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Exploring Teachers' Perspective of Digital Literacy Pedagogy: Implications for Future Practice

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Abstract

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MAEd, University of Phoenix 2004

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Abstract

Pedagogy has not addressed the literacy shift from reading, writing, and speaking to include cognitive digital literacy skills. Teachers lack the technological pedagogical content knowledge to integrate digital literacy skills into student learning. Using a digital literacy framework with 6 essentials skills, the purpose of this qualitative case study was to investigate teachers' (a) current understanding, knowledge and skills; (b) current integration of digital literacy skills; (c) challenges they face in integration; and (d) supports needed in shifting pedagogical practices to address change. Participants were 13 teachers from high school content areas. Data were gathered through focus groups interviews, observations, and artifacts. Data were coded with MAXQDA software, compared, organized, and refined based on the 4 research questions. Findings revealed high levels of knowledge for the terms digital literacy and photovisual literacy. Integration levels of digital literacy skills varied with more evidence in photovisual and reproduction literacy. Five minor challenge themes (critical thinking; time; information and technology literacy; infrastructure and access; and behavior and attitude) and 4 minor support themes (professional development; planning and preparation time; observation and feedback; and schoolwide focus and routines) emerged. Analysis of findings revealed 4 major themes: critical thinking, integrated professional development, effective use of time, and infrastructure and schoolwide routines. Findings may affect positive social change by engaging teachers in critical reflection through professional development leading to improvements in teacher pedagogical practices related to furthering the digital literacy skills of youth.

Exploring Teachers' Perspective of Technology Pedagogy: Implications for Practice

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Dedication

In the spirit of life-long learning and discovery, this doctoral study is dedicated first to my two daughters, Isabella and Realani. I learn from them as much or more as I impart. Their curiosity, love, laughter and support have been my light. Second, to my husband Erin, for his unconditional support, encouragement and patience on this seemingly endless journey. Thank you for being my rock. Lastly, to my parents Katherine and Richard, who instilled within in me a seeking mind and the will and courage to explore anything and everything.

Thank you all for believing in me. This educational expedition would not have been possible without your faith and unyielding support.

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Section 1: The Problem

Introduction

Youth are connected to the world electronically, and they are enveloped in a constant flow of entertainment, information, and communication. Born into a ubiquitous technological world, these digital natives daily receive and respond to a variety of stimuli simultaneously through experiential learning (Ng, 2012). To exist in this digital environment, these adolescents must develop a growing set of skills that allow them to process this information and perform complex tasks. Currently, these youth are using technologies repeatedly to advance their social agendas; yet, they may not use it to develop academic, creative, or critical thinking (Comba, 2011; Nasah, DaCosta, Kinsell, & Seok, 2010; Ng, 2012). Although this may be a priority to these digital natives, participation in this new techno centric reality involves the development of complex digital literacy skills. Their intellectual capacity to function in the global economy must be expanded to include new digital competencies. As they mature, these youth need to participate in authentic learning events and reflect on the experience to successfully acquire new skills.

Adhering to the responsibility to build, enhance, and elevate the digital capacity of the next generation of youth, teachers must adapt accordingly to meet the needs of these digital natives. Based on the National Educational Technology Standards developed by the International Society for Technology in Education (ISTE), Calvani, Fini, Ranieri, and Picci (2012) described a digitally literate learner as a person who can analyze and use information gained collaboratively through digital media to demonstrate creativity and

critical thinking while adhering to the ethical and social norms related to technology. Learning tasks initiated in the classroom should address these skills, cognitively challenging students to analyze and synthesize multiple modes of information by incorporating technology as an educational tool. Although many students are adept at accessing information electronically, they lack the ability to effectively and ethically process and present the information (Greene, Yu, & Copeland, 2014). These attributes of identifying and extracting key ideas to create new knowledge are mastery skills that need to be taught (Ellis, Goodyear, Bluic, & Ellis, 2010). As technology advances in the classroom, teachers are faced with the challenge of successfully integrating technology with content and pedagogy to address digital literacy skills.

Definition of the Problem

Geographical boundaries have been decreased by technology, creating a new intermingling of cultures that influences the development of these digital natives. Existing in a media culture where technology innovations increase the flow of information and the degree of social integration, students must learn to be critical consumers of new knowledge. A part of this learning process includes the ability not to just gather information, but to equip learners with the skills and knowledge needed to actively construct and cocreate new knowledge (Chu, 2010; Fahser-Herro & Steinkuehler, 2009). Calvani et al. (2012) indicated that high school students' ability to assess credibility of sites and process complex digital information is also low. Many students seem to be adept at accessing information, but need to develop higher order thinking and literacy skills.

High school curriculum is not addressing the integration of digital competencies into pedagogy. Through classroom observations and teachers' conversations, the principal of the school study site recognized the lack of effective technology integration with curriculum (personal communication, April, 24 2014). Although teachers have access to technology for use in the classroom, it is not being used as an effective instructional tool for students to cultivate the intellectual competencies needed to function effectively as global citizens (Fahser-Herro & Steinkuehler, 2009; Henderson, 2011). As a result, students inherently lack the cognitive digital literacy skills necessary to function and compete with the pace, complexity, and intensity of technological society. To compete globally, technology must be leveraged in education to engage students in critical learning opportunities that prepare them for college and career. The high school educational setting must reflect authentic learning that mirrors the real-world application of these digital literacy skills, and high school teachers are not adapting pedagogy to effectively address these digital literacy skills. To bridge the digital literacy gap between teacher deficiencies and students' needs, in this qualitative case study, I explored current level of understanding, knowledge, and integration of digital literacy skills of high school in-service teachers in order to identify challenges and supports they need to successfully shift teaching practices.

To adequately prepare students to function after graduation, high school teachers must transform current pedagogy to include content area concepts, skills, processes, and resources relevant to information and communication technology (Ertmer & Ottenbreit-Leftwich, 2010) and include digital literacy skills (Eshet-Alkalai, 2004; McLoughlin,

2011). Educational systems and pedagogical practices have become out of date or obsolete and are not meeting the learning needs of the new generation of tech savvy students. It is not enough for students to be able to use the technology; ICT should be used to facilitate student learning through active participation and collaborative interaction with content and peers to further develop their ability to assess and assimilate multiple sources of information related to discipline areas. The learning environment must be structured to provide learning opportunities where students can begin to build these skills.

There is a growing disparity between the classroom learning experiences provided by the teacher to engage students in learning versus the real-world application of skills required to compete in global economy. Teachers are not adequately preparing students with these challenging, relevant learning experiences using technology to develop digital literacy skills (Ellis et al., 2010; Ertmer & Ottenbreit-Leftwich, 2010; Fahser-Herro & Steinkeuhler, 2009; Lee & Tsai, 2010; Ng, 2012). There is a difference between implementing technology as a teaching tool and integrating technology into teaching and learning practices to engage students in authentic learning experiences. Simply introducing various technical modalities into the classroom does not ensure successful nor meaningful integration unless teachers are trained to use technology to enhance student learning and transform their pedagogical practices (Harris, Mishra, & Koehler, 2009; Koc & Bakir, 2010; Tee & Lee, 2011). Without a blended approach, there is a mismatch in the vision of educational leaders and how the application of digital literacy skills is employed in the classroom to develop mental acuity and problem-solving skills.

Although many teachers have increased their use of technology personally and professionally, it has not been assimilated into pedagogical practices. Researchers (Harris & Hoffer, 2011; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010) have suggested that teachers only use technology as a support of current practices and to target communication and administration tasks rather than as an instructional resource. In what is becoming defined as a second-level digital divide, teachers have been unable to bridge the connection between past teaching practices and the current digital learning environment (Project Tomorrow, 2013). From students' perspective, teachers are stifling learning due to their unsophisticated use and ineffective technology integration (Project Tomorrow, 2013). Teachers' lack of knowledge and skills surrounding this technological divide will continue to grow until teacher practices and student learning needs are interactively aligned.

Rationale

Evidence of the Problem at the Local Level

Teachers need to begin to weave technology, content, and pedagogy into the educational platform to facilitate learning where students' interaction with new knowledge cultivates critical thinking and creativity. The U.S. Department of Education Office of Educational Technology (2010) and the state department of education (DOE) both advocated for a transformation in current educational practices to include authentic learning through the integrated use of technology to enhance discipline literacy. This requires an intentional shift in pedagogical practices, where teachers begin to make meaningful connections with content and technology to construct new playgrounds of

teaching and learning (Ertmer & Ottenbreit-Leftwich, 2010; Harris et al., 2009; Lee & Tsai, 2010). Described as technological pedagogical content knowledge (TPCK), this combination of skills and knowledge pose a challenge for teachers because they often lack the ability to effectively integrate discipline-specific technology to support students' cognitive development (Harris et al., 2009). Improving technology pedagogy involves teachers increasing their pedagogical knowledge through all facets of curriculum development, implementation, and assessment practices (Ertmer & Ottenbreit-Leftwich, 2010). Effective integration of digital literacy skills with content is a skill that teachers need learn. As technology evolves, ongoing support is needed in order to keep pace with advances.

In alignment with the No Child Left Behind Act (2001), the state DOE devised the Department of Education Educational Technology Plan with goals to build school capacity and to prepare students to compete in the evolving economy, locally and globally. Isolated geographically in the mid-Pacific, the islands rely on technology for both industry and economics. Recognizing the gap between the advances of technology used in the workforce and the lack of related educational experiences in the classroom, the technology plan can begin to address this disconnect. Based on a vision to empower learners, the mission for the plan is to provide a system that allows all learners access to the global community. Incorporating the use of technology with professional development and other supports, the seven underlying technology education goals include the following:

- Goal 1. Promote interagency coordination of technology programs and resources
- Goal 2. Use technology to support national standards and the state Content and Performance Standards (HCPS)
- Goal 3. Provide support resources needed for effective technology integration
- Goal 4. Expand access to, and use of, the information infrastructure
- Goal 5. Ensure that technology and resources are implemented as planned
- Goal 6. Provide ongoing evaluation that guides future changes and plans
- Goal 7. Identify funding strategies and resources to support the plan.

The intent of the technology plan is to prioritize tasks and provide support and resources for both teachers and students focused on connecting technology and standards-based learning. Technology plays a role in academic achievement at the school level and requires a paradigm shift on many levels.

Although the state DOE acknowledges that there is a need to provide public schools with necessary software, hardware, and training to advance technology, support is limited. Although some statewide technology training courses are offered, districts and schools have a choice on whether to participate and must absorb the cost of courses and travel at the school or teacher level. Online courses are available through Project Inspire, a credit program designed to help teachers integrate technology in a standards-based curriculum; however, school-level feedback indicates the need for on-site training and school-based technology support personnel. The state is unable to keep up with demands

due to high interest and limited qualified trainers. Many schools are in charge of creating their own technology support plans that include professional development and school-level technology coordinators.

As one of the vehicles for driving this change, the state DOE Strategic Plan 2011-2018 was focused on the implementation of strategies and activities based on the achievement of three overarching goals: (a) student success, (b) staff success, and (c) successful systems of support. Inherent in the underlying core values and beliefs of these goals is that stakeholders collaborate to create learning opportunities that integrate 21st century resources and skills to ensure students leave school prepared. Real-world learning environments should provide meaningful learning experiences relevant to students for productive citizenship and career success. Objectives within each of the three goals further define the parameters connected to successfully promoting academic excellence with the necessary support systems.

Through tiered practices and structures, schools are required to align academic and financial plans with the blueprint laid out in the state Technology Plan and Strategic Plan. The most current state Technology Plan is in draft form with the latest version dated 2008. School leaders are tasked with coordinating goals and resources to support the plan criteria. In informal conversations with the leadership team at the focus school, teachers indicated several areas of concern related to addressing technology criteria within these plans. Identified areas of concern included alignment of resources, infrastructure and training support, ethical and effective use of technology, and finding the appropriate

balance between teaching core content and digital literacy skills. Many teachers recognize the need for reform, but are uncertain as to how to move forward productively.

Although funds have been allocated and improvements to school infrastructures statewide have started, it has not yet filtered through to include classroom technology within the focus school's district. Access to computers, projectors, interactive white boards, visual presenters, and various computer programs are limited, and they restrict the teachers' ability to align technology components into schoolwide instruction and collaborate with grade level or content area peers. School leaders at the focus school recognized the need for differentiated professional development based on current infrastructure and teacher skills. The leadership team believed that to begin to build site capacity, further collaboration was also needed with teachers to identify current digital literacy skills, outline common terms, definitions, and key digital literacy skills to be emphasized and taught schoolwide (personal communication, April 24, 2014). The principal also expressed thoughts regarding training needs to address ethical technology behavior for both students and teachers, as well as provide guidelines for balancing instruction on content standards and digital literacy skills (personal communication, April 24, 2014). The mentor coordinator and technology coordinator affirmed that teachers have a range of technology skills and are challenged in preparing lessons to engage students in interacting with content using technology (personal communication, April 18, 2016). The leadership team agreed that technology is used more for delivery of information rather than as a learning tool. Teachers are not adapting pedagogy to effectively integrate digital literacy skills into authentic student learning. Further research

is needed to determine current knowledge and integration of technology and digital literacy skills.

Incorporating digital literacy skills into pedagogy is also a requirement of the new Common Core State Standards adopted by 45 states across the United States (National Governors Association, 2010). Designed to reflect real-world application of the knowledge and skills needed to graduate college and be career-ready, two anchor standards in the writing strand for *Research to Build and Present Knowledge* are dedicated to incorporating technology into curriculum and instruction:

- CCSS.ELA-Literacy.CCRA.W.7: Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation (National Governors Association, 2010, para. 24).
- CCSS.ELA-Literacy.CCRA.W.8: Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism (National Governors Association, 2010, para. 25).

These standards require teachers to incorporate technology effectively into teaching practices. Teachers need to begin extending their knowledge of appropriate and effective uses of technology to promote these digital literacy skills, challenging the traditional method of both teaching and learning. Technology in the classroom should address the CCSS Anchor Standards to enhance student learning by enabling them to interact with content to construct new knowledge that applies to real situations (Ertmer & Ottenbreit-Leftwich, 2010). This shifts the focus of technology from an entertainment tool into an

educational framework.

Evidence of the Problem from the Professional Literature

Social media, computers, cellular phones, electronic tablets, televisions, game consoles, and other innovative technology sources inundate youth on a daily basis. Described as the generation immersed in technology, these digital natives use media to feed their social and personal interests (Ng, 2012). Although these youth have the ability to navigate the Internet and access information for personal reasons, they lack the skills and motivation to use media for scholarly purposes. Growing up exposed to a digital environment does not mean that they have been taught how to employ the cognitive skills necessary for mindful learning (Ng, 2012). In an investigation of two independent studies on the digital literacy skills of high school and college students, Eshet-Alkalai and Chajut (2010) found that even though students could access information and use technology, it did not equate to sophisticated use of technology in digital environments. Students were able to access information online, but evaluating and putting the information to good use remained a challenge. Meneses and Momino (2010) reported that 72.4% of the 6,602 students surveyed between the ages of 11 and 18 received more Internet training in the context of tutoring, self-teaching, home, and with peers than in the formal classroom learning environment. Meneses and Momino also identified that students had more opportunities to access the Internet outside of the school setting than in school. Equal access to technology and effective integration in an educational setting are integral components in affecting change.

As facilitators of learning, high school teachers need to shift pedagogy practices

to incorporate these digital literacy skills so students graduate prepared to function in these digital environments. In a study of 54 secondary schools in Australia, Neyland (2011) identified several incongruities of educationalists' perception of the importance of information and technology skills and actual use in schools. After evaluating the implementation levels of online learning within the high school system, Neyland found that although many teachers viewed this style of learning as effective and were interested, they did not have the resources, time, or skills to learn the technology or help other teachers. Furthermore, Lee and Tsai (2010) implied that teachers might not have the sufficient technological pedagogy needed to link these resources with instructional materials and objectives. Despite increased access to technology and training, many teachers still have not built the necessary skills and knowledge needed to change how they teach (Ertmer & Ottenbreit-Leftwich, 2010; Fahser-Herro & Steinkeuhler, 2009; Voogt, Erstad, Dede, & Mishra, 2013). This may be contributing to the lack of change in teaching practices.

Through goals and recommendations in the five essential areas of teaching, learning, assessment, productivity, and infrastructure, the National Education Technology Plan (NETP, 2010) was designed to leverage the use of technology to meet the changing needs of these digital natives. Educators are challenged with the task of transforming the current system by improving their expertise and connection to resources to engage learners in experiences that mirror their daily lives. Through collaborative and continuous professional development; a comprehensive, sustainable infrastructure; and a transparent action plan, the U.S. Department of Education Office of Educational Technology (2010)

paved the path for educational reform that coordinates systematic efforts to address these areas in need of change. Efforts to actualize this reform require a shift in both professional and personal practices of the entire education system with an emphasis on teachers who are already in the classroom.

In-service teachers are already immersed in this challenge as they try to maintain current knowledge of technology while no longer actively enrolled in a formal education program. Researchers (Fahser-Herro & Steinkuehler, 2009; Spaulding, 2010) showed that in-service programs and teachers lag behind preservice teachers in the educational use of technology. Although teachers may have some background knowledge and skills regarding digital literacy and technology use, experiences, beliefs, and knowledge may vary. The purpose of this qualitative case study was to explore the current level of understanding, knowledge, and integration of digital literacy skills of high school in-service teachers and to identify challenges and supports they need to successfully shift teaching practices. Information from focus group interviews, observation, and documents were used to design a system to support the reform in pedagogy necessary to actualize change related to digital literacy skills.

Definitions

For the purposes of this study, the following terms and definitions were used:

Common Core State Standards: The knowledge and skills students should have within their K-12 education careers so that they will graduate high school able to succeed in entry-level, credit-bearing academic college courses and in workforce training

programs (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010).

Digital immigrants: People, not born in the digital era, who have developed technology skills over time (Prensky, 2001).

Digital literacy: The ability to use technical, cognitive, and socioemotional skills to understand and assimilate information in a digital environment (Bawden, 2001; Eshet 2012; Gilster, 1997).

Digital natives: Generation of youth, born into the digital era, who speak the native language of technology (Prensky, 2001).

Disciplinary literacy: Literacy skills as they relate to content areas, such as mathematics, science, history, career and technical education, literature, and other subjects (Shanahan & Shanahan, 2008).

Educational technologies: Technology predominately used by students to interact with various forms of information and communicate with peers, teachers, and other audiences (Hechter & Vermette, 2014).

Information and communication technology (ICT): The technological software, hardware, and communication facilities used as tools in education (Berce, Lanfranco, & Vehovar, 2008; Wang & Woo, 2007).

In-service teachers: Licensed teachers who are actively employed in an educational institution.

Instructional technologies: Predominately teacher-driven technology that teachers use for instruction, assessment, and communication with students, parents, administration, and other teachers (Hechter & Vermette, 2014).

Literacy: A fundamental act of cognition that involves the ability to read and write with meaning in a native language (Ferrari, 2012; Gilster, 1997; New London Group, 1996).

Pedagogical knowledge: Knowledge teachers have about teaching methods, practices, and processes related to student learning, classroom management, and lesson planning (Koehler, Mishra, & Cain, 2013).

Pedagogical content knowledge: Knowledge of pedagogical practices as applicable to content where the teacher translates information, determines presentation methods, and modifies instructional materials as appropriate to learner needs and background knowledge (Koehler et al., 2013).

Technology: A set of means for instruction and learning that includes devices, systems, and tools that provides opportunity for learners to access, manipulate, represent, and communicate information and ideas (U.S. Department of Education Office of Educational Technology, 2010).

Technological knowledge: Requires knowledge beyond basic computer literacy where a person can continually adapt to changes in technology and apply it personally and professionally to achieve a goal (Koehler et al., 2013).

Technological content knowledge (TCK): The knowledge and understanding of the influence and limitations of the interactions between discipline-specific content and technology (Koehler et al., 2013, p. 16).

Technological pedagogical knowledge (TPK): Knowledge and understanding of the relationship between the constraints and limitations of education technology tools and how they affect pedagogy within disciplines (Koehler et al., 2013).

Technological pedagogical content knowledge (TPCK): The understanding of how teaching with technology requires knowledge of how content concepts are represented with technology, teaching and learning strategies associated with technology, students' background knowledge, and how everything can be built upon and connected to help students develop new epistemologies (Koehler et al., 2013).

Significance

This intrinsic and instrumental qualitative case study was significant because it has the potential to transform pedagogical practices of in-service teachers to include digital literacy skills connected to 21st century learning. With the continuous progress of both technology and the concept of literacy, in-service teachers are challenged with keeping pace and adapting content and curriculum. Having already completed compulsory education and licensure requirements, these teachers must advance their knowledge and skills in connecting literacy and technology to adequately prepare students for post high school reality. Through focus group interviews, teacher observations, and curriculum planning document analysis, information was gathered to determine current teacher practices and perceived needs to transform teaching and

learning. This research can contribute to the body of knowledge related to in-service secondary school teachers and their understanding and practices surrounding digital literacy skills.

This study was significant to the local setting because I provided information from the teachers' perspective that can be used to develop an onsite professional development plan with additional supports to help them overcome challenges in teaching new literacies. Bringing a variety of knowledge, skills, and beliefs to the classroom, teachers may not even realize the extent to which they are already integrating technology and addressing digital literacy skills. Teachers have insight into both personal and student strengths and deficiencies related to technology and digital literacy skills. Awareness of both their personal skills and abilities and student practices will allow them to identify areas for growth. Data gathered during this project study can be used to identify gaps in knowledge and practice and seek to align content and pedagogy and transform teaching and learning in this secondary school. Additionally, local administrators, district resources teachers, and other curriculum support personnel can use the information and professional development plan for practical application in other district high schools.

Guiding/Research Questions

The concept of literacy has shifted over the years from basic reading, writing, and speaking practices to a multifaceted skill set that includes the integration of digital literacy skills. Effective social and academic communication skills now transcend personal interactions and often require digital literacy skills to use electronic technologies to convey information. Educators in all content areas and grade levels must recognize this

shift in literacy skills and modify curriculum and instruction to address this literacy gap. In an effort to focus progress, this purpose of this case study was to identify in-service teacher needs in developing digital literacy pedagogy by exploring their current level of understanding, knowledge, and challenges. The research questions guiding the study were as follows:

1. RQ1: What are high school teachers' current level of understanding, knowledge, and skills related to essential digital literacy skills?
2. RQ2: How are high school teachers currently integrating the essential digital literacy skills into curriculum, instruction, and assessment across content areas?
3. RQ3: What challenges do teachers currently face in effectively integrating the essential digital literacy skills into authentic learning opportunities?
4. RQ4: What kind of support, knowledge, and skills do teachers feel is essential for them to initiate or advance their use of technology into curriculum to create discipline-specific learning opportunities that build students' essential digital literacy skills?

