the PD components. A decision was made by the design team and Summit leadership that they would remind staff of the content and their next staff meeting and would specifically give teachers time to work on the learning at an upcoming teacher workday. Having an effective design team with the right members possessing the necessary social capital allowed the initiative to move forward in a way that might not have been possible if the Summit administration had been excluded from the team. Working with the school-level administration to enact change within a school system is an important stakeholder to include when developing a design team.

Ensure that PD is Not "One More Thing". As a leader in education, it is vital to balance the workload of teachers with all the other responsibilities placed upon them in the modern classroom. Therefore, a recommendation to future leaders is to consider how training like ROSETTA fits into the overall PD needs of your staff or school system in a way so that educators do not feel as though the training is added burden. Conducting activities like an RCA or a targeted survey to staff, students, and stakeholders can often reveal needs that leadership was unaware of.

Once a path for PD is determined, work with teacher leaders in the building or district to formulate a professional development plan that addresses the needs and is not overwhelming. Just as learning should be fun and exciting for students, it can also be that way for educators. Having some creativity in how teachers are rewarded for their hard work and completion of the work would also incentivize staff to partake in the PD. Host development events off-campus for a change of venue, invite community members to come and speak about the impact education had on their life, or have staff submit ideas of their own. We ask educators to be creative in their teachings; why should they not expect the same for their professional development?

Continuing the Work of Equity in Online Engagement

It is critical to understand that educators in all capacities, in-person or online, need professional development on engaging their students in online learning. Instructional tools like LMSs and other classroom technologies are here to stay. Providing PD opportunities not only on these tools but how they should be used pedagogically is essential in the modern classroom—understanding that with PD, there is no sole source approach in which success is guaranteed. Therefore, using various methods for educator PD like the standards from Learn Forward is critical for a successful implementation.

Although there is no specific approach to effective PD, there remains a great deal of inequity for those in the PK-12 online world. “Teachers teach the way they were taught. Therefore it is important for all online course designers and instructors to have professional development that uses the online media they will be taught through” (Davis & Rose, 2007, p. 7). Even a successful career classroom teacher cannot simply transition from in-person instruction and provide the same level of education to their students in an online environment.

As educational leaders think about the future of PK-12 education and how the pandemic caused a drastic shift in learning to online environments, it behooves us to look to the horizon and ensure that the staff and students within our charge are prepared for the next era of public education. Before, during, and even after COVID-19, there will be students in online learning environments that are inequitable to that of their in-class peers. Looking back at the RCA of Figure 3, there are numerous aspects of the inequity of online engagement that are outside the sphere of influence of PK-12 systems. Government, businesses, and parental understanding all play a role in the current imbalance for online learners. However, if the issue is never raised, any change will never occur. Improvement initiatives like ROSETTA aim to elevate the importance of the inequity of engagement in online learning for students and inspire others to take from these findings, and seek to create teacher education and preparatory courses of their own.

Sustainability for Educator PD in Online Learning

Like online learning for students, for online professional development to be effective, the content needs to be relevant, engaging, and timely. The work of ROSETTA was designed to address many of the needs for online PD identified by the Summit and the Adult Learning Standards from Learning Forward identified in Tables 1 and 2, but still saw lower competition numbers than desired. Some of the feedback from participants and design team members was a desire to have some aspects of synchronous learning occur for the ROSETTA training. Exclusion of these synchronous opportunities identifies a limitation of the improvement initiative aligned to the Learning Communities standard (*Standards for Professional Learning | Learning Forward*, 2011). Therefore a recommendation is to have dedicated times for PD leaders to engage with participants during the school day to make the learning more integrated into the life of the school itself. An example of a synchronous participant session could be an all-staff meeting or simply

coming together with departments or smaller groups of teachers in-person or using a virtual meeting platform. Simply to remind them of the learning outcomes of the PD, a time to ask questions, or merely to keep the training at the forefront of their minds. Sometimes, someone needs to know that there is a connection to keep the conversation alive and moving forward, even if it is a virtual one.

Additional Future Considerations

Despite the lower number of respondents within the initiative, the design team worked with SVA leadership to promote the content via email and staff meetings. A consideration the design team indicates for future endeavors like ROSETTA would be other incentives instead of just a CEU. Given how readily available PD opportunities are for teachers, the group felt this incentive was not as enticing as initially believed. Additionally, the change in staff size at SVA did limit the scope of the ROSETTA work. In the future, the design team recommends working with more than one school/site to ensure a large enough sample size for data collection.

Another consideration would be the overall time of the improvement initiative. Executing the work of ROSETTA from inception to completion into a 90-day process was a significant stretch. The amount of time for the improvement initiative could also factor in fewer participants who could complete the PD modules. Extending the time participants could spend in the training modules speaks to the adult learning standard of Resources. Time is a valuable commodity, and leaders must balance the time allocated for professional development (*Standards for Professional Learning | Learning Forward*, 2011). Therefore, a recommendation of the design team would be to implement the ROSETTA training for an entire semester or school year to provide participants with sufficient to take in the learning and time to apply the new knowledge to their instruction.