Review of the Literature

There are four main sections of this literature review that provide a context for digital literacy in this study. In the first section, I focus on setting a foundation for digital literacy considering definitions central to the framework. In the second section, I identify the gaps in education related to digital literacy. In the third section, I examine digital literacy skills from the teachers' perspective and explore teacher practice in the classroom

as it relate to integrating these skills. The fourth section provides a review of literature connected to students' knowledge and ability to use technology to further their digital competence.

The research for this study was retrieved primarily from three sources: the Walden University's online databases, Google Scholar, and World Wide Web. Databases accessed within the Walden Library included SAGE Premier, ERIC, Education Research Complete, ED/IT Digital Library, and ProQuest Dissertations. In addition, several books were also reserved and downloaded using Ebrary. References from within literature reviewed provided supplemental resources, most of which were then accessed using Google Scholar. Key words and phrases that guided searches included *digital literacy, digital literacy defined, digital literacy framework, digital literacy secondary schools, digital competencies, digital divide, second level digital divide, digital skills, digital natives, information and communication technology (ICT)/secondary schools, in-service/teachers and technology integration/secondary schools, in-service/teachers/digital literacy/secondary schools, and in-service teachers/technology pedagogy*. On occasions, key authors such as Paul Gilster, Yorem Eshet-Alkalai, Colin Lankshear, Michele Knobel, and Dave Bawden, were also researched. Most research was conducted using the 5-year parameter when this study began in 2013; however, as the years to conclude this project study increased, more relevant and recent research has been added. Primary resources related to the definition and framework of digital literacy dated as early as 1997. Information acquired using the Internet included state and federal government reports, local school reports, technology trend reports, and national

technology and education standards. Finally, various qualitative research and case study literature was reviewed to form the foundation for methodology and design application for this project study.

Digital Literacy Framework

The convergence of data in the form of text, graphics, audio, and video from multiple forms of media are erasing the boundaries of the conventional definition of literacy. The conceptual boundaries of literacy have traditionally been limited to basic knowledge of reading and writing skills in a native language from linear printed formats (Ferrari, 2012; Gilster, 1997; New London Group, 1996). Although still an act of comprehension, the influx of technology and social media has created a dynamic set of core competencies that are needed to be digitally literate. The concept of digital literacy includes the ability to process linear information with and navigate through multiple resources using technology (Bawden, 2001; Gilster, 1997). It is no longer a simple dichotomy of literate versus illiterate, but a continuum that spans from basic reading and writing to critical thinking and reasoning.

Although deictic by nature, since the 1990s, a variety of authors have associated the term digital literacy with comprehending multimedia and hypertext (Bawden, 2001). Gilster (1997) referred to digital literacy as the "ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers" (p.1). Gilster believed that it is not just about accessing the information, but the mindset associated with processing, connecting, and assimilating ideas regardless of format. Eshet-Alkalai and Chajut (2009) further expanded on this definition to include social and

emotional skills. For the purposes of this project study, digital literacy was defined as the ability to use technical, cognitive, and socioemotional skills to understand and assimilate information in a digital environment (Bawden, 2001; Eshet 2012; Gilster, 1997). From a holistic viewpoint, the range covers the competencies necessary to be literate in a digital environment.

Eshet-Alkalai (2004) and Eshet (2012) identified key competencies that outline a conceptual framework for digital literacy and align with the complex cognitive, socioemotional, and technical skills necessary to function in a digital environment. This holistic model was established to provide guidelines for future designers and researchers to plan for effective digital learning. This framework was validated by researchers (Aviram & Eshet-Alkalai, 2006; Eshet-Alkalai & Amichai-Hamburger, 2004; Eshet-Alkalai & Chajut, 2009) and revised to incorporate missing skills. Originally comprised of five digital thinking skills, Eshet (2012) revised the framework to include "six digital thinking skills: (a) Photo-visual, (b) Reproduction, (c) Branching, (d) Information, (e) Socio-emotional, and (f) Real-time thinking skills" (p. 268).

The first digital thinking skill, photovisual literacy, refers to the cognitive skill of decoding visual images and graphics and using them to think (Eshet, 2012; Eshet-Alkalai, 2004). Images, symbols, icons, and graphics are used to portray a variety of messages and users must be able to read and interpret them to construct meaning. Users with high photovisual skills are able to translate these messages fluently, and possess intuitive-associative thinking and memory (Eshet, 2012). Without this skill, users are in danger of being misled due to misinterpretations, assumptions, and perceptions. Photovisual

thinking increases the complexity of literacy where users must not only understand the messages, but think visually, evaluate media, and perform tasks to communicate.

Related to this ability to read visuals is the skill of editing and reproducing product from existing information in multiple media formats. The reproduction of digital skills require users to combine independent, established pieces of information in any media form to create new meaning or product in both art and writing (Eshet, 2012; Eshet-Alkalai, 2004; Gilster, 1997). Writing involves rearranging and organizing preexisting sentences and information to construct new meaning, while artwork must be manipulated or edited to craft a new piece. Users must have multidimensional and synthetic thinking skills to reorganize text and syntax and manipulate art material into an authentic, creative piece of work that reflects original ideas (Gilster, 1997). Developing reproduction literacy skills require combining both ethical and cognitive thinking.

With the advent of information-based technology, knowledge construction has moved away from the traditional linear representation via print to a modern hypermedia format (Gilster, 1997). This new digital environment provides users with freedom to navigate through the Internet. This new environment also includes the challenge of accessing information in a nonorderly fashion. Branching digital skills allow users to maintain orientation and purpose, despite their elaborate paths through the various domains (Eshet, 2012; Eshet-Alkalai, 2004). One of the challenges associated with this navigation are hyperlinks. These links lead users to tiers of information that they must read, track, analyze, and include in their knowledge construction (Bawden, 2001; Gilster, 1991). People with branching digital skills can use them to form mental mind maps and

models to think metaphorically and create abstract representations as they navigate Internet cyber structure (Eshet, 2012; Eshet-Alkalai, 2004). Users must improve searching and organization skills and create personal information strategies to be successful in managing this multimedia flow.

The exposure to multiple facets of digital material leads to the fourth component of the framework, information digital skills. Although the skill of evaluation is not new to literacy, the exponential increase in access to information necessitates that users assess content and make informed judgments (Bawden, 2001; Gilster 2001). Information digital literacy refers to the users' ability to question and filter multiple facets of information by identifying false, biased, irrelevant, and erroneous content prior to assimilation (Eshet, 2012; Eshet-Alkalai, 2004). Critical consumers of information are cognizant of their thought process and are able to assess the credibility of sources and draw appropriate conclusions. This allows consumers to establish a cache of reliable information from which they can create authentic meaning and products (Gilster, 1991). This new dimension of thinking is becoming a needed skill to become a literate information consumer.

The fifth component of the digital literacy framework moves beyond the cognitive arena into social and emotional skills. With the Internet expanding the knowledge-sharing and digital communication domain through chat rooms, discussion groups, social networks, and other online collaborative communities, Eshet-Alkalai (2012) identified socioemotional digital literacy as the one of most complex skills. Socioemotional literate users are adept at evaluating evidence and thinking abstractly, sharing knowledge with

others, and collaborating to coconstruct new knowledge (Eshet, 2012; Eshet-Alkalai, 2004). Understanding social etiquette and interacting with peers and other members of the community also applies to the digital environment for users to be successful in sharing knowledge. Additionally, users must be mature, analytical thinkers who demonstrate proficiency in photovisual, branching, and information digital skills (Eshet, 2012; Eshet-Alkalai, 2004). Combining these four skills allows users to safely and actively participate and communicate in cyberspace.

The final skill in the scope of the framework covers the users' senses in response to stimuli. Eshet (2012) referred to real-time digital skill as the ability to divide attention between simultaneous text, images, and sound occurring on screen while still reacting accordingly. This includes processing the excess stimuli, staying on task, and responding to stimuli in real-time (Eshet, 2012). This chaotic sense of reality can lead users astray if they lack the ability to think critically and effectively while processing simultaneously stimuli. In the digital environment, users must develop this critical skill in order to successfully operate and perform in this high-speed setting.

The Digital Gap in Education

As people adapt to new digital trends in the face of advancing technologies, varying levels of skill related to accessing and interacting with the tools and information are needed. The divide was originally identified as a digital divide or gap between those who could access technology and those who could not (Hargittai, 2002; Reinhardt, Thomas, & Toriskie, 2011; Wei & Hindman, 2011). Now known as the second level digital divide (SLDD), the new definition has been refined to include how technology is

being used to access information (Wei & Hindman, 2011). Users must not only be able to operate the technical tools, but successfully navigate the web to perform tasks. In a study of users from ages 18-80, Hargittai (2002) found that there was a generation gap in abilities to complete tasks on the Internet with more skill evident in the younger generation. Users from 18- 20 were able to complete more tasks in a timely manner than those 30 and older (Hargittai, 2002). Education level and time spent online were also predictors in skill level (Hargittai, 2002). Participants with higher education and more prior experience are more innovative and comfortable extracting material online (Hargittai, 2002; Wei & Hindman, 2011). There is a variation in people's online skills with exposure, education, and age as contributing factors relating to the digital divide.

Researchers (Chapman, Masters, & Pedulla, 2010; Fasher-Herro & Steinkuehler, 2009; Goode, 2010; Henderson, 2011; Voogt et al., 2013) claimed that SLDD was evident in the K-12 setting in both the United States and abroad. In a review of research surrounding new literacy classroom practices in the United States, Fahser-Herro and Steinkuehler (2009) found that although the access gap may be lessening, the skill gap is widening between students' in-home technology use compared to technology instruction in schools. At home, students had experienced more in-depth communication, built stronger relationships, and had more variety in choice of technology while classroom instruction was concentrated on drill and practice, information retrieval, or completing work previously started. Henderson (2011) also noted a gap in how teachers and students perceived the usefulness and purpose of technology and found that teachers were more focused on the computer as a tool rather than on developing relevant aspects of literacy in

processing information. Overall, chances to develop digital literacy were superficial and lacking in "authentic content creation opportunities, shared expertise, and dynamic multimodalities" (Fahser-Herro & Steinkuehler, 2009, p. 58). Teachers must broaden their approach to instruction in developing students' digital competencies to address more complex literacy skills.

Scholars (Chapman et al., 2010; Gray, Thomas, & Lewis, 2010; Reinhardt et al., 2011) who examined socioeconomic status as a factor in teachers' ability to use technology found similar results. Although teachers have adequate access to technology for personal use and classroom instruction, there were inequalities in their technical abilities and use of technology in instruction. Teachers in high needs (HN) schools reported that they use technology less in instruction (Gray et al., 2010), and use was basic and did not promote higher order thinking skills (Chapman et al., 2010; Reinhardt et al., 2011). In contrast, teachers in non-HN schools reported more frequent use and demonstrated integrated advanced thinking skills. Gray et al. (2010) found that fewer than 52% of teachers engaging their students in the education use of technology. Reinhardt et al. (2011) further noted that, regardless of high needs status, teachers' perception of use did not match reality. Differences in teacher technology background, experience, and pedagogy must be considered to design differentiate support.

A gap in proficiency and use is also evident when examining the trends in digital fluency of high school students and those in their first year of undergraduate school. Scholars from Canada (Smith, Given, Julien, Ouellette, & DeLong, 2013) and the United Kingdom (Miller & Bartlett, 2012) demonstrated that students performed poorly when

required to access and analyze quality information, recognize bias, and verify sources when using technology. In an information literacy test, 19% of 103 12th grade students achieved proficiency with a mean score of 50.7% (Smith et al., 2013). Although a majority of primary and secondary teachers regarded information literacy as a critical skill they believed they taught, they rated student performance in the same area as poor to average (Smith et al., 2013). Students are still struggling with complex tasks involving digital literacy, and teachers need more support with integrating strategies to enhance digital learning.

There are further inequalities between what colleges expect students to know and actual skill. Goode (2010) found that although university students in California were entering college with an ingrained sense of technology for social and academic purposes, digital competencies were varied, and many still lacked critical skills. Goode concluded that students with low technology efficacy were less likely to enroll in courses with challenging technology requirements, thereby increasing the margin of knowledge and skill between other more tech savvy students. Additional scholars (Jones, Ramanau, Cross, & Healing, 2009; Waycott, Bennett, Kennedy, Dalgarno, & Gray, 2010) of first-year undergraduate students also supported the differences in students' and teachers' technology use. Although students primarily use computers and mobile devices for communication, social networking, and access to materials for courses, teachers viewed technology as an administrative tool and means to augment student learning. Waycott et al. (2010) concluded that although teachers and students may use similar technology, they engage in activities for different reasons. There is a difference between education

technologies and everyday technologies, and teachers need to consider this when planning curriculum. Understanding the divide between how students currently use technology and the complex skills required to participate in 21st century is necessary for practitioners to make changes to academic curricula and pedagogy.

Current Teacher Trends

The conflux of students, teachers, and technology in the educational setting has created new academic trends. The academic profile of learning has shifted as teachers have tried to adapt to this progression and innovation of technology and redefine how digital technologies fit into curriculum, instruction, and assessment. While data (Bradley et al. 2010) demonstrated that teachers' use of technology both in and out of the classroom has increased, the application towards digital literacy is still lacking (Meneses & Momino, 2010; Fahser-Herro & Steinkuehler, 2009). Affecting both in-service and preservice teachers, several contributing factors have constrained progress.

In-service vs. Preservice Teachers. When comparing technology use, self-efficacy, and classroom integration between in-service and preservice, researchers have found similarities and differences. In a study of 112 preservice teachers and 118 in-service teachers, Spaulding (2010) concluded that there was a significant difference in confidence levels related to completing basic and complex computer tasks with preservice teachers self-reporting more confidence in their abilities to adapt instruction and impact learning using technology. Additionally, preservice teachers demonstrated more readiness and competency regarding integrating technology into the classroom.

Scholars (DeSantis & Rotigel, 2014; Moore-Hayes, 2011; Pan & Franklin, 2011) presented different findings related to technology integration and self-efficacy. When tasked with evaluating software for teaching and learning and determining which educational technologies to use in supporting instruction, both preservice and in-service teachers felt they were less than adequately prepared to merge technology and pedagogy (Moore-Hayes, 2011). Although DeSantis and Rotigel (2014) indicated little difference in self-efficacy between the two groups of teachers, further evidence from scholars (Desantis & Rotigel, 2014; Pan & Franklin, 2011) demonstrated that participants in both groups believed they were more competent in the application of basic technology tools than advanced tools. Basic tools (Web 1.0) included skills such as word processing, drill and practice, and web searches, while advanced tools (Web 2.0) consisted more of collaboration, application, and integration of knowledge to create or design products. In a study involving 461 in-service teachers, Pan & Franklin (2011) also concluded that most participants rarely used these Web 2.0 tools and reported low confidence in their abilities. Additionally, participating teachers stated that they have limited resources, knowledge, experience, and support, which discourages them from embracing these tech tools. Without the application of advanced technology tools in the classroom, students lack the opportunity to strengthen their digital literacy skills. The combination of these results indicated the need to further explore teacher perception and how they are applying educational technologies to further student learning.

DeSantis and Rotigel (2014) also noted significant differences in how teachers at various career levels approach and use technology. Results from their survey evinced that

preservice and early career teachers focused more on using the Internet for communication, social networking, and entertainment while veteran teachers used it more for software productivity and educational research purposes. DeSantis and Rotigel (2014) concluded that as teachers advanced in their career levels, technology use also shifted as teachers increased Internet use for productivity and less on communication. Although this demonstrated a shift in teachers' mindset and use, the development of digital literacy skills called for a combination of Web 1.0 and Web 2.0 skills including communication, collaboration, entertainment, and productivity. Evidence from the research indicated that there is a generational difference in technology use between preservice and in-service teachers that invite further investigation.

Teacher Perceptions. Teachers faced many challenges as they attempted to maintain pace with the constant flux of technology and resources in the educational setting. Although they incurred curricular revisions periodically according to state and federal mandates, technology changes so frequently and swiftly, many teachers were reluctant to assimilate these new tools and resources into pedagogy (Ertmer & Ottenbreit-Leftwich, 2010). Stakeholders from the students to the community have expectations that the learning environment has been adapted to embrace new competencies related to the latest digital trends. To close this expectation gap (Mize & Rogers, 2012), teachers' perceptions of technology related to the academic environment must be considered and addressed in order to facilitate more authentic learning.

Although studies have been conducted abroad about teachers perceptions and factors affecting integration of technology in education in Africa (du Plessis & Webb,

2012; Ramorola, 2013), Spain (Badia, Meneses, & Sigalés, 2013; Gisbert-Cervera & Álvarez, J, 2015), Malaysia (Afshari, Bakar, Luan, Samah, & Fooi, 2009), Taiwan (Lee & Tsai, 2010), Australia (Honan, 2012); Singapore (Chai, 2010), and the United Kingdom (Hansford & Adlington, 2008; Perrotta, 2013), limited studies have been conducted on secondary teachers in the Unites States. Results of research performed suggested several factors affecting adoption should be considered to advance digital literacy instruction. These dynamics included perceived usefulness and attitude towards technology (Capo & Orellana, 2011; Hutchison & Reinking, 2011); limited time and training (Hutchison & Reinking, 2011; Kirkscey, 2012); and administrative and other supports (Hutchison & Reinking, 2011). In a study that spanned 31 states and included a range of teachers from K – 12, Hutchison & Reinking (2011) found a gap in participants' perception of the importance of technology and integration into instruction. Although teachers believed that use of technology was important, instructional practices rarely demonstrated integration. Additionally, teachers viewed technology as a delivery tool instead of a means for students to meet a curricular goal or standard, indicating that use is more teacher-centered rather than student-centered. Capo and Orellana (2011) supported these findings, noting that more than 50% of 137 teachers surveyed from five high schools had no plans to integrate Web 2.0 tools into instructions even though they thought it might improve student learning. Participants indicated concerns that centered on liability, feasibility, perceived usefulness, and compatibility with classroom instruction and content goals. Capo & Orellana (2011) and Hutchison & Reinking (2011)

concluded that teachers' beliefs and attitudes were the most important factors to successful technology integration.

Findings from Project Tomorrow (2013) documented this digital conversion progression in the classroom demonstrating the need for continued support in several areas. In the 2012 national trend analysis report of 102,070 educators spanning 8,000 schools, 55% of administrators and teachers indicated a growing concern about having sufficient access to devices and Internet (Project Tomorrow, 2013). Although 55% of administrators were concerned about teachers lacking knowledge of high quality digital content to support learning, teachers expressed more varied concerns regarding learning the use of tablets, student devices, mobile applications, and integration into curriculum and instruction (Project Tomorrow, 2013). Results of the study demonstrated growth since 2008 with 45% of teachers developing interactive lessons that integrate technology (Project Tomorrow, 2013). In order to sustain this digital conversion, both teachers and administrators recognized the need for high quality professional development and support to address these issues and begin building instructional capacity.

Student Perspective on Digital Literacy in the Classroom

Results of research on students also indicated a need for change in this digital conversion movement. In a study of high school students in Texas (Boriack, Alford, Brown, Rollins & Waxman, 2012) and recent graduates in New York (Esposito, Impagliazo, Podell, Bracchio, & Morote, 2011), researchers found that students did not believe they were receiving adequate technology knowledge to prepare them for college. Lacking appropriate skills in "creative, communication-based, netiquette, and tools-based

technology" (Esposito et al., 2011, p. 612), 47 – 54% of students felt their high school learning experiences were not aligned with college expectations. Comparatively, results from a detailed analysis of hardware, software, and internet skills (HSIS) and analyzing and information gathering skills (AIGS) demonstrated that students perceived a decrease in their abilities over a two year period (Boriack et al., 2012). Disaggregated by core subject areas, students reported learning with technology more frequently in English than in other courses (Boriack et al., 2012) and rated teacher technology competence lower in math and science courses (Dornisch, 2013). Lack of confidence in teacher ability and opportunities to practice and master technology skills in the secondary setting created a deficiency as students tried to access 21st century learning and advance their technological knowledge.

Stefl-Mabry, Radlick, & Doane (2010) found that high school and middle school students perceived teachers were not using ICT effectively in classroom instruction. Results from focus group interviews of 48 students indicated that they believed Internet access and computer use was restrictive, infrequent, and hindered their ability to complete assignments (Stefl-Mabry et al., 2010). Students further believed that teachers were challenged technologically and lacked skills to successfully integrate ICT into classroom instruction which created a disconnect between teacher-student relationship and learning. Dornisch (2013) suggested that this connection between a student's perception of teachers' comfort with technology and a student's positive affect towards technology could be a factor in future teacher evaluations. As students have become more affluent and dependent on technology, their expectations to be immersed in a digital

learning environment increased (Dornisch, 2013). Teachers need to become more innovative and proactive in meeting these needs.

Implications

Although preservice teachers have the benefit of coursework and programs designed specifically for entering the education field, in-service teachers must search and enroll in supplemental professional development on their own. Exploring in-service teacher perspectives provided valuable insight as to their explicit needs associated with the integration of digital literacy skills into curriculum, instruction, and assessment. Qualitative focus group interviews, observations, and document study by content area afforded teachers the opportunity to reflect on their knowledge, skills, habits, and frames of references, to provide contextual input that was used to align supports with teacher needs. As high school curriculum, instruction, and assessment are governed by discipline specific content and standards, authentic integration of digital literacy skills into individual content areas varied. Input provided by teachers was used to design discipline specific digital literacy professional development. Building a framework for this type of support plan from the inside can empower teachers and contribute positively to their motivation to transform current pedagogical practices.

In addition to a professional development plan, implications for the study included a supplemental support plan to address other identified gaps and challenges in this pedagogical shift. This supplemental support plan connected specific challenges teachers faced with correlating solutions designed to address their concerns and needs. The combination of teacher learning needs with other institutional barriers to digital

literacy integration at the school level was used to create a holistic development plan to drive change. Results of this case study can potentially improve teacher pedagogical practices by engaging them in a process of critical reflection that can further the digital literacy skills of students.

Summary

The review of literature demonstrated that although the gap may be narrowing between the digital natives and the digital immigrants, in this case teachers, there is still a need for further support in transforming the learning environment to include digital literacy skills (Prensky, 2001). A combination of research revealed that although a majority of studies related to digital literacy in secondary schools were conducted nationally, limited research is available in the United States. Teachers have become more comfortable with their use of basic technology skills for communication and delivery of content but still lack confidence in using technology as an instructional tool to provide students with authentic learning experiences that allow them to analyze information, collaborate, communicate, and create products. As a result, students reported not feeling adequately prepared to enter college or careers with skills necessary to successfully navigate and participate in this technological based society. Exploring how digital literacy skills are being integrated into pedagogical practices and identifying teacher needs relevant to this paradigm shift through this qualitative case study provided insight necessary to potentially actualize this digital conversion.