One final consideration would be taking the additional step of examining student engagement directly. The definition of student engagement utilized for this improvement initiative is geared more specifically on building educator capacity. Choosing to focus specifically on teachers was a determination of the design team given the initiative's timeline due to an inability to gather data without directly surveying students. Therefore, a future consideration would be to collect data directly from teachers and students before and in response to training like ROSETTA.

Continuation of the work

Beyond ROSETTA. Despite the recommended changes and feedback from participants, ROSETTA was a success in exposing the SVA staff to ways to redefine the definition of online student engagement for their students. The participants gained a deeper understanding of online instructional design and learned about new tools at their disposal within the LMS. The school administration at Summit already has plans to build upon the ROSETTA PD to include other components such as working with differently-abled students, parental support, and several other areas. In all, the school staff and design team believe the work put into the improvement initiative was a success and look forward to expanding their work.

Impact of COVID-19. The work of improvement science initiatives is to identify the needs of real-world issues and use existing research to explore and test out potential solutions to identified root causes. During the Coronavirus pandemic, students and teachers in PK-12 schools faced a drastic shift to virtual learning. The lack of professional development for educators in online instructional practices forced teachers to simply transfer their in-person learning to the digital world. Long web-based lectures and reading from slideshows meant that students were not engaged in their own leaner. Teachers reverted to being the holder of the knowledge and

expecting students to sit and listen. While students were forced to endure arduous lectures from teachers, many students struggled with the modality of online learning and needed means to engage with their learning process. Our improvement initiative's design team sought to provide educators with professional development specifically targeted at improving their understanding of online engagement and using strategies in their online classes.

Conclusion. Although virtual experiences can never fully replace in-person learning, the work of ROSETTA and this improvement initiative shows that it is possible to support educators in understanding the need for creating engaging online learning environments. Additionally, the data is encouraging that the ROSETTA framework effectively educates participants on developing engaging content within an LMS through the ADDIE framework. There once was a time when the virtual and in-person worlds for PK-12 were separate, but due to everchanging technologies, demands of the workforce, and global pandemics, online learning for public schools is here to stay. It is up to leaders and educators to determine how we choose to move forward and adapt to best meet the needs of all students.

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Appendix A

TPACK Pre- and Post-Survey

Thank you for taking time to complete this questionnaire. Please answer each question to the best of your knowledge. Your thoughtfulness and candid responses will be greatly appreciated. Your individual name or identity will not at any time be associated with your responses. Your responses will be kept completely confidential and will not influence any evaluations with Rowan-Salisbury School System.

1. Please enter your RSS Email Address
2. Gender Identity
    - Male (1)
    - Female (2)
    - Non-binary / third gender (3)
    - Prefer not to say (4)