Section 2 expands on the qualitative case study methodology for this project study and includes explanations of the research design, participants, data collection procedures,

and data analysis. Detailed descriptions are presented for participants including selection, ethical considerations, and the researcher's relationship. Additionally, information is provided regarding the three phases of data collection comprised of focus group interviews, observations, and document study. Methods of data collection, quality of evidence, and means of addressing discrepant cases are also discussed.

Section 2: The Methodology

Introduction

As basic communication and access to information is being redefined by technology, so is learning in the traditional classroom setting of K-12 schools. Information and communication technologies are transforming not only what it means to work, research, and socialize, but also what it means to think and learn. This raises questions about what educators are doing to support student development related to the skills and knowledge needed to survive in the digital environment. In the interest of studying the integration of digital literacy skills, an intrinsic and instrumental qualitative case study was used to explore high school in-service teachers' current level of knowledge, understanding, and integration of digital literacy skills to identify challenges and supports needed to addresses integrating technology into pedagogical practices to improve students' digital competency. Investigating the problem through the lens of in-service teachers will offer a perspective germane to those who are the agents of change.

Research Design

Approach

Case studies allow the researcher to deconstruct layers through a variety of lenses from within context of the phenomena and then reconstruct the data to make new meaning (Baxter & Jack, 2008; Yin, 2014). Using this constructivist approach to case study research, Stake (1995) and Yin (2014) believed that people's perception of truth is relative to individual perspectives, and it is socially constructed. Enabling participants to express their viewpoints, concerns, and realities affords the researcher a better

understanding of the phenomena. Each teacher brings unique and complex background experience and knowledge to the situation that must be examined within context, thereby framing the case in study.

Description

As described by Yin (2014), the scope of a case study promotes inquiry into situations with many variables and multiple sources within the real-world context. Meaning is derived from an in-depth investigation of the case as related to those involved. The case in this study was bounded by the content areas defined by the high school setting: science, social studies, English language arts (ELA), career and technical education (CTE), math, world languages, fine arts, and physical education/health. As every content area has a set of standards to address and every teacher has distinctive skills and knowledge, the application of digital literacy skills will vary. In this study, I explored teachers' (a) current understanding, knowledge, and skills; (b) current integration of digital literacy skills; (c) challenges they face in integration; and (d) supports needed in shifting pedagogical practices to address this change. Generating data from the experiences, perceptions, and interpretations of in-service teachers in their field validates a relativist approach to case studies, acknowledging their view of multiple realities with multiple meanings (Yin, 2014). Comparing and contrasting data points from these multiple perspectives will generate a broad understanding of the phenomena.

An intrinsic and instrumental qualitative case study design was used to explore multiple layers of the digital literacy phenomena within a local high school learning environment. Stake (1995) categorized case studies into the three fields of (a) intrinsic,

(b) instrumental, and (c) collective. Central to both intrinsic and instrumental designs is the opportunity to learn and understand; yet, the purpose for gathering evidence is different. Arising from the desire to understand the depth and breadth of digital literacy skills in a high school setting, I selected an intrinsic inquiry to allow real-time collaboration between the researcher and practitioners to investigate current pedagogical practices in comparison to student needs and to identify areas to make focused changes. Focused on exploring the nature and complexities of the case, intrinsic studies are guided by interest in the case (Grandy, 2010b). Researchers use an instrumental case study to focus on research questions and sample participants to help build related theory (Grandy, 2010a; Stake, 1995). Combing the two designs enabled me to explore the case and increases the ability to generalize findings. As this is a single case study of one high school, a collective approach was not appropriate.

Other qualitative research designs considered and rejected included grounded theory and phenomenology. Although grounded theorists also follow an inductive process and triangulate similar qualitative data points, the primary focus is on identifying a core category and building a substantive theory (Merriam, 2014). Because the outcome of this project study was to identify or create a support model to help teachers integrate digital literacy skills and not to develop a theory, this approach to research was rejected. The other approach considered was phenomenology. In phenomenology, a scholar defines principles of life's experience; this approach links phenomena to the essence and emotions of the experience (Merriam, 1998, 2014). Researchers employ this design to understand the structure and meaning of the experience and participants' interpretation of

the experience. This approach was also not appropriate as the purpose of this research was to explore teacher knowledge, skills, current use, and perceived challenges related to a topic.

Participants

Criteria for Selection

Qualitative data were gathered from participants within the total population of 87 high school classroom teachers at the focus school. As dictated by the nature of qualitative research, purposeful sampling was used to increase the efficacy of information accessed for an in-depth case study as it allowed me to target a specific population. Homogenous sampling was combined with random sampling to access participants with similar characteristics as related to the content area they taught. Grouping teachers homogenously by content area afforded me the opportunity to delve deeper into perspectives on digital literacy based on discipline-specific characteristics For random sampling, representatives from eight content areas of social studies, science, math, fine arts, P.E./health, world languages, ELA, and CTE were asked to volunteer to participate in content area focus group interviews, classroom observations, and provide archival documents for analysis.

The number of participants varied for each of the three data points. The largest sample size was through the six focus group interview sessions. Although the recommended group size varies from four to 12, the suggested range of participants is between six and 10 members (Creswell, 2012; Lichtman, 2006; Merriam, 2014). For the purposes of this project study, groups ranged from four to eight with a total possible

sample of 55 participants out of the 87 classroom teachers. This large sample size was due to the interest in exploring teachers' perspectives from the viewpoint of each high school content area. Three of the departments within the school were small because they only had five members with some as long-term substitutes. Participants for observations and document study were based on members from each of the eight focus groups resulting in a variable sample size depending on the number of participants

Access to participants was gained through both Walden University and the state DOE research protocol. In addition to institutional review board (IRB) approval from Walden University, consent was obtained from three levels within the state DOE: (a) the Data Governance and Analysis Branch, (b) site school principal and, (c) teacher participants. The state DOE required a data sharing agreement (DSA) work plan with project details, IRB approval, and authorized signatures be submitted prior to beginning the study. The process was streamlined because the principal granted verbal approval to the Governance Branch. IRB approval (08-10-16-0275877) was granted, the DSA was submitted and the study began.

Participants for this project study were recruited through a series of steps including a staff briefing, an e-mail letter documenting the study objectives and process, and an electronic and printed informed consent document. An overview presentation provided site teachers with a basic outline of the study and afforded them the opportunity for an initial question and answer session regarding the purpose, data collection process, confidentiality, and reporting methods. I sent out a follow up e-mail to invite teachers to ask additional questions and submit a letter of informed consent. The letter of informed

consent was attached to the e-mail and a print form was placed in teachers' internal school mailboxes. From there, Phase I focus group interview sessions, Phase II classroom observations, and Phase III document study were scheduled.

Participant/Researcher Working Relationship

As an employee for the site school of this study for over 13 years, I have established a working relationship with most of the teachers in the capacity as both an English teacher and as curriculum coordinator. As curriculum coordinator for the past 6 years, I have been responsible for facilitating teacher professional development, aiding in the implementation of state mandates, as well as coordinating the accreditation process, student personal transition plan (PTP), and other various projects. Although I serve on the leadership team with other department chairs, I have no authority over teachers in my role as curriculum coordinator. Throughout this time, I have built positive relationships and established trust. Through open and honest communication, I honored these relationships in my role as researcher in this qualitative case study. All participants were advised of the nature of the study and were provided an informed consent form prior to the study. They were assured that participation was completely voluntary and multiple measures were taken to assure confidentiality. This included the means to review transcripts, observation descriptions, and data analysis results prior to publishing.

Ethical Considerations

In anticipation of ethical concerns that may arise, several precautions were taken throughout the study to ensure a safe social environment, confidentiality, and protection of participants.

Informed consent. Beginning with informed consent, all participants were educated about the process, procedures, and contact information for the study including how confidentiality will be maintained. During an initial meeting, I outlined the contents of the letter, timeline of the study, and three data points. Additionally, teachers were provided with both electronic and print versions of a letter of consent. In the letter, I also assured teachers that participation was completely voluntary and they may remove themselves from the study at any time. Classroom teachers who submitted consent letters within the week allotted were randomly selected to participate in department level group interview sessions.

Confidentiality. Due to the nature of the researcher and participant relationships, confidentiality was important. Several precautions were undertaken to maintain confidentiality. Although interviews were recorded, all information were password-protected and stored on a home computer or locked in a secure filing cabinet. Participants were identified in results using aliases coded by content area such as "science1", "science2," etc. Care was also taken to remove all identifying personal character traits from transcribed content and data analysis. Additionally, throughout the study and before results were finalized, participants were provided the opportunity for member checks and review of all analysis and findings.

Protection from harm. Ethical issues in any research are in constant flux and the key to heightened awareness of potential harm is continuous reflection and assessment of personal behaviors and responsibilities (Lichtman, 2006). Using a relativist approach, I evaluated my personal conduct to identify and resolve potential dilemmas on an ongoing

basis. To further preserve researcher integrity, I also maintained a journal with self-reflections after interviews and observations while also providing a continuous documentation of the process.

Data Collection

Triangulation of qualitative data sources that are interactive and noninteractive will allow for exploration and comprehension of the complexity of the case (McMillan & Schumacher, 1997). Using an emergent planning design in which each phase is determined by data from the prior phase data were gathered in three phases and then shared with the participants of the study. This sharing allowed for further corroboration of initial findings and helped to reduce researcher bias. Qualitative data sources are discussed in the subsections following the identified phases:

Phase I–Focus Group Interviews

1. Conduct eight semistructured focus group interviews; one for each content area.
2. Analyze data to determine coding and identify themes and answer the research questions.

Phase II–Classroom Observations

1. Conduct classrooms observation for each content area based on participant volunteers from the focus group interviews.
2. Begin gathering documents relevant to classroom observations conducted
3. Analyze data to determine coding and identify themes and answer research questions.

Phase III–Document Collection

1. Continue gathering documents for study based on classroom observed and course taught by participants.
2. Analyze documents gathered using the document study rubric and compare findings to focus group interviews and classroom observations

Data from the focus group interviews were used to address all four research questions while additional data from the classroom observations and documents study were used to supplement RQ2.

Focus Group Interviews

A semistructured focus group interview consisting of open-ended and probing questions was used to "collect shared understanding from several individuals" (Creswell, 2012, p. 219) and gain multiple perspectives of both the problem and possible professional development topics. Conducting this type of interview will help shift the focus from the interviewer to the conversation and allow for thoughts and ideas to build upon one another (Creswell, 2010; Lichtman, 2006). To facilitate the semistructured interview process, a digital literacy focus group interview protocol (Appendix B) with 29 questions was created to guide the project study using research questions and sample questioning stems from Lichtman (2006), Creswell (2010), and Merriam (1998). The protocol was divided into four sections with questions corresponding to each research question in the designated section: (a) RQ1 questions 5-13, (b) RQ2 questions 14-19, (c) RQ3 questions 20-25, and (d) RQ4 questions 26-29. To increase reliability, this protocol

was shared with the school leadership team and an outside provider for further input and validation on questioning stems and word choice.

Focus group participants were divided into eight interview sessions, one for each department. Interview sessions were conducted in an onsite meeting room over the course of 2 to 3 days. Depending on the size of each group and conversation generated by interview questions, sessions lasted from 50–90 minutes. Audio recordings of the interview session were used to aid in the transcribing and coding process. Data from the focus group interviews were transcribed and analyzed through a coding process to identify categories and to narrow themes based on the research questions. Tools used for coding and analyzing data included a qualitative software program, MAXQDA, and a transcribing application, transcribewreally.com. The findings were validated through participant member checks to ensure accurate interpretation and representation of content. Qualitative data were presented using visual displays and narrative and thick descriptions.

Observations

In conjunction with focus group interviews, observations of participants were conducted to determine the extent to which digital literacy skills were being integrated into curriculum, instruction, and assessment. Directly addressing RQ2, the data gathered during observations were used to complement information from the interviews and document study, providing more illustrations of actual events occurring in the classroom. Members from the interview sessions will be asked to volunteer to participate in these

observations. The goal was to observe one to three teachers from each of the focus groups for a total of 24 or more observations.

In the role of observer as participant, I gathered data in the form of both descriptive and reflective field notes in electronic and print form. In lieu of a formal observation protocol, a simplified digital literacy observation protocol (Appendix C) was created to include basic demographic information and to record detailed descriptions of activities, interactions, settings, comments, people, and illustrations. Full notes were written up for later coding and analysis based on the six digital literary skills with MAXQDA following each observation. As with transcribed interviews, participants had the opportunity to conduct member checks on their individual observations.

Document Study Data

The third data point that was used for triangulation in this project study to address RQ2 was teacher-created documents, such as curriculum maps, pacing guides, and lesson plans. Used to verify information gained from interviews and supplement observations, document data can provide insight and connections about the topic (Merriam, 1998; Yin, 2014). For the purpose of this study, documents mined included both electronic and print form as Google Docs was used as a communication and collaboration tool at the site school. In addition to Google Docs access, participants were asked to share other related print documents including, but not limited to, curriculum maps, pacing guides, lesson plans and books, assignments, and other instructional and assessment materials. Actual documents gathered and analyzed depended on what participants from the focus group interviews and observations were willing to share. All documents were analyzed using a

three-point document study digital literacy skills rubric (Appendix D) created based on the six digital literacy skills. Once themes and codes were generated based on these six skills for the document study, data were compared to the focus group interviews and observations findings to determine commonalities.

Researcher's Role and Potential Bias

As curriculum coordinator at the site school, I had an established relationship with current faculty and staff. Throughout the years I have worked with classroom and non-classroom teachers and administration on a variety of state initiatives and school projects where we have built mutual trust and professional relationships. In this position, I did not hold any authority over teachers and am considered on the same level as a certificated teacher. For the purposes of this qualitative case study, my role as investigator was to interview, observe, record, and analyze data. To preserve these relationships and strive for credibility, I worked continuously protect participants from harm and maintain confidentiality through open and honest communication; member checks; peer examination and collaboration; and personal identification of biases as suggested by Merriam (1995) and Yin (2014). Participants examined transcripts and observation protocols to validate transcription and provide feedback and comments. Participants were also asked to comment on findings throughout the study. To heighten awareness of potential biases and other ethical concerns, I maintained a reflective journal to clarify and record thoughts, assumptions, and other personal commentary.

Data Analysis

To build a comprehensive case, qualitative data was gathered and triangulated from multiple sources representing multiple perspectives. Using an inductive process to analyze and compare findings, data from content area focus group interviews, observations, and documents were compared to identify conceptual links between categories. The process included both discovery and interim analysis of data as it was received throughout the study to develop preliminary categories and distinguish patterns in order to answer the research questions.

Collection Process

According to McMillan and Schumacher (1997) qualitative data analysis is inductive and cyclical occurring continuously in all phases of research. Following the steps of inductive analysis, data gathered during the focus group interviews, observations, and documents study segments of this research was coded using the six digital literacy skills and compared after each phase. In addition to the six digital literacy skills, the focus group interview results was analyzed to determine minor themes related to RQ3 and RQ4. Interview sessions were transcribed using transcribwreally.com and coded with MAXQDA software following the sessions. Initial coding for both interviews and observations was conducted following discovery and interim analysis protocols and guided by relevant research questions. Resulting codes and categories from each data set were compared and contrasted to determine distinctive characteristics and patterns. Relevant documents were gathered via Google Docs and printed from participants who volunteer to share items. Information from the interviews and observations was

triangulated with data from the document study to further identify patterns until themes emerge.

Evidence of Quality

Central to building a comprehensive picture and extending findings from case study research is the validity and credibility of the data and process (McMillan & Schumacher, 1997). Considerations that were taken to address evidence of quality included audio and video recorded data, member checking, participant review, triangulation of data, peer debriefing, and a researcher field journal. To aid in data accuracy and transcription, focus group interviews were audio and video recorded. Participants checked transcripts for accuracy and provided further information or interpretations of data soon after interviews and observations. This combination increased the accuracy and integrity of information prior to analysis. Finally, participants and designated peer colleagues were provided with a completed copy of the project study findings for final review and input prior to submission.

Pursuant to triangulation, identified patterns and themes from multiple data sources were cross validated during inductive data analysis to find commonalities and discrepancies. This type of comparison allowed me to identify regularities that occurred across data. If results from the three data sources converged, this corroboration lends to both the construct validity and extension of findings (McMillan & Schumacher, 1997; Yin 2014). Data that is contradictory or inconsistent helps construct a holistic view of the situation and further identifies areas of interest (Merriam, 1998). Examining and

comparing all results from the focus group interviews, observations and document study increased the convergence of evidence, accuracy of findings, and validity.

The last two components used for evidence of quality as strategies to minimize bias were peer debriefing and a researcher field journal. A peer debriefer is usually a colleague who engages in professional dialogue with the researcher by reviewing preliminary findings and field notes, asking probing questions, and presenting alternate viewpoints or perspectives to help validate findings (McMillan & Schumacher, 1997; Merriam, 1998; Yin, 2014). The peer debriefer enhanced understanding of the data and provided valuable insight about possible ethical concerns and potential biases. Field journals include detailed decisions, modifications, rationale, strategies, and assessments of data trustworthiness used by the researcher (McMillan & Schumacher, 1997; Merriam, 1998). To further supplement evidence quality, I also used a field journal to document my research process. Combining these two strategies helped me reflect on personal subjectivity and monitor biases throughout the research process.

Discrepant Cases

The identification of negative cases or discrepant data was another aspect in assessing the credibility of a study. Negative cases appear as participant viewpoints, situations, or social scenes that are contradictory to meanings derived from emerging patterns (McMillan & Schumacher, 1997). Also inconsistent with developing patterns, discrepant data appears in the form of evidence and is useful because it provides insight for possible modifications to current patterns (McMillan & Schumacher, 1997). Researchers must actively search for these incidents and seek to explain them, amend

patterns or suggest possibilities for future study. Recording, analyzing and adjusting for negative cases or discrepant data further the validity of the study for both the participant and the researcher.

Data Analysis Results

Data for this study was gathered in three phases of focus group interviews, classroom observations, and documents for study. Questions in the digital literacy focus group interview protocol (Appendix B) were designed to collect evidence related to all research questions while information from the classroom observations and documents gathered were designated to support RQ2. Thirteen teachers participated in all three of these phases with four in social studies, three in science, two each in CTE and Fine Arts/health, and one each in math and English language arts. There were no participants from the world language department. Classroom observation protocols and document data for each participant were coded by department name correlating to speaker title in the focus group interviews. Tracking data by participant and department provided the opportunity to code and connect themes between research questions and data points.

Six focus group interview sessions were conducted over a 2-day period for seven departments to complete the first phase of the data gathering process. The site school combines teachers in the Fine Arts and PE/Health department in the master schedule so they were combined into one session for the interviews. The only department with no participants was world languages. Interview sessions lasted between 32 and 55 minutes depending on the number of participants and length of answers and discussion. Although the original intent was to conduct sessions with 4 – 8 participants per department, actual

numbers ranged from 1 – 4. At the conclusion of each session, participants completed a simple form stating when they would like to be observed and their preferred method of receiving information and transcripts for member checking, electronic or print. The audio files were then sent to Rev.com for transcription and imported into the MAXQDA software-coding program. To aid in credibility of research findings, I reviewed the transcripts for errors prior to submitting to participants for member checking. All members received electronic copies of interview transcripts shared securely via Google. Additionally, printed transcripts were provided in a secure envelope to the four participants who opted for information in both print and electronic format. Transcripts were appropriately adjusted using participant feedback.

Once member checks were completed, data from the focus group interviews was initially coded using the MAXQDA software program using codes that corresponded to the four research questions. After data was segregated by these codes, I regrouped and exported data into segments that combined responses by content area and like codes. This provided the opportunity to evaluate data in matrices to identify emerging levels of knowledge and integration of digital literacy. In some areas, data matrices were then further analyzed to reduce overlapping codes and combine similar ideas. Processing data in segments and comparing data, abstract concepts, and descriptions allowed me to discriminate between recurring themes and discrepant data (Merriam, 2009). This initial coding and exportation of data continued until all data from focus group interviews, classroom observations, and documents were analyzed and themes emerged.

Classroom observations were scheduled over the course of two weeks for the second phase of data collection with each of the focus group participants observed for an entire class period. Observation descriptions were recorded using the digital literacy observation protocol form and later coded manually using the six digital literacy skills. To differentiate, I assigned each skill a color and highlighted corresponding evidence reflected in the observation. Both student and teacher actions were evaluated to determine whether or not individual digital literacy skills were addressed. Content area tables were then created to represent data corresponding to research questions and digital literacy skill.

Documents for study were gathered in electronic and print form from each participating teacher and included pacing guides, lesson plans, PowerPoints, and Google Classroom invites. The invitations to teacher Google Classroom sites allowed me to view both teacher and student created assignments, posts, and announcements. Documents from all sources were segregated by content area and evaluated using the document study digital literacy skill rubric. Similar to classroom observation analysis, varied highlighter colors were used to code data as aligned to the six skills and corresponding research questions. Evidence from the document study was used to determine levels of integration for each digital literacy skills by content and then compared to focus group interviews and classroom observations to determine overall level of digital literacy skill integration.

Ensuring Credibility of Research Findings

Integrity is forefront in producing quality research and depends on investigator ethics. Consideration to preserve the credibility and reliability of research findings for

this project was initiated through triangulation of data, member checks, peer review, and rich descriptions.

Research Findings

Current Teacher Knowledge of Digital Literacy (RQ1)

The purpose of this case study was to determine the current level of knowledge and integration of digital literacy skills of high school in-service teachers and identify challenges and supports they needed to successfully shift teaching practices. To address RQ1, teachers' current levels of digital literacy skills based on the Eshet (2012) framework, evidence was collected from focus group interviews in six different departments: English language arts (ELA), science (SC), social studies (SS), math, fine arts/physical education (FA/PE), and career technical education (CTE). Related questions (see Appendix B: questions 5-13) from the focus group interview focused on assessing teacher knowledge of the term "digital literacy" and the six digital literacy skills. Responses were coded into low, medium, or high levels of knowledge based on connection to definitions. To ascertain knowledge level, participants were asked to define the term to the best of their ability prior to being exposed to the actual definition used in the study.

As depicted in Table 1, all participants were able to provide evidence of medium to high knowledge of the term digital literacy and the skill of photovisual literacy.

Table 1

Focus Group Interviews: Content Area Overall Knowledge of Digital Literacy Terms

	Social Studies (SS)	Science (SC)	Math	English language arts (ELA)	Career & Technical Education (CTE)	Fine Arts PE/Health (FA/PE)
Digital Literacy	Medium	Medium	High	Medium	Medium	Medium
Photovisual Literacy	High	High	High	High	Medium	Medium
Reproduction Literacy	Low	Medium	Low	Low	Low	Low
Branching Literacy	Low	Low	Low	Low	Low	Low
Information Literacy	Medium	Low	Low	Low	Low	Low
Socioemotional Literacy	Low	Low	Low	Low	Low	Low
Real-time Thinking Skills	Low	Low	Low	Low	Low	Low

Note: Levels of knowledge: Low, Medium, and High

Participants demonstrated knowledge related to digital literacy with comments such as: "Your understanding of how technology works" (FA/PE); "Do you [people] know how to use things in a digital world today? From phones, to research, to performance based tasks like CTE" (CTE); "Complete their assignments, turn them in, in the format they want using tools that they provide" (SC); "Using technology to access information" (SS); "Able to use digital tools… in a critical, and constructive and productive way" (Math). They were able to articulate a basic understanding of digital literacy. Participants from each department demonstrated a more complex knowledge of photovisual literacy, as they were able to provide commentary directly relating the definition of the term. This

included statements using key words such as interpretation, inference, decoding, layers of meaning, and statements such as: “understand the meaning in photos and other images…interpret and understand captions” (ELA); “decode like layers of information that might be in a picture or groups of pictures” and “layers in a picture which is a graph…basic numeracy stuff or it can be just something that’s done with a color code” (SC); “like propaganda that might come with the photo” and “perspective…deeper questions about the photo” (SS); “read visual information and being able to interpret and glean understanding of what the author intended” (Math). Going beyond basic knowledge, these statements indicate that teachers have a deeper working knowledge of photovisual literacy.

When considering the five remaining digital framework terms, all content areas exhibited a low knowledge level with the exception of science and social studies teachers interviewed who demonstrated medium level knowledge in reproduction and information literacy respectively. Science teachers interviewed expressed their comprehension of reproduction literacy through comments such as:

> Start with being able to take a document and make a copy and reformat it to what you need to use next with it…one level of reproduction literacy; knowing the limits of each one…if you have the rights to modify; and producing it in a new medium. (Science)

Compared with the definition, these remarks indicated science teachers understand some of the key concepts including plagiarism and reproduction of a new product. Comments from the SS, math, ELA, CTE and FA/PE demonstrated a basic knowledge level related

to either plagiarism or reusing information such as: “being able to reproduce work” (ELA); “could it be a reuse of information” (FA/PE); “knowing what you can use, and how to reuse it, … and who has rights to publishing it and reproducing it and copying it” (SS); “ethical literacy… what we can and cannot reproduce” (Math). There was no indication of synthesizing multiple pieces of information and reproducing into something new with the use of technology.

The other term departments presented varied knowledge level in was information literacy. Comments from the social studies teachers such as, “how to decipher information, and analyze information” and “how to analyze their sources…what was their point of view,” provided evidence that their level of understanding this term was slightly higher than the other departments. These teachers identified several components of the term including evaluating and analyzing sources as well as interpreting information. Responses from teachers in the other departments only highlighted one component of the term as evinced in commentary: “understanding all the information they are receiving and analyze it to make meaning” (ELA); “obtaining valid information from different sources… knowing what’s legitimate versus something that’s just made up on the Internet” and “different listening and speaking and reading… demonstrating the knowledge through those modes” (FA/PE); “I’m thinking surfing the web, being able to find what you want, when you want…including knowing the validity of your source” (SC). The simplicity of these responses demonstrated a basic understanding to the term.

Further evidence from focus group interviews revealed a basic, or low knowledge level for the three remaining framework terms: branching literacy, socioemotional

literacy, and real-time thinking skills. Although many teachers expressed some ideas of concepts related to terms, responses ranged from unsure to generalized deductions. For branching literacy, participants were either unclear or able to make indirect connections to navigation through Internet domains with the following phrases:

- "It is about links online" (ELA);
- "It's like webbing maybe, showing how things interconnect" (FA/PE);
- "Never heard of it"; "something like being able to use some kind of electronic tool and then being able to use something similar" (SC);
- "Never heard of that term before"; "I'm thinking that you're looking for one thing, and then all of a sudden you pick up on something else that's connected to that one, and it branches off to another idea" (SS); and
- "Connect to different areas of knowledge. Maybe into different disciplines" (Math).

In response to defining socioemotional literacy, participants provided answers that alluded to key concepts such as maturity and some critical thinking skills, but they were not able to address collaboration, thinking abstractly, or the requisite skills of information literacy and branching literacy. Comments included:

- "Thinking about thinking; metacognition" (ELA);
- "I think of socio-economic backgrounds… they learn differently, they respond differently"; "How you use your emotions in appropriate ways, how you handle different situations" (FA/PE);

- "Resilience to be able to cope with stresses that come up with technologies" (SC); and
- "Kids behind their phones and expressing their emotions that way throughout the digital world vs face to face"; "Having compassion and empathy towards others if you are reading about what's going on" (SS).

Participant descriptions for the final digital literacy term, real-time thinking skills, also revealed a basic level of knowledge. Although the following teacher comments revealed awareness of responding to feedback and creating new material, the key elements of processing multiple stimuli, executing multiple tasks simultaneously, and synthesizing multiple modes of information into new product were missing:

- "Connect the past with the present and the future; how do they make new knowledge" (ELA);
- "Every year we have different focuses and different things… maybe real time keeping current with that" (FA/PE);
- "How well you are at problem solving"; "Critical thinking" (CTE);
- "Being able to give a question and expect a complete answer in an amount of time" (SC);
- "Ability to listen and process information and then offer some sort of response within the context of a conversation or debate"; "Checking your own bias within that whole situation" (SS);
- "You're interacting with somebody who's solving a problem in another part of the world" (Math).

When comparing the responses provided by teachers to the definition of these three digital literacy framework terms, key components for each were term missing, demonstrating a basic level of comprehension.

Current Level of Digital Literacy Skill Implementation (RQ2)

To gather information for RQ2, the current level of digital literacy skill implementation in the classroom, a combination of classroom observations, focus group interview questions (see Appendix B: questions 14-19), and documents were gathered and analyzed. Results were used to determine levels of teacher integration of digital literacy skills into curriculum, instruction, and assessment six content areas.

Classroom Observations Findings for Integration (RQ2)

For classroom observations, a total of 13 high school classrooms were observed between 30 – 45 minutes using the digital literacy observation protocol: four social studies, two career and technical education, two fine arts/health, three science, and one each in math and English language arts. After organizing and analyzing the data using MAXQDA, I extracted key observation phrases connected to the six digital literacy terms and created matrices portraying data. In the event there was no evidence of the term, the phrases “not observed” was inserted.

Observations of the four social studies classrooms (Table 2) revealed evidence in all digital literacy framework skills with the exception of branching literacy. Teachers’ observed actions demonstrated various levels of skills integration as they facilitated student-learning activities that promoted the application of thinking and interaction skills

related to other five terms. For each term addressed, teachers created opportunities for students engaged in activities allowing them to practice new digital learning skills.

Table 2

Classroom Observation: Digital Literacy Skills Observed in Social Studies

	Teacher Actions	Student Actions
Photovisual Literacy	Facilitate students understanding of infographics for SAT testing	Discuss and respond to teacher prompts related to infographics
	Use clip art and images to enhance presentations and use for discussion	Respond to teacher prompts related to images
	Use video clips of content to promote discussion & critical thinking	Respond to teacher prompts related to video clip and link to current content
Reproduction Literacy	Use role play as assessment for students to apply knowledge of content and re-create time period events	Prepare to synthesize knowledge and act out event from time period using various roles
	Facilitate student presentations of review games created individually or in groups	Collaborate with peers to create review games (Kahoot Quiz, Memory Game, Bingo) based on current content; facilitate review games w/peers
Branching Literacy	Not Observed	Not Observed
Information Literacy	Facilitate role playing game where students synthesize content knowledge	Identify relevant content knowledge to portray character role and act through scene
	Facilitate student presentations of review games created individually or in groups	Identify critical information from instruction to incorporate into review games
Socioemotional Literacy	Provide opportunity for students to collaborate on role playing and review games	Collaborate to role play and re-enact event
		Collaborate to create review games
Real-time Thinking Skills	Provide technology tools for student presentations	Navigate between student instruction and technology (computer and cell phones) to follow directions and perform task
	Facilitate student use of computer to navigate between programs: Achieve 3000 and electronic quiz	Navigate between two websites to complete tasks; navigate through website to complete task

Note: Four social studies classrooms observed – Participation in Democracy (2), US History & SAT Prep

In the math classroom observation (Table 3), evidence revealed application of information literacy and real-time thinking skills. After modeling using various forms of

technology, the teacher guided students through the steps prior to providing individual work time. The teacher provided data for students to organize, input into graphing calculators, and then graph. Students were expected to respond to a variety of simultaneous stimuli and process information from multiple sources of input that included a document camera, SMART Board, and whiteboard in order to meet the lesson objective. The other four digital literacy skills were not observed.

Table 3

Classroom Observation: Digital Literacy Skills Observed in Math

	Teacher Actions	Student Actions
Photovisual Literacy	Not Observed	Not Observed
Reproduction Literacy	Not Observed	Not Observed
Branching Literacy	Not Observed	Not Observed
Information Literacy	Present data for students to input into calculators and then graph	Identify relevant information to solve math problems using graphing calculators; chart information and then graph
Socioemotional Literacy	Not Observed	Not Observed
Real-time Thinking Skills	Switch between SMART Board, Calculator and Document Camera to model task	Switch between receiving instruction via tech tools, and performing tasks using graphing calculator, individual lesson materials and information presented on document camera

Note: One math classroom observed – Model Our World I

The classroom observations for Public Human Services Core (PHS Core) and Digital Media courses (Table 4) for CTE revealed evidence for photovisual literacy, reproduction literacy, information literacy, and real-time thinking skills. In the PHS Core class, students were actively engaged in learning through the combined use of an interactive Google Slides presentation, video, article, teacher and peer discussions, and a note-taking tool. The note-taking tool and discussion questions were designed to elicit

critical thinking and analytical responses in relation to the video and images on the slides, addressing both information and photovisual literacy. In the Digital Media course, the teacher addressed reproduction literacy and real-time thinking skills guiding the students in the manipulation of images using Photoshop and CS4-6. Throughout the lesson, students were required to download and upload various images; mirror instruction through guided practice; apply multiple editing strategies; and assist peers in a lesson designed to help students manipulate photos and create new personalized images. Lessons in both classes were designed to incorporate technology and digital literacy skills into curriculum and instruction.

Table 4

Classroom Observation: Digital Literacy Skills Observed in Career & Technical Education (CTE)

	Teacher Actions	Student Actions
Photovisual Literacy	Use video in instruction w/note-taking tool; paused video for discussion & notes	Used note-taking tool to record initial thoughts; responded to teacher prompts and revised/added to notes
Reproduction Literacy	Model/demonstrate use of Photoshop and CS4 tools on sample images	Practice using program tools to manipulate images through teacher guidance
Branching Literacy	Not Observed	Not Observed
Information Literacy	Use guided questions to facilitate discussion and help students process content information in a video and printed article	Respond orally and in writing to teacher prompts analyzing information in the video and article
Socioemotional Literacy	Not Observed	Not Observed
Real-time Thinking Skills	Model the use of Photoshop and CS4 tools on sample images	Download images sent from teacher and in personal files to manipulate while following teachers' modeling; navigate between files, internet, and computer program

Note: Two CTE classrooms observed – Public Human Services Core and Digital Media

Classroom observations in the Photography and Health courses (Table 5) revealed evidence of photovisual literacy, information literacy, socioemotional literacy, and real-

time thinking skills. Instruction in the photography class centered on developing photovisual literacy through the analysis of images using the elements of art and design principles in a collaborative group review game. Students competed in small groups to synthesize critical statements that combined key vocabulary terms with supporting evidence from each image displayed using a document camera. This activity created a learning environment where students also practiced socioemotional literacy in collaborative groups and used real-time thinking skills when they responded to teacher and peer feedback as they continued the review game. Although students were not using technology, they were actively engaged in the developing these three skills. Observations in the health course revealed similar findings where the students practiced photovisual and information literacy. Through the use of Google Slides, the teacher presented a variety of print and video advertising campaigns aimed at selling products and using propaganda. Guided by teacher prompts and discussion, students analyzed the ads to determine audience, meaning, and hidden agendas. Reproduction literacy and branching literacy were not addresses in either classroom observation.

Table 5

Classroom Observation: Digital Literacy Skills Observed in Fine Arts/PE/Health

	Teacher Actions	**Student Actions**
Photovisual Literacy	Use images, advertisements, and video in PowerPoint presentation with discussion prompts to analyze message within media	Respond to teacher prompts related to analyzing image, advertisements, and videos
	Use games to get students to analyze images using the elements of art & design principles	Collaborate in groups to analyze images using elements of art & design principles
Reproduction Literacy	Not Observed	Not Observed
Branching Literacy	Not Observed	Not Observed

	Teacher Actions	Student Actions
Information Literacy	Prompt students to analyze image, advertisements and video for bias and purpose	Respond to teacher prompts related to images, advertisements, and videos
Socioemotional Literacy	Group students in teams to collaborate an co-construct statements related to the images and elements of art & design principles	Collaborate to analyze image using the elements of art & design principles and co-construct statements
Real-time Thinking Skills	Provide feedback to student groups regarding their analytical art statements and allow revisions	Respond to teacher feedback and revise statements to reflect feedback

Note: Two classrooms observed – Photography & Health

Observation in the special education English class (Table 6) revealed evidence of reproduction and branching literacy, and real-time thinking skills. After an introductory presentation using Google Slides, students migrated to the computer lab and proceeded to complete an assignment using Google Classroom. The assignment required students to navigate between electronic and print documents as they responded to prompts and completed the online assignment related to analyzing a poem. This required navigation between multiple print and electronic sources while responding to feedback and direction from the teacher. Through guided practice, students were able to practice developing these three skills.

Table 6

Classroom Observation: Digital Literacy Skills Observed in English Language Arts

	Teacher Actions	Student Actions
Photovisual Literacy	Not Observed	Not Observed
Reproduction Literacy	Provide instructions on the use of Google Classroom to complete assignment	Use Google Documents to provide answers after interpreting a poem from print
Branching Literacy	Provide electronic copies of assignment and poem for students to navigate between	Navigate between two documents to interpret poem and respond to questions; copy & paste and type from one document to another

Information Literacy	Not Observed	Not Observed
Socioemotional Literacy	Not Observed	Not Observed
Real-time Thinking Skills	Use Google Classroom as instructional tool where students navigate between textbook and electronic assignment to complete task	Login to Google Classroom, make "copy" of assignment an navigate between text, computer, and teacher feedback to provide responses

Note: One classroom observed – English 12

As depicted in Table 7, observations in Human Physiology, Physical Science, and Biology provided evidence of all six digital literacy skills. Combined teaching and learning activities in all science classes provided opportunities for student to apply skills in analyzing graphs and a variety of visuals that were both teacher and student created. Addressing reproduction, branching, information, and socioemotional literacy, students collaborated with peers to conduct research, synthesize information, and navigate a variety of computer software programs and Internet applications to create review games and Google Slides presentations. Through the use of Google Classroom, Quizlet, and Google Sheets, students practiced real-time thinking skills while collaborating with peers to navigate between multiple programs and respond to peer and teacher input to complete tasks. In all three courses, teachers and students actively used technology and digital literacy skills to demonstrate knowledge and co-create new knowledge.

Table 7

Classroom Observation: Digital Literacy Skills Observed in Science

	Teacher Actions	**Student Actions**
Photovisual Literacy	Provide instruction on creating and interpreting graphs in Google Sheets	Create graphs using previously determined data and follow visual PDF of instructions
	Provide instructions on building Google Slides presentations with visual	Research images to match assigned content and determine the most appropriate visual for Slides
	Create quizzes and games with visuals (graphs & images) for interpretation	Answer questions on quiz that require analysis of graphs and images; analyze

	Teacher Actions	Student Actions
		information in images on collaborative Quizlet online game
Reproduction Literacy	Provide instruction on creating a Google Slide presentation that synthesizes information related to assigned group topics	Collaborate with peers to conduct research and synthesize information into a group Google Slide presentation
	Provide oral and electronic instructions on analyzing data to create graphs	Use Google Sheets and teacher instruction to analyze data and create graphs
Branching Literacy	Use Google Classroom and other Google Drive elements for classroom instruction	Navigate between Google Classroom, Google Sheets, PDF documents and other information to complete electronic assignment
	Use Google Classroom, Juno (JupiterIO), and Quizlet as instruction and assessment tools	Navigate between Google Classroom and Juno to complete quizzes, assignments and reflections; collaborate with peers to navigate through Quizlet to complete review game
Information Literacy	Facilitate student learning through lab work and research to create informative Google Slides to present to peers related to assigned topic	Collaborate with peers in analyzing lab results and research to create informative Google Slides
Socioemotional Literacy	Create collaborative group assignment using Google Slides	Collaborate with peers to evaluate information and create informative slide presentation
	Create online collaborate group review game and electronic peer response assignment	Collaborate with peers to complete online Quizlet review game; read and respond to peer comments online
Real-time Thinking Skills	Create assignment requiring students to read and follow online directions, respond to peer and teacher feedback and navigate between multiple online sources.	Follow instructions in Google Classroom using Google Sheets to complete assignment; Ask and respond to teacher and peer feedback to complete assignment

Note: Three Science classrooms observed – Human Physiology, Physical Science & Biology

Overall findings from classroom observations (Table 8) indicated a range of integration of digital literacy skills into curriculum, instruction, and assessment for each department. Evidence for each digital literacy skill was evaluated using the definition for the correlating term and assigned one of three levels: *evident, developing,* or *not evident*. The level of technology application was used to differentiate between levels of evident and developing, depending on whether student use of technology was evident in

observation. Science demonstrated the most integration with a level of *evident* in each of the six digital literacy skills indicating a general ability to address each skill. Social studies demonstrated three instances of *evident* in photovisual literacy, reproduction literacy, and information literacy, with two *developing* and one *not evident*. Instances in the English language arts and career and technical education departments were spread throughout all six skills with two *evident* occurrences in real-time thinking skills and reproduction literacy and the other occurrences spread throughout *developing* (5) and *not evident* (5). The math and fine arts/PE departments demonstrated a lower level of integration with zero instances of *evident*, six instances of *developing* and six instances of *not evident*. Total for each level of integration was *evident* (10), *developing* (13) and *not evident* (13).

Table 8

Classroom Observation Findings: Summary of Integration of Digital Literacy Skills by Department

	Social Studies (SS)	**Science (SC)**	**Math**	**English language arts (ELA)**	**Career & Technical Education (CTE)**	**Fine Arts PE/Health (FA/PE)**
Photovisual Literacy	Evident	Evident	Not Evident	Not Evident	Developing	Developing
Reproduction Literacy	Evident	Evident	Not Evident	Developing	Evident	Not Evident
Branching Literacy	Not Evident	Evident	Not Evident	Developing	Not Evident	Not Evident
Information Literacy	Evident	Evident	Developing	Not Evident	Developing	Developing
Socioemotional Literacy	Developing	Evident	Not Evident	Not Evident	Not Evident	Developing
Real-time Thinking Skills	Developing	Evident	Developing	Evident	Developing	Developing

Note: Levels are Evident, Developing, and Not Evident

Focus Group Interview and Document Study Findings for Integration (RQ2)

In connection with classroom observations, evidence from focus group interviews and documents were analyzed and compared to observation findings to further address RQ2. Focus group interview protocol questions (14-19) were designed to illicit information related to teacher's perceived integration of digital literacy skills in classroom practices. Participant comments from these questions were reviewed and organized by department into codes using the MAXQDA software and further analyzed using the definitions for each of the six digital literacy skills. Evidence for each skill was

then evaluated based on the definition of the correlating digital literacy skill and student use of technology. Departments were assigned a score for each skill using the following scale: *evident, developing,* or *not evident.*

Documents gathered for comparative analysis to address RQ2 included curriculum maps, pacing guides, daily lesson plan samples, various assignments/worksheets, project instructions, science labs, and a variety of teacher and student created PowerPoints and Google Slides. Although pacing guides provided an overview of the course content as paced throughout the semester or year, most did not provide enough pedagogical information to determine the depth and breadth of technology and digital literacy skills integration. The daily lesson plans, assignments, Slides, and PowerPoints provided the most insight into integration and were used to determine levels of integration into curriculum, instruction, and assessment. Evidence in the documents correlating to the digital literacy skills was color-coded by skill and key details were organized into matrices that were analyzed to determine integration level. Identified evidence from documents was evaluated by department using the document study digital literacy skill rubric (Appendix D) and assigned one of three levels of integration for each digital literacy skill: *evident, developing,* or *not evident*.

To differentiate between *developing* and *evident* in both focus group interviews and documents, the purpose of evidence and use of technology were analyzed. If the evidence was purposefully designed to integrate technology and address the specific skill, the level assigned was *evident*. If the skill was somewhat addressed but lacked evidence of purposefully planning to address the skill and/or technology integration, the level

assigned was *developing.* For each department, all documents submitted and participant comments for each skill were compared to determine the final document study rating.

Analysis of the participant comments and documents provided for the study revealed a wide range of digital literacy integration for the six skills. Evidence from focus group interviews was assembled and into tables (see Tables 10-15) and displayed with findings from document study evidence for presentation for comparative analysis. For documents studied, the term *no evidence* was inserted to demonstrate lack of related evidence found during analysis. Participant comments related to the digital literacy skill were displayed in the focus group column to demonstrate teacher perception and thinking.

As evidenced in Table 9, all departments demonstrated some integration of the skill photovisual literacy into instruction. Social studies, SC, and ELA provided opportunities for students to analyze cartoons, videos, and images related to content and document based questions. CTE and FA/PE planned for students to analyze professional logos and various artwork using art elements as well as advertisement for personal care products. Both math and SC integrated the analysis of charts and diagrams related to specific content. With the exception of math, participants in each department integrated technology and purposely incorporated specific elements for analyzing the photovisual content such as art elements, rhetorical appeal, analysis protocols, and rubrics.