3. Age Range
    - 20 - 30 (1)
    - 31 - 40 (2)
    - 41 - 50 (3)
    - 51 - 60 (4)
    - 61+ (5)

4. Years of Teaching Experience
    - Less than 5 (1)
    - 5 - 10 (2)
    - 11 - 20 (3)
    - More than 20 (4)

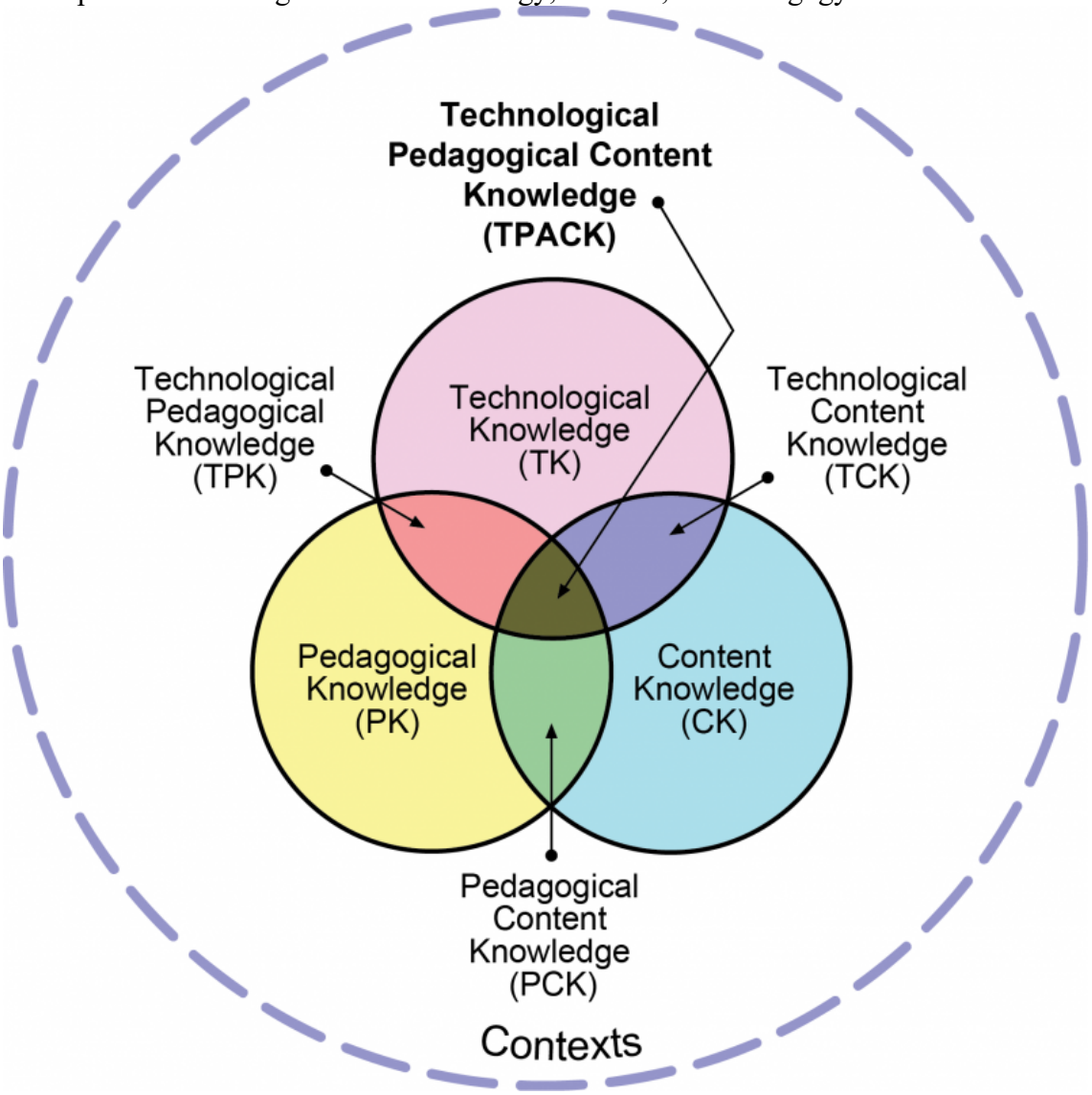
5. Subject Area(s) you are currently teaching, **check all that apply**
    - English-Language Arts (1)
    - Mathematics (2)
    - Science (3)
    - Social Studies (4)
    - Art (5)
    - Music (6)
    - Physical Education (7)
    - Career and Technical Education (8)
    - Other (9) _____

At the heart of the TPACK framework, is the complex interplay of three primary forms of knowledge:

Content (CK) - Your subject area.
Pedagogy (PK) - Teaching strategies like groups, direct instruction, etc.
Technology (TK) - The use of technology for teaching

The TPACK approach goes beyond seeing these three knowledge bases in isolation. The TPACK framework goes further by emphasizing the kinds of knowledge that lie at the intersections between three primary forms: Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK).

6. Please click in the region below that you believe best identifies your current level of expertise with integration of Technology, Content, and Pedagogy.



Technology is a broad concept that can mean a lot of different things. For the purpose of this questionnaire, technology is referring to digital technology/technologies. That is, the digital tools we use such as computers, laptops, iPods, handhelds, interactive whiteboards, software programs, etc. Please answer all the questions and if you are uncertain of or neutral about your response you may always select "Neither Agree or Disagree"

7. TK (Technology Knowledge)

	Strongly Disagree (1)	Disagree (2)	Neither Agree or Disagree (3)	Agree (4)	Strongly Agree (5)
I know how to solve my own technical problems. (1)	○	○	○	○	○
I can learn technology easily. (2)	○	○	○	○	○
I keep up with important new technologies. (3)	○	○	○	○	○
I frequently play around the technology. (4)	○	○	○	○	○
I know about a lot of different technologies. (5)	○	○	○	○	○
I have the technical skills I need to use technology. (6)	○	○	○	○	○

8. TPK (Technological Pedagogical Knowledge)

	Strongly Disagree (1)	Disagree (2)	Neither Agree or Disagree (3)	Agree (4)	Strongly Agree (5)
I can choose technologies that enhance the teaching approaches for a lesson. (1)	○	○	○	○	○
I can choose technologies that enhance students' learning for a lesson. (2)	○	○	○	○	○
My teacher education program has caused me to think more deeply about how technology could influence the teaching approaches I use in my classroom. (3)	○	○	○	○	○
I am thinking critically about how to use technology in my classroom. (4)	○	○	○	○	○
I can adapt the use of the technologies that I am learning about to different teaching activities. (5)	○	○	○	○	○
I can select technologies to use in my classroom that enhance what I teach, how I teach and what students learn. (6)	○	○	○	○	○
I can use strategies that combine content, technologies and teaching approaches that I learned about in my coursework in my classroom. (7)	○	○	○	○	○
I can choose technologies that enhance the content for a lesson. (8)	○	○	○	○	○