Table 9

Focus Group Interview & Document Study Findings: Integration of Photovisual Literacy Skills

	Focus Group Interview Participant Comments	Document Study Examples
Social Studies (SS)	Analyzing "Two cartoons about immigration" "Document based questions…one visual in there… to interpret it in relation to the other primary sources"	Analyzing videos for meaning Selecting images to represent historical events and outcomes;
Science (SC)	"Trying to draw things…so that there is a picture that goes along with the words" "Graph as much as we can… shape of the graph means different things" "We do videos that are short with 'I notice and wonder'" "Quizlet vocab program where you can put pictures with the definitions"	Students conducting virtual labs Analyzing videos for labs Draw conclusions from table, charts, topography, and various images
Math (MA)	"I don't think I'm using it to its fullest potential… I have diagrams"	Investigation of math problems using maps, charts, and diagrams
English language arts (ELA)	"Interpret and understand meaning in photos and other images" "Being able to interpret and understand captions"	Photo Essay unit; identify rhetorical appeals in visual images Analyzing images using Imagery Graphic Organizer Collaborate with peers to define and generate visual representation of Archetypal Criticism
Career & Technical Education (CTE)	"How to use a tool on Adobe Illustrator" "Interpret how lines are being used, how are the colors being used, and why they are being used"	Media analysis activity Identify design elements & principles in images Analyzing and creating logos Critiquing of professional and personal photography, artwork and videos
Fine Arts PE/Health (FA/PE)	"We look at charts and we try to make meaning of it" "Learn to critique photographs…what might be happening or the time period… quality image"	Group analysis of advertisements Analysis of personal care products including labeling and packaging Analyzing original and peer artwork to then produce original artwork integrating art elements and design principles

In terms of reproduction literacy, evidence (Table 10) indicated each department provided learning opportunities to integrate this skill. English, SS, and FA/PE described instances where students conducted research online and synthesized information into an Instagram account, poetry, and informative or argumentative writing. Science and CTE participants described more project based learning where students synthesized information into original designs, food, and presentations or labs. For math, integration included producing geometric forms and proving theorems. Although the use of technology is more implied in math with the word "tools"; science with "physical models" and labs; and CTE with original art designs and cooking; it is explicitly described in SS with "digital media", "visual displays", and creating an Instagram account. A participant in science also recognized the need to learn more about using technology to create digital representations for models in science.

Table 10

Focus Group Interview & Document Study Findings: Integration of Reproduction Literacy Skills

	Focus Group Interview Participant Comments	Document Study Examples
Social Studies (SS)	"History Day [projects and essays]" "Research projects…have the kids understand the difference between plagiarism and paraphrasing" "Synthesize information [from research] into a new document, an essay."	Create an Instagram account representing a historical figure integrating information from research Use digital media and visual displays to express information and present findings with supporting evidence Integrate information from primary and secondary sources into coherent understanding of idea or event, noting discrepancies
Science (SC)	"I had them do cellular transport [drawings]…try to have them do it digitally, but I didn't know how" "They synthesize answers to the cells lab"	Classification presentations Cell Books & Analogies Create & present Phylogenetic Trees

	Focus Group Interview Participant Comments	Document Study Examples
	"Phases of the moon [posters]…based on the position of the sun and even include some cultural things… and we do the physical model"	
Math (MA)	"Doing a scavenger hunt where I could see them [students] having to apply, and think about, and talk about what they had been learning."	Investigation and critical thinking on math tasks and problems Prove theorems about lines and graphs
	"Unscramble the words, and then take the message, and then do something with it.	Make formal geometric constructions with a variety of tools and methods
English language arts (ELA)	"This is the synthesize of information to produce essays"	Poetry unit involving analyzing and writing poems Informative and argumentative writing involving synthesis of multiple sources into evidence based essays.
Career & Technical Education (CTE)	"Teach them about copyright and fair use… emphasize having original concepts" "Actually created and inspiration board…take ideas from it, to create your own original idea"	Creating original designs based on specific criteria (logos, videos, photos, posters, etc) Produce a variety of food dishes using original and student revised recipes Cook and serve plate lunches in a class restaurant
Fine Arts PE/Health (FA/PE)	"Showing them an example…giving them information and then now take what you learned and create something new… to show your learning	Analyze sources to write a cause and effect essay Investigate a variety of snacks and write and analysis Create photos based on unit concepts using elements, principles, and technical aspects

When considering all six digital literacy skills, evidence for branching literacy (Table 11) showed the lowest level of integration in all departments. In SS and math, participant comments and documents provided indicated no evidence of learning opportunities for students to address skills related to branching literacy. Science, CTE, and FA/PE comments and documents provided evidence related to Internet use in the forms of Google and other online applications and research, but branching skills were not

explicitly taught or assessed. Although the ELA pacing guides indicated an introduction to Google Classroom and Google Calendar, there was no indication of explicit instruction about navigation within the hypermedia environment for students to further practice constructing information. Overall, there was evidence of technology use in SC, ELA, CTE, and FA/PE, where teachers were starting to provide learning opportunities for students to find information on the Internet.

Table 11

Focus Group Interview & Document Study Findings: Integration of Branching Literacy Skills

	Focus Group Interview Participant Comments	Document Study Examples
Social Studies (SS)	"Not directly"	Not Evident
Science (SC)	"I did this Internet scavenger hunt where they [students] were going to different site, but I was very explicit."	Current events from online sources Online quizzes, Google Classroom
	"I pay attention [monitor] as they're researching their animals to keep them from getting lost"	Navigation of online sources for classroom assignments
Math (MA)	"It's about the links [online]"	Not Evident
English language arts (ELA)	"I think at this point it's more developing mindfulness"	Introductory tour to Google Classroom, Calendar and other Google Apps used in classroom
Career & Technical Education (CTE)	"In our career exploration project, I give them websites…use these three and if you use any others, make sure you take the URL down."	Online research related to creating Public Service Announcements
Fine Arts PE/Health (FA/PE)	"They [students] go on one website and I show them the features and how they can get different types of information based…on the project."	Receive feedback on personal images and use various photo software to manipulate images; posting images on Google Classroom Use Foodfacts.com and other online resources to conduct research on various snack food

Evidence evaluated from interviews and documents revealed that each department provided various opportunities for students to analyze multiple sources of information and assimilate new knowledge related to developing information literacy (Table 12). Social studies and CTE participants provided evidence that described instances where all components of information literacy including, critical thinking, identifying biased and irrelevant material, and assimilating information, were all apparent. Instances included using a SCAR rubric, questioning propaganda, obtaining information from sides of an event, fact checking, and synthesizing information into a public service announcement. Data from the other departments revealed instances where the same components of information literacy were only partially addressed and assessed. Integration of technology to address information literacy was evident in SS with the evaluation of primary and secondary sources; in science connected to lab stations; and in ELA, FA/PE, and CTE with the analysis of videos, broadcasts, advertisements, and websites.

Table 12

Focus Group Interview & Document Study Findings: Integration of Information Literacy Skills

	Focus Group Interview Participant Comments	**Document Study Examples**
Social Studies (SS)	"Built into the document-based questions format…part of the rubric where kids have to identify the bias of the authors"	Students develop and use a SCAR (subject, cause, action, result) chart to summarize source information
	"Whole unit about propaganda…more questioning and critical about who's presenting the information and what they are trying to convince them of."	Evaluating primary and secondary sources
Science (SC)	"[I] Talk about stats and that anytime you read any stats…think about where it could be… and pick the one that makes you sound better"	Use of scientific method for lab stations Salt comparison activity Drawing conclusions in all labs
	"When I've done a research project, I go through the library and they choose a	

	Focus Group Interview Participant Comments	Document Study Examples
	book"	
Math (MA)	"Rewrite their [student] knowledge about what's true and not true… interpret what the information actually means" "Develop deductive reasoning [in geometry]	Prove theorems about lines and angles Proving Special Triangles Conjectures Pythagorean Theorem Proof
English language arts (ELA)	"Understand the information they are receiving and analyze it to make meaning"	Review and identify rhetoric in images, videos and writing Poetry Analysis Unit
Career & Technical Education (CTE)	"I give them specific websites… [searching] for basic information like pay, [job] tasks" "[Identify] Biased information… when we had broadcasts. We would talk about having to get both sides of a story…from multiple sources" "Fact check to make sure they are giving the right information…relevant to what they are talking about"	Advertisement analysis for bias and meaning Research related to creating Public Service Announcements; Synthesizing information into a PSA
Fine Arts PE/Health (FA/PE)	"We do quite a bit of that [evaluate sources] especially when we hit drugs and alcohol [lessons]…look at their [website] credibility… biases on both sides"	Analyzing advertisements, video and science and technical texts to identify specific evidence to support claims for Drug and Alcohol, Chronic Diseases, and Snack Choice Units

Analysis of data from interviews and documents revealed a wide range of integration of learning opportunities related to socioemotional literacy (Table 13) throughout the departments. Social studies, SC, and CTE demonstrated the most instances of integration with opportunities for students to collaborate with peers in an online environment to create presentations, conduct research, and develop products. Evidence for developing socioemotional literacy in math and FA/PE addressed the collaboration with peers to analyze information and share and co-construct knowledge, but the use of technology was unclear. The component of branching literacy as related to

the definition of socioemotional literacy was partially evident in SS and SC with the integration of Google Classroom, Quizlet Live, and social media, but was difficult to discern within the evidence provided in other departments.

Table 13

Focus Group Interview & Document Study Findings: Integration of Socioemotional Literacy Skills

	Focus Group Interview Participant Comments	**Document Study Examples**
Social Studies (SS)	"Do a form in Google Classroom… they have to respond to each other, whether I [student] agree with you [peer]"	Guide students in creating an appropriate social media account reflecting a historical figure
	"A group project that compared world religions…they were sharing this document [Google Doc] together and working on it in the computer lab"	Work in groups to develop a progressive map and create a governmental structure
Science (SC)	"Quizlet Live…mixes them [students] into random groups that have to work together"	Collaborative lab groups
	"A jigsaw… invertebrates presentations so… they have to work with a partner…then teach the class"	Cooperative group activities and presentations
	"I say consider the people in your group because you're going to be doing this for three days"	Peer sharing activities
Math (MA)	"We are laying the foundation by having them work in groups in investigative teams"	Not Evident
English language arts (ELA)	"They [students] need to identify the rhetorical appeals, and that help them to see what is the persuasion behind them"	Not Evident
Career & Technical Education (CTE)	"I don't think this is part of our actually teaching"	Collaborative Occupation Posters
	"We might advise students about what they should or should not do"	Digital Media Group Research and Presentations
	"Twitter and Snake [school activity] and this kind of stuff"	Various collaborative group projects and presentations
Fine Arts PE/Health (FA/PE)	"I try to teach them that these are the types of pictures [social media] that are trending it's not necessarily what's important to you"	Collaborative group analysis of snack and food products
		Group presentation of various projects

As portrayed in the comparison of findings in Table 14, there were fewer instances of learning opportunities provided to address real-time thinking skills in the documents than in the interview comments. Due to the lack of descriptive commentary in many documents, it was difficult to link information within unit and lesson descriptions to the application of real-time thinking skills. Therefore, the phrase "not evident" was inserted where evidence was not apparent from document analysis in SS, math, ELA, and FA/PE. Participant comments in math and ELA also further indicated that real-time thinking skills are not currently being addressed in pedagogical practices. Evidence from interviews in SS, SC, CTE, and FA/PE demonstrated participants provided some opportunity for student to interact with peers using technology while responding to feedback from peers and the teacher. Evidence provided did not indicate explicit instruction in any department related to developing the skills needed to multi-task and respond to simultaneous stimuli to create a product as indicated in the term definition.

Table 14

Focus Group Interview & Document Study Findings: Integration of Real-time Thinking Skills

	Focus Group Interview Participant Comments	**Document Study Examples**
Social Studies (SS)	"We're doing our essays as well as our slideshow presentation and we have 3 tabs open…assignment in Google Classroom, one was a Google Document for them to write their notes on, and one whatever source they were using"	Not Evident

Science (SC)	"I feel like I kind of push the edge with this one because I usually have two or three tasks on a computer lab day… when this is done, move onto that one" "I do give a lot of lectures and they take notes…I'm writing and then I'm talking and explaining and there's pictures and demos…If they're writing, they might not be listening and trying to process"	Quizlet competitions Google Classroom assignments connected to online research Creating and presenting information through Google Slides
Math (MA)	"I haven't placed them [students] in an environment where they are getting a lot of stimuli yet"	Not Evident
English language arts (ELA)	"We give them various sources. They need to synthesize the information and also giving quotes and the citations and the commentary"	Not Evident
Career & Technical Education (CTE)	"Checklists keep them on task, guiding them" "I don't really teach them to multi-task and stay-on task" "They are in their groups and have to plan what they are doing…on person's in charge of finding the music…another one's editing, another one's doing graphic"	Implementation of software tools (Photoshop, Illustrator, inDesign, etc) to: Manipulate/enhance photos; Mirror teacher actions; and Collaborate and design original pieces
Fine Arts PE/Health (FA/PE)	"I have different levels of students so the old timers [optional repeat students] end up doing the organizing and I teach them and then they will take their own groups and manage" "Brainstorm their projects and then they check in with me… go out and re-shoot [photo] and try it again" "Practice them responding to your [teacher] feedback"	Not Evident

Overall findings from focus group interviews (Table 15) revealed nine instances each in the levels of *evident* and *not evident* with the most instances of 18 in *developing*. Disaggregated by digital literacy skill, findings revealed a higher level of teacher ability to integrate learning opportunities in photovisual, reproduction literacy, and information

literacy with a total combination of seven *evident* and 10 *developing*. Evidence for branching literacy, socioemotional literacy, and real-time thinking skills indicated the most room for growth with eight occurrences of *not evident*. Disaggregated by department, social studies and science demonstrated a higher level of integration of all digital literacy skills with a combination of seven instances of *evident* and four instances of *developing*. Math and ELA demonstrate the most area for growth with a combination of six instances of *not evident*.

Table 15

Focus Group Interview: Summary of Digital Literacy Skills Integration from Comments

	Social Studies (SS)	**Science (SC)**	**Math**	**English language arts (ELA)**	**Career & Technical Education (CTE)**	**Fine Arts PE/Health (FA/PE)**
Photovisual Literacy	Evident	Evident	Not Evident	Developing	Developing	Evident
Reproduction Literacy	Evident	Evident	Developing	Developing	Evident	Developing
Branching Literacy	Not Evident	Developing	Not Evident	Not Evident	Developing	Developing
Information Literacy	Evident	Developing	Developing	Developing	Developing	Developing
Socioemotional Literacy	Evident	Evident	Developing	Not Evident	Not Evident	Not Evident
Real-time Thinking Skills	Developing	Developing	Not Evident	Not Evident	Developing	Developing

Note: Levels are Evident, Developing, and Not Evident

Based on the final analysis of documents studied (Table 16), results revealed various levels of integration of the six digital literacy skills in each department. Overall

findings revealed 15 instances in the level of *evident*, 13 instances of *developing,* and eight in *not evident*, indicating more integration of skills than evinced in focus group interviews. Similar to focus group findings, data disaggregated by digital literacy skill indicated a higher integration level in photovisual, reproduction, and information literacy with a combination of 14 instances of *evident* and four in *developing*. Real-time thinking skills presented the most *not evident* with four instances. By department, participants in the SC and CTE departments provided evidence that addressed each of the six skills to some level, while evidence from other departments was *not evident* in 1-3 of the skills. Math presented with the lowest level of integration with no instances of *evident* and three each in *developing* and *not evident*, indicating the most room for growth.

Table 16

Document Study Findings: Summary of Digital Literacy Skill Present by Department

	Social Studies (SS)	**Science (SC)**	**Math**	**English language arts (ELA)**	**Career & Technical Education (CTE)**	**Fine Arts PE/Health (FA/PE)**
Photovisual Literacy	Evident	Evident	Developing	Evident	Evident	Evident
Reproduction Literacy	Evident	Evident	Developing	Evident	Evident	Evident
Branching Literacy	Not Evident	Developing	Not Evident	Developing	Developing	Developing
Information Literacy	Evident	Evident	Developing	Developing	Evident	Evident
Socioemotional Literacy	Evident	Developing	Not Evident	Not Evident	Developing	Developing

Real-time Thinking Skills	Not Evident	Developing	Not Evident	Not Evident	Developing	Not Evident

Note: Levels are Evident, Developing, and Not Evident

Overall Integration of Digital Literacy Skills by Department (RQ2)

Data from the focus group interviews, classroom observations, and documents were triangulated to determine the overall level of integration of digital literacy skills for each department. Participant statements from the focus group interview questions 14-19, classroom observation findings, and document findings were compared for an overall level of integration. As in previous summary tables, the same three levels of *evident, developing,* or *not evident* were used and the protocol for assigning levels of integration was similar. If triangulated evidence demonstrated purposeful design to address components of the specific skill and integrate technology, the level assigned was *evident*. If combined evidence revealed that the skill was somewhat addressed but lacked purposeful planning and/or technology integration, the level assigned was *developing.* If information was vague or not apparent in findings, the level assigned was *not evident.* Levels of integration for all three data points were combined to determine overall rating.

Table 17

Summary: Content Area Overall Integration of Digital Literacy (RQ2)

		Social Studies	**Science**	**Math**	**English language arts**	**Career & Technical Education**	**Fine Arts PE/Health**
Photovisual Literacy	O	Evident	Evident	Not Evident	Not Evident	Developing	Developing
	FG	Evident	Evident	Not Evident	Developing	Developing	Evident
	DS	Evident	Evident	Developing	Evident	Evident	Evident
	Overall	***Evident***	***Evident***	***Developing***	***Developing***	***Developing***	***Evident***
Reproduction Literacy	O	Evident	Evident	Not Evident	Developing	Evident	Not Evident
	FG	Evident	Evident	Developing	Developing	Evident	Developing
	DS	Evident	Evident	Developing	Evident	Evident	Evident
	Overall	***Evident***	***Evident***	***Developing***	***Developing***	***Evident***	***Developing***

Branching Literacy	O	Not Evident	Evident	Not Evident	Developing	Not Evident	Not Evident
	FG	Not Evident	Developing	Not Evident	Not Evident	Developing	Developing
	DS	Not Evident	Developing	Not Evident	Developing	Developing	Developing
	Overall	***Not Evident***	***Developing***	***Not Evident***	***Developing***	***Developing***	***Developing***
Information Literacy	O	Evident	Evident	Developing	Not Evident	Developing	Developing
	FG	Evident	Developing	Developing	Developing	Developing	Developing
	DS	Evident	Evident	Developing	Developing	Evident	Evident
	Overall	***Evident***	***Evident***	***Developing***	***Developing***	***Developing***	***Developing***
Socioemotional Literacy	O	Developing	Evident	Not Evident	Not Evident	Not Evident	Developing
	FG	Evident	Evident	Developing	Not Evident	Not Evident	Not Evident
	DS	Evident	Developing	Not Evident	Not Evident	Developing	Developing
	Overall	***Evident***	***Evident***	***Developing***	***Not Evident***	***Developing***	***Developing***
Real-time Thinking Skills	O	Developing	Evident	Developing	Evident	Developing	Developing
	FG	Developing	Developing	Not Evident	Not Evident	Developing	Developing
	DS	Not Evident	Developing	Not Evident	Not Evident	Developing	Not Evident
	Overall	***Developing***	***Developing***	***Developing***	***Developing***	***Developing***	***Developing***

Note: Levels are Evident, Developing and Not Evident. O = Observation, FG = Focus Group, DS = Document Study.

As depicted in Table 17, all departments were making progress at various levels in integrating the six digital literacy skills. Overall, there were 11 instances of *evident* in the all skills with the exception of branching literacy; 22 instances of *developing* distributed through all six skills with the most in real-time thinking skills; and three instances of *not evident* between branching and socioemotional literacy. Disaggregated by department, SS and SC demonstrated more ability to provide learning opportunities related to photovisual, reproduction, information, and socioemotional literacy with a level of *evident* in the four skills. With the exception of the level *evident* for FA/PE in photovisual literacy and CTE in reproduction literacy, the four departments of Math, ELA, CTE, and FA/PE demonstrated the most instances in of *developing* in photovisual, reproduction, information literacy, and real-time thinking skills. The levels of *not evident* were indicated in branching literacy for SS and math and in socioemotional literacy for ELA. The summary of findings for RQ2 indicated a need for differentiated professional development related to department needs based on content area and digital literacy skills. Departments would benefit from training and collaboration time with peers to share

experiences, knowledge, and construct lessons that incorporate technology with discipline specific content.

Perceived Challenges in Digital Literacy Integration (RQ3)

To identify teachers' perceived challenges in integrating the essential digital literacy skills (RQ3), phrases from participant responses to designated focus group interview questions (20-25) were analyzed and coded. The initial examination of responses involved highlighting, labeling, and classifying phrases into various "challenge" categories. Preliminary challenge categories included training, life, literacy, perseverance, transitions, time, technology, beliefs, roles, infrastructure, and awareness. Responses for these categories revealed that integration challenges were present for teachers and students in several areas. The next step involved printing matrices and reviewing and annotating information to collapse data and narrow categories. These categories were then further refined until five minor themes emerged from the analysis of participant input from related focus group interview questions.

One of the first challenge categories that emerged from participant comments (Table 18) was related to student's ability to struggle through difficult tasks and use appropriate strategies to solve problems. CTE and ELA participants identified challenges with students and their desire and ability to persevere through a task. The ELA teacher stated, "They don't want to think… they think is a wasting of time," and both CTE teachers indicated that the students plan for projects and tasks superficially and, "Just want to jump into it." The math teacher also affirmed that, "Students aren't accustomed to having to do that level of seeing. They are accustomed to superficially look at what's

in front of them," indicating that students give up and lose patience if they don't understand immediately. From these comments, the minor theme of *critical thinking* emerged as a challenge, encompassing the inability of students to think critically about a problem, task, or information, and then apply themselves to solve problems or thoroughly plan and develop ideas.

Table 18

Challenges in Digital Literacy Integration (RQ3): Responses for "Critical Thinking"

Department	Focus Group Interview Participant Comments
FA/PE	"They [students] don't take is serious when I still want them to put out their best efforts"
	"[Students] just want to jump into it"
CTE	"I give them planning sheets [for making a PSA] and look at them like, 'you just gave me basic stuff. What exactly are you going to have them wear? Where are you going to be?'"
ELA	"They didn't obtain this stage…it is vital for them to develop as a complex thinker"
	"They don't want to think… they think is a wasting of time"
Math	"Students aren't accustomed to having to do that level of seeing. They are accustomed to superficially look at what's in front of them"
	""Lack of patience on their [student's] part. If they don't understand it right away then something's wrong"

Another concept that emerged from the analysis of comments (Table 19) related to challenges was the need for effective use of time. Due to the constant evolution of technology, software, and applications, teachers indicated the lack of time to research, plan, and reflect on lessons related to digital literacy skills and their content as a challenge. Science participants indicated that it required great deal of time researching quality materials without actually meeting their needs and they, "Have a hard time finding stuff for them [students] to use and interpret. It's either not accessible to them or is doesn't show the concepts that I know exists, that I need." Social studies and math

teachers implied that it was difficult to determine which digital literacy skills were pertinent to their content and then align instruction and build assessments within current allotted planning time. Combined with limited classroom instruction time of approximately 50 minutes, integration of digital literacy skills competes with the need to address content. Other participants also stated maintaining current knowledge of technology required additional professional development time, which should be accompanied by compensation or count towards reclassification. These participant comments led to a second minor theme, *time,* which covers a broad cross spectrum from purposeful teacher planning and training time to the appropriate use of classroom instructional minutes.

Table 19

Challenges in Digital Literacy Integration (RQ3): Responses for "Time"

Department	Focus Group Interview Participant Comments
Science	"Have a hard time finding stuff for them [students] to use and interpret. It's either not accessible to them or is doesn't show the concepts that I know exists, that I need"
Social Studies	"Assessment time" "Skill building [time]. What sources we can call reliable and why" "Some time to teach [and plan] it right" "I wish I had more time with the kids" "For older teachers [not age], we didn't have the same kind of technology so unless we have time to learn..."
Math	"I think the 50 minute classes is a huge challenge. It takes time to get to that good deep place of thinking" "I feel so compressed to cover content"
CTE	"Time to plan, time for the kids to get work done"

A third challenge category that emerged from focus group findings (Table 20) was the need to develop digital literacy for both teachers and students. Participants in SS,

math, and SC identified a weakness in student's capacity to conduct quality research that included research using databases and selecting key phrases for search engines. Additionally, participants revealed that there is an assumption on both teachers and students part that students have already acquired this skill; however, students lack, "Confidence on their part to come forward and ask for help," and can't identify next steps when they don't find what they are looking for. The math participant also implied that progress in research is further hindered since students have difficulties, "Being able to read and interpret… recognizing that you may have to read it once, twice, three times," to make meaning and perform. Comments from participants in SC, SS, and ELA further revealed a need to improve teacher digital literacy to keep abreast of technology developments and increase their ability to use the tools in instruction. The minor theme that emerged from these comments was *information and technology literacy*, defined as need for increased teacher digital literacy knowledge and pedagogy to positively impact student's ability to conduct research using technology and process the information obtained.

Table 20

Challenges in Digital Literacy Integration (RQ3): Responses for "Information & Technology Literacy"

Department	Focus Group Interview Participant Comments
Science	"It's constantly evolving, like Google Apps for Education are totally new… Things are changing and I like that we have these 21 [PD] hours of technology and service learning. That should be mandatory for all teachers, every year" "Some of their [students] abilities are just poor… there is an assumption on their [students] part that they should know how to do it. I do assume that there are things they should know how to do" "Confidence on their [students] part to come forward and ask for help," "Information Literacy. I think, just clearly knowing what they're [students] supposed to

Department	Focus Group Interview Participant Comments
	look for, but I think it's bigger than that is what do you do when you don't find what find what you're expecting"
	"[Information literacy] not only for them but for teachers…Consistency on whatever the rules are about using technology that all the teachers are monitoring and foreseeing"
Social Studies	"[Librarians] would be able to conduct a short class, especially for seniors, on how to use research database"
	"I think in many cases nobody's ever showed them how to do quality research on the internet…many of them don't know how to do it"
	"I want everyone [student] to see what the other groups did to compare and I don't know how to do that so that they can all see without commenting on it"
CTE	"More pre-teaching, I think on the things they should look out for"
ELA	"I have to distinguish, like the definitions are here and give them examples to show them why it's relevant for them to learn that. Then include it in each lesson"
	"Maybe we [teachers] have the concepts somehow, but we need to develop more skills
Math	"Being able to read and interpret… recognizing that you may have to read it once, twice, three times"

Another topic derived from the data was the concept of consistent access to appropriate technology for instruction (Table 21). Science, math, and SS participants raised the issue of consistent access to computers or labs for students both in school and at home. Teachers were hesitant to assign homework requiring access to Google Apps or other Internet resources due to limited access to technology at home. Additionally, they indicated that access to computer labs in school was limited due to the competition for reservations and outdated or broken chrome books, computer labs, and computers. The number of working computers in a lab often did not correlate to class size. As noted by the math teacher, time also factors in, as teachers need to plan for passing to and from computer labs, checking in and out, and completing a task within the 50-minute class periods. The limited access to technology resources in the classroom and low numbers of computer labs to meet the capacity of the school makes teachers hesitant to plan

curriculum that requires access to this technology. Emerging from this data is the fourth minor theme, *infrastructure and access*, referring to equal access to technology and for teachers and students.

Table 21

Challenges in Digital Literacy Integration (RQ3): Responses for "Infrastructure & Access"

Department	Focus Group Interview Participant Comments
Science	"I think not all of them [students] have access, if we're talking about digital means, but just in general, as far as access to things" "One of my wobbles is for the students to say they don't have any access at home" "I try to use the lab once a week, but sometimes people need it... I really don't know if there's enough computers there [in library computer lab] for that to be realistic" "I think we should know what the demand is for our computer labs and see if we have enough computers for our demand" "What kind of resources would we need to make so whenever you need a computer, you can have a computer, basically for any class"
Social Studies	"Class size" "Access to technology" "Chromebooks last about three year and the keypads are gone" ""I feel like I could do so much more of this kind of stuff [learning with technology] in my class if I just had the computer ready to go every single day"
Math	"I'm not going to – my 50 minute classes we're not walking to that lab" "It's not just the physical infrastructure. I'd rather have it be integrated more often that that. More seamlessly. Not a special thing that we go to do, visit" "The infrastructure's huge, but is has to be meritable only if it's backed up by a shift in pedagogy"

The last classification of challenge statements (Table 22) that surfaced was related to student behaviors and teacher attitudes. Science participants stated that, "Student's behavior is a challenge, especially for freshman and ELL and lower levels, because technology comes with a price. I am discouraged from taking them in [computer labs]

ever unless I absolutely need to," and there is a, "Divide between the ability levels of students." Learning opportunities within the computer labs presented a challenge to these teachers due students destroying technology and student's overall ability to control themselves academically and behaviorally in this setting. Additionally, the FA/PE and math teachers mentioned that students were also not adept at multi-tasking with technology or maintaining focus and suggested that this inability stemmed from maturity levels and, "Their distracted teenage life." Social studies participants expanded on the problem, attributing the deficiency to lack of listening or actually hearing what is being said, whether from teachers, peers, or various forms of media. On the teacher side, SC, CTE, and math participants identified personal resistance to technology integration and lack of brain knowledge for the adolescent mind as barriers. The final minor theme that emerged from the data related to challenges with integration was *behavior and attitude,* specifically students' aptitude in using technology effectively and ethically and teacher's need to understand the teenage brain.

Table 22

Challenges in Digital Literacy Integration (RQ3): Responses for "Behavior & Attitude"

Department	Focus Group Interview Participant Comments
Science	"I feel inadequate in the digital world and so I know that I want to move them [students] their, but I need to move myself"
	"I feel like I need to spend energy [on digital literacy] but I resist it at the same time… because I also believe that they should know traditional things too"
	"I still try to keep open-minded… I wouldn't say I'm intensive into the technology on a continuum. I don't know where I'm at"
	"Student behavior is a challenge especially for freshman and ELL and lower levels, because technology comes with a price. I am discouraged from taking them in [computer labs] ever unless I absolutely need to"
	"Divide between the ability levels of students"

Department	Focus Group Interview Participant Comments
Social Studies	"I might…spend a week talk about what does it mean to really listen, because it seems like a I have a problem with it too sometimes, but some of these kids are absolutely incapable"
	"Accountability for the students who are not using it [computers] properly… we have a whole computer lab with a bunch of broken computers and keyboards that are missing keys"
CTE	"How do you get teenagers to really take into consideration what you think, and to internalize it, and actually do it… because they are so impulsive, you know"
	"It's almost like a teacher needs to also know how to be a therapist, or something, to understand the psychology of teenagers"
ELA	"Maturity is not there completely. Some of them do, but my students, special ed, they are still in the process"
Math	"I think just their distracted teenage life. That's a given"
	"It has to be a shift in how we think as teachers"
FA / PE	"Be a little more positive so that they [students] are more willing to put out too. If we start acting like grumps, they'll behave negatively"
	"I have a real difficulty with kids who, I mean talk about multi-tasking. They are doing other things such as they are looking at their phones… when they should be actually focusing"

After a complete analysis of participant comments related to perceived challenges in integrating digital literacy skills, five minor themes (Table 23) with defining statements emerged: *Critical Thinking, Time, Information Literacy, Infrastructure and Access,* and *Behavior and Attitude*. As part of the inductive process of analyzing data, these minor themes will be further compared with results from findings of all research questions to determine major themes from research.

Table 23

Summary of Minor Theme Challenges Identified by Teachers in Digital Literacy Integration (RQ3)

Minor Challenge Theme	Statement
Critical Thinking	Students lack the ability to think critically and persevere through tasks
Time	Use designated class time, planning time and professional development time effectively to address both teacher and student needs
Information and Technology Literacy	Improve teacher digital literacy knowledge and pedagogy to positively impact student's technology research and information processing skills
Infrastructure and Access	Provide consistent and timely access to technology and other digital resources for teachers and students
Behavior & Attitude	Increase teacher knowledge of teenage brain science and improve students ability to use technology effectively and efficiently

Identified Supports to Advance Digital Literacy Integration (RQ4)

The final research question in this project study was related to determining teacher-identified supports necessary to promote integration of the essential digital literacy skills into pedagogical practices. Participant responses from focus group interview questions 26-29 were analyzed to answer RQ4. Using the same analysis sequence as RQ3, preliminary data was grouped into initial categories comprised of themes such as support, solutions, overcome challenges, content skills, insight/a-ha's, activate learning, emotion, shift in teacher thinking, and one-to-one. Additionally, some of the responses from the challenge codes related to supporting change were integrated into RQ4 categories and analyzed. Printed matrices were annotated and codes were refined until four minor themes emerged related to supports needed for successful digital literacy integration.

The first concept that developed from data analysis of responses to questions related to needed supports (Table 24) centered on training for teachers. Specifically, SC participants suggested that this professional development should be ongoing and consistent while including, “Straight out lessons on information literacy. How do we teach it? What are the next steps?” Other participants also suggested the professional development (PD) sessions incorporate modeling of lessons; teaching and learning strategies; consumables or other samples; and new content specific applications, programs, and resources. To build capacity, one SS teacher proposed, “Having working models where we actually get to see it happening in the classroom, you see the product that came out of it, you see how it was assessed.” The math teachers requested knowledge and time on, “How to take the common core content, and rewrite it, revise it, remap it, so that literacy skills can be developed. Learning how to rework activities in the common core, and make it a little more consumable for the kids.” FA/PE teachers further recommended practical application of new lessons and with resources such as flip charts and posters. Additionally, one CTE participant suggested incorporating brain science to improve teacher understanding of, “The psychology of teenagers.” The first minor theme that emerged, PD, refers to the need to support teachers with ongoing digital literacy PD and resources that can be differentiated and aligned with teacher and student needs.

Table 24

Supports Identified for Digital Literacy Integration (RQ4): Responses for “Professional Development”

Department	Focus Group Interview Participant Comments
Science	“Straight out lessons on information literacy. How do we teach it? What are the next steps?”
	“I think more training for teachers, there should be dedicated training like what we have

Department	Focus Group Interview Participant Comments
	with DELL [a site school technology training]"
Social Studies	"Having working models where we actually get to see it happening in the classroom, you see the product that came out of it, you see how it was assessed"
	"Definitely need some type of training and understanding on how to do it so we can teach the kids how to research and apply"
	"The training can be effective for me to hear all the stuff but it gets to be too much. I need the overall picture…it has to become part of our rubrics now as we start to assess things"
Math	"How to take the common core content, and rewrite it, revise it, remap it, so that literacy skills can be developed. Learning how to rework activities in the common core, and make it a little more consumable for the kids."
	"I would like training on math specific like Desmos, and GeoGebra"
	"The infrastructure's huge, but is has to be meritable only if it's backed up by a shift in pedagogy"
	"For example, total participation techniques. A book like that. Learning how to rework activities in the common core [standards], and make it a little bit more consumable for kids"
CTE	"The psychology of teenagers."
	"I mean, [more] knowledge I think, because I didn't even know I have any of these words [digital literacy terms from interview]"
	"I think maybe a couple of resources"
FA / PE	"Under each category, what are some specific themes? How does this translate for teachers in the classroom? What do we need to do as teachers?"
	"The more we look at it, we actually use it"
	"Having some specific examples of what that looks like for teachers. You know what helps me is like posters [visuals]"
	"I have those laminated flip things [charts]. I keep them with me all the time…to make sure that you are doing [correctly]"
ELA	"It was wonderful what I learned [in DELL training] , but don't know how to put it in my classroom… I want it from beginning to end"

Connected to professional development sessions was the second support category of providing meaningful opportunities for teachers to collaborate and plan with adequate resources and time for reflection. Participants implied that some allocated planning

sessions be connected to the PD sessions with samples and include collaboration with content area teachers to review, "Some of the things that I've created, and having conversations about what I am doing." One FA/PE teacher emphasized the concept of application as, "Reading about and talking about it with you [researcher] makes sense, but if we are going to just read over it like this, it's very foreign." Another participant requested planning sessions also include facilitated research phases so teachers can navigate the internet and find specific resources without getting, "Sucked down the rabbit hole too," implying the need to use time productively and have some guided instruction from a coach. It was also apparent through comments that there is a need for planning time connected to PD sessions integrated throughout the school year to increase effectiveness. Analysis of participant comments (Table 25) led to the second minor theme of, *planning and preparation time*, specifically designed to address the planning, application and reflection of digital literacy skill lessons that span time.

Table 25

Supports Identified for Digital Literacy Integration (RQ4): Responses for "Planning & Preparation Time"

Department	Focus Group Interview Participant Comments
Science	"I spend an awful lot of time researching quality stuff … I know what I'd like to pull out to support his unit and I have the hardest time finding stuff for them [students] to use and interpret"
	"Yeah, the content materials can be hard for me. I can spend an awful lot of time searching without getting what I need"
	"I wish it [PD] would be regular so that I would be able to utilize what I have been learning because that is kind of my dilemma"
Social Studies	"Probably unlikely that there will be a whole separate class, but if people agreed to do it together, the students would have those basic skills and it's not the burden of one particular department because they overlapped"
ELA	"But in order to add it to a lesson, I have to put it in my head and not just follow the Springboard [Hawaii ELA curriculum]… be aware of each section, preparation"

Department	Focus Group Interview Participant Comments
Math	"Looking over some of the things that "I've created, and having conversations about what I'm doing. It's happening in a vacuum"
	"I think having someone collaborate, and taking a look at what I'm doing would force me to, like I say, stay honest with it [planning]. Slow down and take a better look at stuff"
FA / PE	"For me reading about it and talking about it with you [researcher] makes sense., but if we're just going to read over it like this, it's very foreign"
	"Be more conscious as incorporate it in our lessons and do go modeling [for students]. Be real specific and make sure that it gets to the kids and ask them questions"

In line with professional development and planning time, a third category of planned classroom observation and feedback on lessons and teaching became apparent from data analysis (Table 26). Once teachers have received training and produced lessons that integrate digital literacy skills, participants expressed interest in participating in two different types of observations for constructive feedback. The first type of observation would be similar to a learning walk where peers observe each other and later collaborate to discuss strengths and growth areas. Not sure what it looks like in action and unsure whether it's possible, the SC, FA/PE, and math teachers expressed interest in observing others teachers in action and receiving feedback from peer observations, especially in like content areas. The other type of observation would include reciprocal observations from a coaching or expert perspective where teachers observe a model lesson and then have a lesson they created observed by a coach or expert to receive more constructive feedback. Many participants stated the need for realistic representations of the digital literacy skills in action. Analysis of participant comment in this category revealed *observations and feedback,* as the third minor theme, highlighting the need for routine observations and constructive feedback from both peers and an instructional coach.

Table 26

Supports Identified for Digital Literacy Integration (RQ4): Responses for "Observations & Feedback"

Department	Focus Group Interview Participant Comments
Science	"I think I'd like to see it in action. People utilizing different technologies or whatever they're doing in their classroom" "Yes, a second pair of eyes in there would be fabulous" "Maybe a teacher who's on their prep [non-teaching period]"
Social Studies	"Working models where we actually get to see it happening in the classroom, you can see the product that came out of it, you see how it was assessed. For me that works better because I get an idea of okay that's how they did it and I can do it in my classroom as well"
Math	"Some kind of collaborative observation or reflection. Like feedback to help build things" "If you have someone coming and taking a look at it, then you really slow down. Don't run to that next one. Stop and really take a look at what this is"
FA / PE	"Maybe just feedback would help, observation and feedback. I feel like, oh gosh, I've been observed twice a year for the last three year and always helps" "What does it look like in the classroom for us as teachers if we're practicing in all of these areas"

The final concept that emerged from data analysis of participant responses (Table 27) was connected a conducting a comprehensive technology needs assessment and identifying common schoolwide practices. For the integration of digital literacy skills to be successful, participants indicated that one level of support included building site capacity and maintaining and upgrading technology to match teacher and student needs. Social studies, math, and SC teachers stated they would be more prone to integrating digital literacy skills, "If I just had the computer ready to go every single day," or at least more frequent and consistent access to technology for learning. The other level of support specified related to monitoring of rules and behaviors for both teachers and students. Social studies participants indicated that there should be, "Some kind of accountability

for the students who are not using it properly….We have a whole computer lab with a bunch of broken computers and keyboards that are missing keys." Science teachers believe this should extend to teachers so there is, "Consistency of whatever rules are about using technology that all teachers are monitoring and foreseeing, and that the students know everybody is monitoring." The hope is that a system that monitors computer lab routines and procedures and holds teachers and students accountable would present a more proactive approach and decrease infrastructure and access issues. The need for *schoolwide focus and routines* related to identifying technology needs and academic and behavior monitoring and support was the final minor theme that emerged from the data.

Table 27

Supports Identified for Digital Literacy Integration (RQ4): Responses for "Schoolwide Focus & Routines"

Department	Focus Group Interview Participant Comments
Science	"Consistency of whatever rules are about using technology that all teachers are monitoring and foreseeing, and that the students know everybody's monitoring." "I think we should know what the demand is for our computer labs and see if we have enough computers to meet our demand" "What kind of resources would we need to make so whenever you need a computer, you can have a computer, basically for any class"
Social Studies	"I feel like I can do so much more of this kind of stuff [learning with technology] in my class if I just had the computer ready to go every single day," "Some kind of accountability for the students who are not using it properly….We have a whole computer lab with a bunch of broken computers and keyboards that are missing keys." "Eventually we'll have another tech person that can come through and switch those things out, but it's just got to be a continual thing"
Math	"I'm not going to – my 50 minute classes we're not walking to that lab" "It's not just the physical infrastructure. I'd rather have it be integrated more often that that. More seamlessly. Not a special thing that we go to do, visit"

In addition to the minor themes above, a few other concepts were presented as further supports including a separate student technology course, teacher aides or other assistance in the classroom, and continued support from a technology expert. The separate course could be an elective where content addressed digital literacy skills as well as digital citizenship. Several participants also mentioned an additional teacher or aide in the classroom may help with classroom management when technology is in use. The final suggestion of a technology support person referred to the need for in-house assistance related to fixing technology hardware problems and system glitches not related to pedagogy.

Four minor support themes (Table 28) were revealed from the analysis of participant comments to advance digital literacy integration: *Professional Development, Planning and Preparation Time, Observations and Feedback,* and *Schoolwide Focus and Routines*. These minor themes were compared with finding from RQ1, RQ2 and RQ3 to determine overall final themes (Table 29) from research.

Table 28

Summary of Minor Themes for Supports Identified by Teachers in Digital Literacy Integration (RQ4)

Minor Support Theme	Statement
Professional Development	Ongoing digital literacy professional development and resources aligned with teacher and student needs
Planning and Preparation Time	Dedicate time for teacher planning, application and reflection of digital literacy lessons
Observations and Feedback	Ongoing peer and “expert” classroom observations with constructive feedback

Schoolwide Focus and Routines	Schoolwide focus on digital literacy with monitoring and support of technology and student action

Conclusion

A review of the qualitative data from the focus group interviews, classroom observations, and documents provided for study revealed varied levels of knowledge and integration of digital literacy skills as well as several related themes to support digital literacy integration and address challenges. A comparison of interviews and documents indicated that a majority of the participants were endeavoring to design and implement curriculum that integrating technology at some level. Overall, participants expressed interest and found value in using technology to enhance teaching and learning, but had limited knowledge on how to further augment their pedagogy and make explicit links to content. Initial findings revealed high knowledge levels (RQ1) of the terms digital literacy and photovisual literacy and a low level of knowledge of the other skills. Integration levels (RQ2) of the essential digital literacy skills varied with 11 instances of *evident* in the all skills except branching literacy; 22 instances of *developing* in all six skills; and three instances of *not evident* between branching and socioemotional literacy. Initial reading and analysis of focus group responses for RQ3 and RQ4 led to the development of five minor themes for challenge (Table 23) and four minor themes (Table 28) for supports.

Examination and triangulation of data from each research question uncovered interlaced common subtopics and key attributes. This included the need for professional development to address multiple areas of growth for students and teachers as well as the

need to balance the use of time for collaborative planning and reflection. Additional similarities included the need to define common ground rules and effective policies for technology use and design and address student's ability to think critically and persevere through problems. These concepts were evaluated and further refined to reveal four major themes (Table 29) associated with successfully integrating digital literacy skills into pedagogy: *critical thinking; integrated professional development; effective use of time;* and *infrastructure and schoolwide routines.* As portrayed in Table 29, each theme included multiple components that need to be addressed to create a comprehensive approach to integrating digital literacy skills and building site capacity to affect a positive shift in pedagogical practices.

Table 29

Four Major Themes Identified from Research

Major Themes	Explanation and Skills to Address
Critical Thinking	*Student's lack ability to think critically and persevere through tasks* • Critical thinking • Problem solving • Perseverance
Integrated Professional Development	*Ongoing professional development is needed to increase teacher's knowledge and ability to improve student's digital literacy skills* • Digital Literacy Skills • Adolescent Brain Science & Motivation • Effective and Ethical use of Technology Strategies & Practices • Technological, Pedagogical, Content Knowledge • Digital Literacy Resources • Peer observations & Collaboration • Instructional Coaching
Effective use of Time	*Time needs to used effectively to address both teacher and student needs* • Integrated with Effective & Timely Professional Development • Research Content Materials and Pedagogy Strategies • Planning & Collaboration with peers • Coach, peer and personal reflection
Infrastructure & Schoolwide Routines	*Provide consistent access to technology, resources and support with an emphasis on implementing and monitoring schoolwide routines* • Updated and Maintained Technology • Support & Training from Technology Coordinator

- Schoolwide procedures and policies
- Common Focus Schoolwide
- Consistent and Timely Access to Technology

Based on these findings, Section 3 presents a detailed explanation of the proposed Technology Professional Development Support Plan (TPDSP). Specific components that will be addressed include a description of the project with rationale, a literature review, implementation and evaluation guidelines, and implications for social change.