9. TPACK (Technology Pedagogy and Content Knowledge)

	Strongly Disagree (1)	Disagree (2)	Neither Agree or Disagree (3)	Agree (4)	Strongly Agree (5)
I can teach lessons that appropriately combine my content/subject area, technologies and teaching approaches. (1)	○	○	○	○	○

10. Models of TPACK (Summit & District Support Staff)

	Strongly Disagree (1)	Disagree (2)	Neither Agree or Disagree (3)	Agree (4)	Strongly Agree (5)
My school-based coaches and Instructional Technology Facilitator appropriately model combining content, technologies, and teaching approaches in their teaching. (1)	○	○	○	○	○
My school administrators appropriately model combining content, technologies, and teaching approaches in their teaching. (2)	○	○	○	○	○
RSSS central office administration appropriately models combining content, technologies, and teaching approaches in their teaching. (3)	○	○	○	○	○

Post-Survey Only

11. What is one thing you would have us not change about the ROSETTA training?

12. What is one thing you would have us do differently for this training?

13. How likely are you to use at least one aspect of the ROSETTA training in your classroom/instruction?
    - (0)
    - (1)
    - (2)
    - (3)
    - (4)
    - (5)
    - (6)
    - (7)
    - (8)
    - (9)
    - (10)

END OF SURVEY
Thank you for your participation in the survey!

TPACK Survey for Summit Virtual Academy teachers within Rowan-Salisbury School System. Adapted from (Denise et al., 2009)

Appendix B

Pilot Teacher Feedback

Thank you for taking time to complete this questionnaire. Please answer each question to the best of your knowledge. Your thoughtfulness and candid responses will be greatly appreciated. Your individual name or identity will not at any time be associated with your responses. Your responses will be kept completely confidential and will not influence any evaluations with Rowan-Salisbury School System.

1. Overall, how satisfied are you with the Professional Development you experienced?
    - (0)
    - (1)
    - (2)
    - (3)
    - (4)
    - (5)
    - (6)
    - (7)
    - (8)
    - (9)
    - (10)

2. How easy or difficult was it to use the features you experienced in the modules?
    - (0)
    - (1)
    - (2)
    - (3)
    - (4)
    - (5)
    - (6)
    - (7)
    - (8)
    - (9)
    - (10)

3. What is one thing you would have us not change?

4. What is one thing you would have us do differently?

5. How beneficial did you find the Professional Development content?
    - (0)
    - (1)
    - (2)
    - (3)
    - (4)
    - (5)

- (6)
- (7)
- (8)
- (9)
- (10)

6. Would you use these strategies in your own classroom, if so how?
7. Do you believe your colleagues at Summit would benefit from the training in this module?

Appendix C

Design Team PDSA Cycle Feedback

Thank you for taking time to complete this questionnaire. Please answer each question to the best of your knowledge. Your thoughtfulness and candid responses will be greatly appreciated. Your individual name or identity will not at any time be associated with your responses. Your responses will be kept completely confidential and will not influence any evaluations with Rowan-Salisbury School System.

1. Please identify the PDSA Cycle in which you are providing feedback on?
    - Cycle I – Design Team Creation & Initial Data Collection (1)
    - Cycle II – Developing ROSETTA & Piloting (2)
    - Cycle III – Deploying Training to Summit Staff & Collecting Feedback (3)

2. In general, how positive or negative are your interactions with other members of the Design Team?
    0 (0)
    1 (1)
    2 (2)
    3 (3)
    4 (4)
    5 (5)
    6 (6)
    7 (7)
    8 (8)
    9 (9)
    10 (10)

3. How effective was the work of this PDSA Cycle in addressing our primary goal?
    0 (0)
    1 (1)
    2 (2)
    3 (3)
    4 (4)
    5 (5)
    6 (6)
    7 (7)
    8 (8)
    9 (9)
    10 (10)

4. If given the opportunity to repeat the cycle just completed, what would you do differently?

Appendix D

ROSETTA Module Reflection

1. First and Last Name
2. Grade level you teach (check all that apply)
    - K
    - 1
    - 2
    - 3
    - 4
    - 5
    - 6
    - 7
    - 8

3. Rate your overall impressions and experience with this PD module

Ease of Use (1)

Knowledge Gained (2)

Relevant to my teaching/career (3)

4. How would you compare this PD experience to previous experiences?

1
2
3
4
5

5. What is the most important element you learned in this module?
6. What is still challenging about the topic covered?
7. Is there any additional information that you might recommend we spend more time upon?