Section 3: The Project

Introduction

The purpose of this study was to explore teachers' knowledge and skill in integrating digital literacy and to identify supports needed and challenges that may be faced in order to shift pedagogical practices. Based on the findings, a TPDSP was designed to address both teaching learning and building site capacity for integrating digital literacy skills into pedagogical practices. Through technology professional development sessions, teachers will engage in a collaborative learning process to enhance their skills and knowledge over time. Conducting onsite training will allow all in-service teachers to participate in the program throughout the year with integrated assistance from curriculum coaches and mentors as they develop and practice new adapted lessons. Involving administration throughout the program will aid in ongoing reflection and evaluation of both teacher practice and administrative support.

Description and Goals

I identified four key items needed to support successful digital literacy skills integration including professional development, planning and preparation time, observation feedback, and a schoolwide focus with common routines. Teachers expressed the need to link these four concepts in a comprehensive approach to affect positive change. In the focus group interviews, teachers revealed that although they were beginning to integrate technology and digital literacy skills into curriculum, instruction, and assessments, they recognized the need for support in further developing their skills and knowledge. Although teachers may have content knowledge and many had at least a

basic knowledge of technology, the connection between content, technology and pedagogy was not established. I found that teachers were at various levels of purposeful planning and integration of digital tools and skills addressing both student-centered and teacher-centered use. To begin addressing these identified areas of growth, teachers requested that support include time to collaborate, plan, and reflect on lessons and to receive feedback from peers and coaches in addition to professional development.

In an integrated design, I am recommending a two-tiered approach to developing teachers' digital literacy skills and building the site capacity to maintain a pedagogical shift. The first tier of the TPDSP is a holistic technology professional development approach that spans the school year and incorporates new digital literacy knowledge and instructional coaching while also providing time for teachers to collaborate with content area peers to develop lesson plans, observe peers in action, and reflect after implementation. The second tier involves a collaborative process that aids administration in aligning technology routines and procedures schoolwide to support teachers with access, monitoring, and continuous improvement with digital literacy skills and integration. The goals of this comprehensive tiered approach are to (a) increase teacher knowledge and ability of integrating digital literacy skills into pedagogy and (b) build site capacity of the school and sustain forward movement.

Rationale

Creating a tiered comprehensive approach to affect change will address the multiple components of supports and challenges identified by participants in the study. I found that teachers were in need of purposeful professional development that links

content area standards with technology, digital literacy skills, and resources necessary for ongoing pedagogical development. In my observations of current teaching practices, I found pockets of instruction and assessment with student learning tasks purposefully designed to integrate digital literacy skills. For example, students practiced photovisual literacy by analyzing photographs using content-specific vocabulary in their photography course and analyzed messages in propaganda images for social studies. Students also used a variety of applications in the Google Apps for Educators Suite such as slides, classroom, and sheets to demonstrate and apply knowledge and develop collaboration skills. Although I found a breadth of teachers and students applying basic digital literacy skills, depth of purposeful digital literacy lesson planning was not apparent. In focus group interviews, teachers further indicated a lack of knowledge and time related to exploring resources and making connections to content and standards. Developing an ongoing professional development program with sessions throughout the year affords teachers the opportunity to learn, plan, practice, and reflect on newly acquired knowledge and skills.

Including an administrative support component as the second tier of the TDSP will help align teacher and student needs with administrative focus and designated support. Teachers identified the need to streamline infrastructure and access, as well as provide planning time for teachers to continue developing and applying digital literacy skills. Allocating time during the professional development sessions and other staff meetings for process reflection and discussion between administration and teachers about progress related to all components establishes a foundation and allows for collaborative

growth. It is my hope that this tiered approach will affect positive growth in developing teacher digital literacy skills and knowledge to initiate a pedagogical shift with administrative support.

Review of the Literature

Introduction

A professional development project is the most relevant choice in supporting teachers to improve their ability to implement digital literacy skills and content into current practices. I conducted a literature review associated with topics like adult learning; professional development; and technological, pedagogical, content knowledge (TPACK). Using Google Scholar and database resources within the Walden Library, I researched and reviewed related peer-reviewed scholarly articles. Databases accessed included Education Research Information Center (ERIC), SAGE Journals Online, Pro-Quest Central, LearnTechLib-The Learning and Technology Library, Academic Search Complete, and Thoreau Multi-Database Search. I used the following key terms in a variety of combinations to narrow the field produce relevant research: *adult learning; teacher learning; andragogy; teacher professional development; technology professional development; digital literacy professional development; digital literacy; high school teachers; in-service teachers;* and *technological, pedagogical, content knowledge (TPACK).* In addition, I conducted general Internet search for PD related to TPACK and digital literacy for more information related to designing and implementing the PD plan. The extensive research was assessed and compiled into the following review.

Professional Development for Teachers

To galvanize an effective paradigm shift, a PD plan must be substantive, integrating content with learner needs. In new conclusions about teacher learning (Korthagen, 2017; Postholm, 2012; Yurtseven & Altun, 2017; Yurtseven & Bademcioglu, 2016), scholars indicated that there is a connection between theory, practice, and person. Although previous PD has focused on presenting theories and strategies hoping to impact teacher practice, Korthhagen (2017) suggested the added dynamics of practice and person. Practice refers to the practical application of and the reflection on new knowledge gained from training. Person refers to the multidimensional learning connected to social context and the multilevel learning connected to teachers' prior knowledge and skills. To encourage authentic learning within the context of teaching environment, the PD design must address all three pieces.

Entwined with practice and person is the essential component of the process of reflection. As the application of new strategies is grounded in teacher practice and guided by personal experience, purposeful reflection should be promoted as part of the PD design (Korthagen, 2017; Morales, 2016; Yurtseven & Altun, 2017). Using a guided reflection practice that focuses on rational thought, as well as emotion and motivation, allows teachers to develop personal theories about new practices and create a meaningful connection (Korthagen, 2017). In a detailed process, practitioners can find a deeper awareness about problems and solutions related to their experience and adapt as necessary. This is the beginning of the paradigm shift as teachers make connections between new content and pedagogy. An integrated PD model that combines theory with

practice and person can increase competence, collaboration, and the culture for learning within the school environment (Korthagen, 2017; Postholm, 2012). As catalyst for change, this approach to PD is critical in the advancement of teacher knowledge, skills, and practice.

Another key factor in PD design is administrative support in the form of time and resources. To build an educational community focused on learning and growth, PD should be job-embedded, sustainable, and intensive (Engelbrecht & Ankiewicz, 2015; Korthagen, 2017; Stewart & Houchens, 2014). In order to meet these qualifications, administration must provide time throughout the year for teachers to train, collaborate, implement, observe, and receive coaching and feedback to reflect on practice. In a literature study of continuous teacher PD (CTPD) models, Engelbrecht and Ankiewicz (2015) found that a comprehensive approach addressing these features is the integration of school knowledge, subject knowledge, and pedagogical knowledge. School knowledge refers to teachers' understanding of facilities, expertise of staff, peer and student ethos, and political interpretations of technology and the community (Engelbrecht & Ankiewicz, 2015). Combined with discipline-specific knowledge and practice, these components intersect to constitute teacher development.

Resources in the form of mentoring, coaching, and time for peer observations and feedback are also noted as a tier of administrative support. Several researchers (Eliahoo, 2017; Postholm, 2012; Stewart & Houchens, 2014) have concluded that structuring PD opportunities to include collegial inquiry with peer and/or group mentoring and instructional coaching is more conducive to shifting teacher practice. Guidance with

sound judgment from peers and coaches helps teachers assimilate. Coupled with observation of experienced practitioners, these practical examples and feedback related to integrating new teaching and learning practices helped teachers create new constructs.

Technology Professional Development

Many of the fundamentals of effective PD are also aligned with effective technology PD. Although still emergent, researchers have outlined several key components for technology PD including collegial inquiry and collaboration (Cloonan, 2015; Jones & Dexter, 2017; Tondeur, Forkosh-Baruch, Prestidge, Albion, & Edirisinghe, 2016; Yurtseven Avci & O'Dwyer, 2016); teacher input and contribution to PD topics (Thomeczek & Shelton, 2015; Tondeur et al., 2016; Yurtseven Avci & O'Dwyer, 2016); structured support to provide time for research, design, implementation, and reflection (Cloonan, 2015; Jones & Dexter, 2017; Thomecczek & Shelton 2015; Yurtseven Avci & O'Dwyer, 2016); mentoring or coaching (Leslie & Johnson-Leslie, 2014; Yurtseven Avci & O'Dwyer, 2016); and that PD subject matter address teacher content, technology, and pedagogy (Horton, Shack, & Mehta, 2017; Yurtseven Avci & O'Dwyer, 2016; Walker et al., 2012). Supporting practitioners in professional growth related to technology integration requires attention to planning and aligning design and content to meet the diverse needs of teacher. Using a model that accounts for the above characteristics alleviates potential barriers to assimilation and can improve learning and application affecting positive change.

Technological Pedagogical Content Knowledge

Designed to address the integration of content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK), the TPACK model addresses the convergence of these three components. As the gatekeepers to classroom instruction, teachers determine how these three components are woven together to create authentic learning. Researchers (Blau, Peled, & Nusan, 2016; Doering, Koseoglu, Scharber, Henrickson, & Lanegran, 2014; Koh & Chai, 2014; Koh, Chai, & Lim, 2017; Lehiste, 2015; Matherson, Wilson, & Wright, 2014) suggested that including TPACK in PD is a way to increase knowledge and actualize effective integration. The model offers a construct for each component where teachers can deepen their understanding and learn to integrate technology into instruction as a means of enhancing curriculum rather than just as a tool.

The TPACK framework has been found to enrich both teacher practice and confidence. Lehiste (2015) determined that TPACK training over the course of a year was effective in improving inservice teachers' perceived knowledge of the components, specifically TK and TPK. Koh and Chai (2014) and Koh et al. (2016) demonstrated a perceived increase in TPK knowledge with a small increase in confidence. Blau et al. (2016) and Doering et al. (2014) recommended long-term sessions with instructional scaffolding and coaching and administrative support to increase learning and implementation. Overall, teachers found value in the TPACK PD and demonstrated increased awareness in the components.

Project Description

The design of the technology development support plan will include 3 full-day training sessions with one to two staff meetings as needed in between each session and at the end of the year for reflection and collaboration with administration. During the 3-day training, teachers will be introduced to concepts of TPACK and the digital literacy framework. Content for TPACK and six digital literacy skills will be spread out over the first 2 days of training with reflection, peer sharing, and planning for next steps rounding out the final full day of training. In the interim between each training day, teachers and administration will attend at least one, two if necessary, 1-hour reflection meetings where peers will debrief and reflect on new technology pedagogical practices and discuss current challenges and necessary supports for continued success with administration.

The first 2 days of PD will follow a similar format of training with integrated work sessions. Day 1 of training will be broken into segments covering the introduction of TPACK, and overview of the term digital literacy and the first two digital literacy skills of the framework, photovisual and reproduction literacy. Each segment includes learning activities for teachers to internalize information and will be accompanied by a brainstorm and planning session where they can conduct further research and formulate planning ideas. Day 2 will review the final four terms of branching literacy, information literacy, socioemotional literacy, and real-time thinking skills. The second day will end with an introduction to a peer-sharing and problem-solving activity that will commence on the final day of training.

The third and final day of training will be a day of review, reflection, and collaborative planning. Beginning with a review of all components, the session will continue with a peer-sharing activity that allows teachers to share success and gather ideas to address challenges related to technology pedagogy. The day will culminate with a tech slam where teachers can share new technology applications with the large group and final session of collaboration with administration regarding next steps for the school to continue building site capacity.

The interim sessions between the full-day trainings and after the final session will be designated for teacher reflection on current progress, a needs assessment, and collaboration with administration. The duration of each session will be 45 minutes to an hour. A second meeting may be held if teacher leaders and administration determine the need. The goal of these sessions is to highlight progress in pedagogical shifts and to identify possible challenges and further support. These elements will be determined through peer sharing, teacher surveys, and collaborative group discussions between teachers and administration.

Potential Resources and Existing Supports

Several resources and supports are necessary to improve the success of the training and integration of new digital literacy skills, many of which exist at the site school. Ongoing school support includes access to computers/labs and the resources available through the Internet; continued access to Google Apps for Educators (GAFE); time to conduct further research and plan and reflect on lessons; continued support from curriculum coordinator and mentor coordinator; and access to other technology such as

SMART Boards, document cameras, and projectors. The opportunity to explore and purchase additional web-based resources, applications, and software should also be considered as teachers expand their knowledge and ability to integrate these tools.

One of the most important resources that must also be considered is time. As both a resource and support, time is a variable that is an often overlooked, but is necessary component for success on many levels. For teachers, time is a resource needed for researching new digital resources related to their discipline, as well as time to collaborate with peers to build lesson plans and to reflect on implementation. Administration needs to provide time as a support so teachers are able to follow through with their pedagogical shift.

Potential Barriers and Solutions

Several possible factors may impede progress of this pedagogical shift including meeting teachers' differentiated needs; teachers' attitudes and beliefs related to digital literacy and technology; and providing adequate time to support teachers in the shift. Every teacher brings a different technology background story to the field and these differentiated skills need to be considered and integrated into professional development. Planning and implementing differentiated PD and further coaching will require additional resources including time and personnel. In addition to experience, teachers bring a variety of mindsets, attitudes, and beliefs related to technology and student learning. This can hinder growth and progress if effort is not made to shift mindsets. The final challenge that may emerge is designating the time needed for PD, meetings, and coaching with the school's other competing priorities.

Proposal for Implementation and Timeline

The timeline for the technology professional development support plan is to begin implementation at the start of school and pace throughout the year. Each school is permitted 2-4 waiver days that they pace throughout the year. It is my recommendation that the three full-day sessions be paced using three waiver days occurring consecutively: August, October and March. Contingent on administrative support and approval, the short interim sessions will be scheduled after school as needed between waiver days for collaborating and coaching. Due to the extended months between second and third sessions, at least two interim sessions should be planned. After the final full-day training, one final short meeting should be scheduled in May for an end-of-year reflection.

Roles and Responsibilities

There are several different roles needed to implement the TPDSP including instructor, coach, participant, and administrator. As the instructor, I will be responsible for developing and implementing the three full-day workshops and assisting in the coaching to help teachers expand their digital literacy pedagogical practices. I will also be assisting administration in developing the interim sessions to help sustain progress. The role of coaches will be to assist during the PD and interim sessions with teachers who need and want more individualized assistance in designing and reflecting on lessons. Administration will have a dual role in participating in the full-day PD sessions as well as facilitating the teacher reflection and collaboration during the interim sessions. The individual participants in this plan will be responsible for a variety of roles including

active listening, participation, and collaboration as well as follow through with planning and preparing required materials for the sessions.

Project Evaluation Plan

The TPDSP will be evaluated using two different approaches, a professional development survey for the full-day sessions and a Google Form survey after collaborative discussion at the end of each interim session. The digital literacy skills professional development evaluation (Appendix A) administered to staff after each session will provide input from staff regarding content, learning, and areas of strength and growth. Information from the survey will be provided to administration for further analysis and used to continue building site capacity. A second evaluation will be conducted at the end of each interim session to measure teacher progress and administrative support to continue forward growth.

Implications for Social Change

Local Community

This project was designed to affect positive social change in the development of digital literacy skills at a local high school. As progress continues in the digital era, teachers must adapt pedagogical practices to make sure that students are prepared for their future. Participants identified challenges in transitioning current practices in curriculum, instruction, and assessment to include digital literacy skills. Creating a holistic plan that addresses professional development and additional administrative supports can help aid this transition. Providing time for teachers to improve their knowledge and skills can in turn lead to improved student learning. Although the targeted

population is centralized at one local high school, other high schools in the district can potentially benefit from the TPDSP since stakeholders in the community are similar.

Far-Reaching

In the larger context, the design of the TPDSP could possibly transform how schools approach integrating new digital skills and knowledge into teacher practice. Obtaining input from teachers at individual sites about their background knowledge and skills and combing that information with collaborative administration support can help schools create individualized implementation plans to meet their needs. Students, teachers, and administrators bring a variety of needs, experience, and skills to the learning environment. Addressing these needs on-site for in-service teachers in their professional environment may advance pedagogical practices affecting student learning.

Conclusion

Practitioners in the field are faced with the task of keeping pace with current educational practices. As in-service teachers, this presents challenges on many levels as they try to balance their daily responsibilities with assimilating and integrating new knowledge and skills. Research questions that guided this study were designed to gather information from in-service teachers associated with these challenges and current pedagogical practices related to digital literacy skills integration. Findings evinced that although teachers perceived technology and digital literacy skills as important to student learning, there was a gap in their knowledge and skill levels and ability to integrate these skills into pedagogical practices. Furthermore, teachers identified several challenges faced in integration and suggested several items for support. The resulting technology

professional development support plan is designed to address these identified challenges and provide supports.

Section 4 focuses on my reflections and overall conclusions from the project study. Topics discussed will start with project strengths and limitations, project development and evaluation, leadership and change, personal reflections and end with implications for the future.

Section 4: Reflections and Conclusions

Introduction

The intent of Section 4 is to provide discourse related to the strengths and limitations of the project and personal reflections as a scholar. Beginning with a discussion on the merits and constraints of the PD project, I will continue with an analysis of myself as a learner and leader. This will follow with the project's possible impact for social change and conclude with implications, applications, and directions for future research.

Project Strengths

Several strengths lie within the overall design and implementation of the TPDSP, as it was aligned to both the local problem and the findings of the study while addressing the fundamentals of effective PD. As identified by the local problem and study evidence, in-service teachers lack some of the foundational knowledge and skills needed to integrate digital literacy skills into pedagogical practices. The TPDSP provides a long-term, job-embedded structure where practitioners can engage in technology PD with underlying supports from administration and peers. This includes attention to collaborate and reflect with administration to evaluate current progress and determine next steps and additional supports. The plan also aligns with the components of effective technology PD as it incorporates time for teachers to explore, plan, collaborate, observe peers, receive support from coaches, and reflect on practices. The training, materials, and additional supports within the plan can be implemented immediately and are flexible to be paced over time as dictated by the need of the site school.

Limitations and Recommendations for Remediation

There were a variety of limitations associated with the study and project related to participants, possible researcher bias, and constraints related to conducting a case study. The first limitation regarding study participants was connected to sample size and student voice. The original construct of the focus group interviews called for three to five participants in each department. However, when it came time to conduct the sessions, only one group had four members with most only including one to two teachers. Also, there was no representation from the world language department. The low number of participants may be due to the timeline of the study and sessions as they occurred shortly before a scheduled break in the semester when grades and other state mandates were due. Many teachers expressed interested in participation, but were unable to due to competing priorities. In the future, consideration should be given to when the study is conducted related to competing teacher responsibilities.

Another limitation presented was that of possible researcher bias due to existing relationships with participants at the site school. As the onsite curriculum coordinator for the past 7 years, I have built both personal and professional relationships with many of the teachers on staff. I also believe that digital skill integration is important to address as educators to improve students' ability to thrive as they matriculate into colleges and/or careers. However, by being cognizant of these influences in my role as researcher, I was able to take the necessary steps to maintain subjectivity. This included incorporating the use of transparent communication with participants, member checks, a peer debriefer, and

a reflective journal. These protocols and self-checks increased personal awareness and encouraged continuous reflection.

The final limitation presented was that of the ability to generalize findings from this qualitative case study to a larger population. Based on the construct of a case study, generalizing findings is limited due to the boundaries applied in selecting the case including sample size, location, and time (Creswell, 2012; Merriam, 1998; Yin, 2014). However, that same construct allows for the investigator to gain a deep understanding of the phenomena and generalize to settings or people with the same priori conditions (Merriam, 2009.) Although results may not be applicable to high schools outside the district, the findings and the TPDSP may be useful for schools within the district from elementary through college.

Recommendations for Alternative Approaches

Although the TPDSP is one method of addressing the pedagogical shift, there are alternative approaches. If the school is unable to provide 3 PD days evenly throughout the school year, sessions may be offered in a different manner. Training may be provided up front at the beginning of the school year with short staff meetings for follow-up offered throughout the year. If needed, the PD session could also be offered on a pilot basis for a group of teachers at designated times throughout the year. Professional credit for reclassification or a stipend may also be considered an option for these teachers if possible. Another feasible option would be to divide the content of the PD into short, 1-hour sessions and provide training during after school meeting days. Regardless of the

method selected, the school must ensure that the administration collaboration and reflections session are incorporated into the plan.

Scholarship, Project Development, Leadership, and Change

Scholarship

Learning is a life-long process, at the heart of which is inquiry and curiosity, where a person is seeking new knowledge and skill. Wisdom is gained through the metacognitive experience of reflection on this learning with a growth mindset. Through this journey, assimilation and innovation occur. Learning, wisdom, and innovation converge to form scholarship. Although the definition of scholarship may be as simple as high-level learning, the word invokes much more and is personal on many levels.

My path on this scholarly journey has been full of straight and winding roads, detours, uphill battles, roadblocks, inspiring scenery, and a variety conflicting navigation signs as I raced to the finish line. Through it all, I have learned that diligence, perseverance, critical and innovative thinking, and flexibility are key factors to navigating the road to success. In research, an abundance of information to support any viewpoint is easy to find. A scholarly practitioner must pull from all these skills at any given time to evaluate, synthesize, and assimilate the information into a valid and meaningful construct. They must think critically to narrow the focus and validate and process research and findings. Additionally, it is wise to have passengers on this journey for discussing, supporting, processing, ideating, and innovating. Scholars must remember that they are not alone and to surround themselves with like minds for support.

Project Development

My role at the site school over the past 7 years has evolved from that of an English teacher to an accreditation and curriculum coordinator. The switch from students to teachers as my audience during the first years as curriculum coordinator was a struggle as I endeavored to create PD sessions that connected content with adult learning. Through a variety a personal learning experience ranging from professional training to peer and self-reflection, I was able to transform my pedagogy to meet the learning needs of teachers. There is a need for training over time with an emphasis on time for planning, collaboration and feedback, reflection, and peer sharing or presentations. During my tenure, I have designed and implemented both full-day and short training sessions. Combining this personal knowledge with research and new knowledge from the project study helped facilitate the PD design for this project. The resulting 3-day PD sessions with accompanying supports are a result of integrating new knowledge with prior experience and feedback from administration, the mentor coordinator, and fellow peer educators.

Leadership and Change

I have learned through experience as a parent and a practitioner that leadership is about being an inspiration to others. This means that actions, thoughts, behaviors, speech, and body language correspond the to the model that a person physically and mentally presents. To actualize any change, a person must demonstrate and exemplify what he or she wishes to see. This holds true from modeling behaviors like patience, skills like

collaborative dialogue, and pedagogy like teaching and learning strategies. Leadership is situational.

The strength in any school lies in its diversity. Like a puzzle, all stakeholders represent a different piece as they bring their diverse personalities and experiences to the learning institute. An effective leader empowers stakeholders to embrace areas of strength and grow as they collaborate to affect social change. Leaders facilitate change by building relationships, promoting collegiality, listening effectively, and encouraging the diversity that leads to innovation. Considering these characteristics from the perspective of an instruction leader, I need to continue to model these qualities to facilitate growth within the organization.

Analysis of Self as Scholar

Entering into this doctoral study process 6 years ago, I had preconceived notions about the characteristics of a scholar. As an educator and curriculum leader, I believe that I already embodied some of these qualities and this journey provided the venue to explore my boundaries and practice and enhance my skills daily. Everyday has been an exercise in learning, curiosity, challenge, growth, creativity, problem solving, integrity, and balance. Curriculum, instruction, and assessment are my passion, and I embrace the challenge of evolving with the trends in education. My goal is to empower teachers to be agents of change by providing them with the necessary tools, knowledge, and skills they need to engage their students in learning. To do this, I must continue to reflect on my practices as a scholar, expanding my own knowledge and skills.

Analysis of Self as Practitioner

As a practitioner, I am actively involved in the learning community as a student, a teacher, and a leader. In my quest for knowledge, I attend district meetings and optional PD related to my field to stay abreast of the evolution of state mandates and new programs. This information is integrated into staff meetings and PD sessions throughout the school year. In designing and implementing mini PD sessions for the school, I plan and facilitate meetings, conduct research, generate or create accompanying resources and training materials, and provide training. This experience as a doctoral study candidate has increased my ability to function effectively as a school leader and instructional coach as I integrate knowledge from my research and district trainings into PD meetings. This includes a new focus on reflection and evaluation of programs and process as I look toward the future as a curriculum leader.

Analysis of Self as Project Developer

Developing PD training and designing engaging curriculum and instructional materials is something I have thrived in. I embrace the challenge that lies in the research, conception, innovation, collaboration, implementation, and continuous improvement. I will continue to expand my knowledge and raise the standards of personal expectations in what I can accomplish. In developing the project for this study, I was able to stretch my skills as I worked to fuse prior experience and knowledge with new fundamentals. Although I realize that there will be something to learn and explore, I am confident that with a growth mindset I can continue to progress.

The Project's Potential Impact on Social Change

As educational facilities across the nation try to keep up with the evolution of technology, there is an increasing need to successfully integrate technology and digital literacy skills into curriculum, instruction, and assessment. In-service teachers bring varying levels of skills and knowledge related to the integration of technology into the classroom and determining school levels of support to affect positive change is one of the first steps in the journey. Fostering a technology-safe learning environment that starts by addressing teachers' need to intentionally shift pedagogical practices is a foundational key to initiating change. Providing effective training that meets teachers' learning needs can increase confidence, knowledge, and attitude, potentially increasing student knowledge and skills in preparing for the 21st century workforce. Another potential social impact is on administration. Creating an integrated approach that addresses administrative support and building school site capacity can create sustainability and address the change augmented by technology.

Although this project was originally designed to affect positive social change in the development of digital literacy skills at a local high school, the results may applicable to other schools within the district because the stakeholders in the community are similar. Participants identified challenges in transitioning current practices in curriculum, instruction, and assessment to include digital literacy skills. Creating a holistic plan that addresses PD and additional administrative supports can help aid this transition. Providing time for teachers to improve their knowledge and skills can lead to improved student learning. The results from the study could stand as a model for other local schools

on the island and throughout the state to meet the needs of teachers, administrators, and students.

Implications, Applications, and Directions for Future Research

Implications

The research and process of this project study influenced the local organization. As the enabling activities in the school's academic plan called for the integration of technology into instruction, PD on the Google Apps for Educators was occurring during the same year as this study. Participants involved in the project study were enthusiastic and intrigued by the interview questions and the concept of a digital literacy framework. Several requested more information and wanted feedback on instruction from the classroom observations. As this was not consistent with the study parameters, we agreed to broach the subject again after the completion of the project study. Additionally, the leadership team, principal, and several district personnel have inquired about the results of the study and are interested in the progress. The discussion generated and overall willingness to receive further guidance and instruction indicate that practitioners in the local setting are open to advancement in this field.

Applications

The research conducted and the resulting TPDSP are aligned with the local problem and needs. The focus of the project was to address teachers' needs as they shift pedagogical practice to include digital literacy skills. Based on the analysis of findings from focus group interviews, classroom observations, and documents provided for the study, the TPDSP will engage both administration and teachers in the discussion,

collaboration, and innovation needed to embrace change and evolve. Additionally, the plan is flexible, allowing the pace and structure of the meetings to be adjusted throughout the year as determined by practitioner reflection. This flexibility may also make the plan appealing to other schools in the district as well as the local college.

Directions for Future Research

As this qualitative case study was bounded by in-service teachers at a local high school, there are several implications for future research. The first branch would be to expand the research to include student voices from the local setting. At the receiving end of instruction, student input would be invaluable in providing insight as to interest, skill, motivation, and engagement. Additional data could also be gathered after an interval of digital skill integration to determine impact on student achievement and to gather further student input. Another research avenue to explore would be administration perception. Contribution from the administrative perspective would supplement the study, further strengthening the design of both PD and support. The convergence of data yielded from including the voice of both students and administrators would add another dynamic to any program created to affect change related to digital literacy skills integration.

Conclusion

Educators must choose to address the change within their circle of control. Change is often met with many emotions including fear, enthusiasm, anxiety, animosity, ambivalence, anticipation, joy, anger, and elation. Planning with attention to root causes of these emotions can alleviate or lesson the ability of these feelings to drive decision making. This is how research enters the equation. Building a plan of action through the

analysis of information assembled from critical research can lead to a cultural shift from within as the needs of the individuals are recognized, addressed, or met.

From an educator's perspective, both emotions and intellect must be considered in the attempt to mobilize a paradigm shift. This includes having a voice in the process. Engaging practitioners in the circle of inquiry during the transformation can serve to heighten commitment and willingness to participate. Ultimately, this is what the project study and resulting technology PD support plan can help achieve. The project was designed to address teachers' needs through a collaborative process, engaging them in scholarly practice to affect change. In due course, as the teachers begin to shift pedagogical practices leveraging technology, students will become more actively engaged and benefit both personally and academically.

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Appendix A: Technology Professional Development Support Plan

Technology Professional Development Support Plan

Introduction

The Technology Professional Development Support Plan is an integrated two-tiered approach to developing teacher's digital literacy skills and building the site capacity to maintain a technological pedagogical shift. The first tier of the Technology Development Support Plan (TDSP) is a holistic technology professional development approach that spans the school year and incorporates new digital literacy skill knowledge and instructional coaching while also providing time for teachers to collaborate with content area peers to develop lesson plans, observe peers in action and reflect after implementation. The second tier involves a collaborative process that aids administration in aligning technology routines and procedures school-wide to support teachers with access, monitoring, and continuous improvement with digital literacy skills and integration.

The first two days of training will enhance teacher knowledge of the Technological Pedagogical and Content Knowledge (TPACK) framework and the Digital Literacy Skills Framework. Time will be provided time teachers to collaborate, brainstorm and integrate digital literacy skills into lesson planning. The third and final day of training is designed as a peer sharing session for teachers to present successes and challenges with their digital literacy experience. This final session will also include time for determining next steps the integration process

Purpose

This Technology Professional Development Support Plan is designed to provide teachers an overview of the Technological, Pedagogical, and Content Knowledge (TPACK) framework connected with a Digital Literacy Framework with time for collaboration, planning, application and reflection.

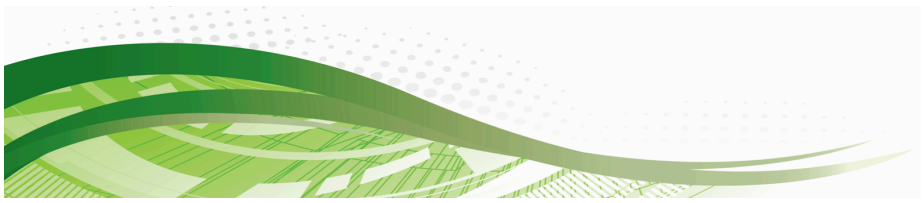
Goal

The goals of this Technology Professional Development Support Plan are to:

- Increase teacher knowledge and ability of integrating digital literacy skills into pedagogy
- Build site capacity of the school and sustain forward movement.

Participants

This professional development session was designed for school-wide participation of high school in-service teachers. It is open to teachers in any content area including all core subjects, elective courses, and special education and English Language Learner course.



Technology Professional Development Support Plan

Three-Day Objectives

1. Introduce the educational framework of Technological, Pedagogical, and Content Knowledge (TPACK)
2. Increase teacher's foundational knowledge of the Digital Literacy Skills Framework
3. Determine how digital literacy skills can be integrated into curriculum, instruction and assessment based on discipline specific content
4. Integrate digital literacy skills into lesson planning for an upcoming unit
5. Day 3 (During 4th Quarter): Participate in a peer sharing process: "Keep This, Solve This" related to digital literacy skill integration

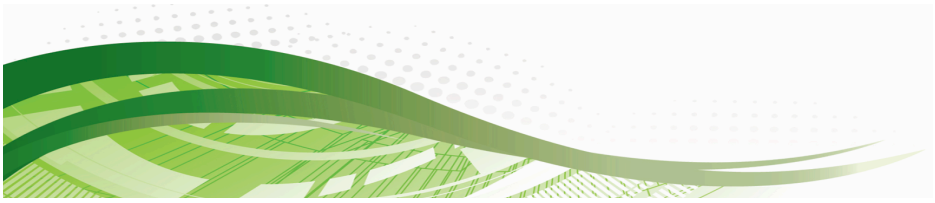
1-Hour Interim Session Objectives

1. Briefly highlight skills from the previous session
2. Celebrate success through peer sharing of lesson from each the skills addressed in the previous professional development session
3. Address & discuss feedback and commentary from the previous professional development Evaluation

Day 1	Day 2	Day 3 (During 4th Quarter)
1. Introduction to TPACK 2. Overview of Digital Literacy Skills Framework 3. Photo-visual Literacy 4. Reproduction Literacy	1. Branching Literacy 2. Information Literacy 3. Socio-emotional Literacy 4. Real-time Thinking Skills 5. Introduction to "Repeat this/Solve This"	1. Review of TPACK & Digital Literacy Framework 2. Repeat This / Solve This 3. Tech Slam (optional) 4. Determine Next Steps

1-Hour Interim Sessions

1. Review of topics from last session
2. Peer sharing of success and challenges
3. System support reflection



Technology Professional Development Support Plan

Day 1 Agenda

8:00 – 8:30 AM	Registration & Introductions Training Objectives & Expectations
8:30 – 9:30 AM	Introduction to TPACK
9:30 – 9:45 AM	Break
9:45 – 10:45 AM	Overview of Digital Literacy Framework
10:45 – 11:45 AM	Photo-visual Literacy
11:45 – 12:45 PM	Lunch
12:45 – 1:15 PM	Photo-visual Literacy Continued Brainstorm & Planning
1:15 – 1:30 PM	Break
1:30 – 3:00 PM	Reproduction Literacy Brainstorming & Planning

Day 2 Agenda

8:00 – 9:30 AM	Welcome Branching Literacy Brainstorm & Planning
9:30 – 9:45 AM	Break
9:45 – 11:15 AM	Information Literacy Brainstorm & Planning
11:15 – 12:00 PM	Socio-Emotional Literacy
12:00 – 12:45 PM	Lunch
12:45 – 1:30 PM	Socio Continued Brainstorm & Planning
1:30 – 1:40 PM	Break
1:40 – 3:10 PM	Real-Time Thinking Brainstorm & Planning
3:10 – 3:30 PM	Introduce “Repeat This/Solve This Closing

Technology Professional Development Support Plan

Day 3 Agenda (During 4th Quarter)

8:00 – 8:15 AM	Welcoming
8:15 – 8:45 AM	Review of TPACK and Digital Literacy Framework
8:45 – 9:30 AM	Review "Repeat This/Solve This" protocol Complete handouts
9:30 – 9:45 AM	Break
9:45 – 10:30 AM	Round One: "Repeat This/Solve This"
10:30 – 11:45 AM	Round Two: "Repeat This/Solve This"
11:45 – 12:45 PM	Lunch
12:45 – 1:15 PM	Tech Slam
1: 15 – 1:30 PM	Reflection
1:30 – 1:45 PM	Break
1:45 – 2:30 PM	Determine Next Steps
2:30 – 2:45 PM	Closing

1-Hour Interim Session Agenda(s) (as needed between full-day sessions)

Sample timeline for After School Session

2:00 – 2:15 PM	Opening & Review of Previous Skills
2:15 – 2:25 PM	Small Group Sharing of Successful Lesson
2:25 – 2:35 PM	Large Group Sharing of Successful Lesson
2:35 – 2:55 PM	Discussion & Reflection of Progress and Evaluation Feedback
2:55 – 3:00 PM	Closing

Technology Professional Development Support Plan (TPDSP)

Digital Literacy Professional Development & Administrative Support

TPDSP Purpose

Provide teachers and administration overview of:

- *An overview of Technological, Pedagogical, and Content Knowledge (TPACK) Framework and a Digital Literacy Framework*
- *Time for collaboration, planning, application and reflection.*

TPDSP Goals

- *Increase teacher knowledge and ability of integrating digital literacy skills into pedagogy*
- *Build site capacity of the school and sustain forward movement.*

Plan Overview

Day 1

- Introduction to TPACK
- Overview of Digital Literacy Framework
- Photo-visual Literacy
- Reproduction Literacy

Day 2

- Branching Literacy
- Information Literacy
- Socio-emotional Literacy
- Real-Time Thinking Skills
- Introduction to Repeat This / Solve This

Plan Overview Continued

Day 3

- Review of TPACK and Digital Literacy Framework
- Repeat This / Solve This
- Tech Slam (Optional)
- Determine Next Steps

Interim Sessions

- Review of topics from previous sessions
- Peer Sharing of Success & Challenges
- System Support Reflection

Objectives: Day 1-2

- Introduce Technological, Pedagogical, and Content Knowledge (TPACK)
- Increase teacher foundational knowledge of Digital Literacy (DL) Skills
- Identify how DL skills can be integrated into discipline specific curriculum, instruction and assessment
- Integrate DL skills into lesson plan to be implemented during 3-4 week interim

TPACK

Digital Divide

Digital Natives	Digital Immigrants
• Born into the world of digital technology • Native speakers of digital language • Parallel process & multitask	• Born before advent of digital technology • Non-native speakers of digital language • Learn to adapt to environment

Mishra, P., & Koehler, M. (2006).

Introduction to the TPACK Model

Video Link: www.commonsensemedia.org

TPACK - Terms

Turn & Talk

What do you know, or think you know about these terms?

Technological Knowledge
Pedagogical Knowledge
Content Knowledge

Mishra, P., & Koehler, M. (2006).

Technological Knowledge

- Understand information technology
- Beyond computer literacy
- Productively apply technology at work and in life
- Skills: Information processing, communication, problem solving
- Continuously evolving skills
- Open-ended interaction with tech

Mishra, P., & Koehler, M. (2006).

Pedagogical Knowledge

Teacher's knowledge about

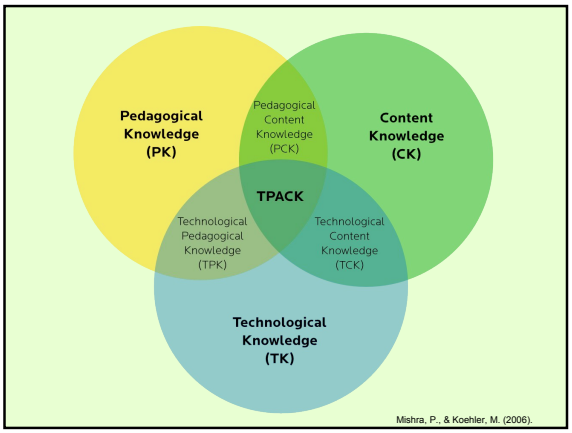
- The processes and practices of teaching and learning
- Educational aim, purpose, & values
- How students learn; target audience
- Classroom management
- Lesson planning & assessment

Mishra, P., & Koehler, M. (2006).

Content Knowledge

Teacher's knowledge about
- Subject matter to be learned or taught (grade or content level appropriate)
- Organizational frameworks, theories, concepts, etc. related to content
- Discipline specific fundamentals and nature of inquiry

Mishra, P., & Koehler, M. (2006).



Mishra, P., & Koehler, M. (2006).

The Blends of TPCK

Pedagogical Content Knowledge

Technological Pedagogical Knowledge

Technological Content Knowledge

Mishra, P., & Koehler, M. (2006).

Pedagogical Content Knowledge

- Teacher interpretation and manipulation of content
- Adaptation of instructional materials; multiple means of representation
- Links between curriculum, assessment and pedagogy
- Connection between students' prior knowledge, cross-curricular concepts, and teaching strategies

Mishra, P., & Koehler, M. (2006).

Technological Pedagogical Knowledge

- Understanding impact of technology on discipline
- Explicit selection of tech tools to enhance teaching and learning
-

Mishra, P., & Koehler, M. (2006).

Technological Content Knowledge

- Understand constraints and influence of technology on content
- Understand how application of technology can change subject matter
- Explicit selection of tech tools to enhance content
-

Mishra, P., & Koehler, M. (2006).

Plan a 20 - 30 second speech…

What is your current understanding of the blending of Technology, Pedagogical, and Content Knowledge?

What more do you want to know about related to this framework?

Digital Literacy Framework

Digital Literacy

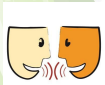
"The ability to use technical, cognitive and socio-emotional skills to understand and assimilate information in a digital environment"

(Bawden, 2001; Eshet 2012; Gilster, 1997)

20 Second Speech…

What essential skills initially come to mind when you think of this term?

Digital Literacy



Share with a partner not at your table

Digital Literacy Framework

Article Study

"Thinking in the Digital Era: A Revised Model for Digital Literacy"

By Yoram Eshet

"A◆B◆C Teach"

ABC Partners	Read	Summarize	Teach
• Designate who is A – B – C	• Read assigned section	• Summarize section • Provide example in classroom	• Take turns teaching your section to group

6 Key Terms

- Photo-Visual Literacy
- Reproduction Literacy
- Branching Literacy
- Information Literacy
- Socio-Emotional Literacy
- Real-Time Thinking Skills

Photo-visual Literacy

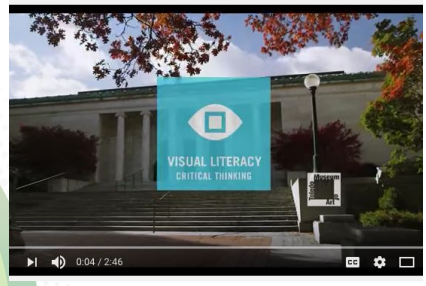
Photo-visual Literacy

"To read intuitively and freely, to understand the instructions & messages represented visually; having good memory and strong intuitive-associative thinking, which help decode and understand visual messages"

Eshet-Alkalai, 2004 & 2012

Various Visuals

Visual Literacy & Critical Thinking



Video Link: https://youtu.be/2jR8zWqyHBY

Various Visuals

- Advertisements
- Cartoons
- Charts
- Collages
- Comics
- Diagrams
- Dioramas
- DVD's
- Graphic Novels
- Graphs
- Icons
- Magazines
- Maps
- Memes
- Multimodal Texts
- Photos
- Pictograms
- Political Cartoons
- Signs
- Slides Shows
- Storyboards
- Symbols
- Tables
- Timelines
- Videos
- Websites

Visual Literacy Strategies

- Think-Alouds
- Visual Thinking Strategies
- Asking the 4Ws
- 5 Card Flickr
- Imagine Analysis Worksheets
- Step-by-Step: Working with Images that Matter

Content Brainstorm

What does this DL skill look like in your content area and how can you explicitly teach this skill?

Work Time

Integrate this DL skill into your curriculum, instruction and assessment

Reproduction Literacy

Reproduction Literacy

"The ability to create meaningful, authentic, and creative work or interpretation by integrating existing independent pieces of information"

Eshet-Alkalai, 2004 & 2012

The Basics of Reproduction Literacy

- Digital reproduction
- Synthesize information from multiple media sources
- New meaning or interpretation
- Increased rigor

Learning Assessment

- Formative or summative
- Project-based or Problem-based learning
- Differentiated
- Technology integrated
- Collaborative
- Assimilation of information into new product

Content Brainstorm

What does this DL skill look like in your content area and how can you explicitly teach this skill?

Work Time

Integrate this DL skill into your curriculum, instruction and assessment

Day 1 Evaluation

Please take a moment to complete the evaluation for today' session. Results will be shared during the first Interim Session.

Technology Professional Development Support Plan (TPDSP)

Day 2

Digital Literacy Professional Development & Administrative Support

Objectives: Day 1-2

- *Introduce Technological, Pedagogical, and Content Knowledge (TPACK) – Day 1*
- Increase teacher foundational knowledge of Digital Literacy (DL) Skills
- Identify how DL skills can be integrated into discipline specific curriculum, instruction and assessment
- Integrate DL skills into lesson plan to be implemented during 3-4 week interim

Overview
Day 2

Day 2

- Branching Literacy
- Information Literacy
- Socio-emotional Literacy
- Real-Time Thinking Skills
- Introduction to Repeat This / Solve This

Branching Literacy

Branching Literacy

"Using the hypermedia environment to construct meaning for 'associative, branching, and non-linear navigation through different knowledge domains'; multidimensional thinking; maintain orientation when navigating internet"

Eshet-Alkalai, 2004 & 2012

What challenges do you personally face when researching information on the internet?

Branching Literacy Skills

- Also "hypermedia" literacy
- Multidimensional thinking skills
- Abstract & metaphoric thinking
- Website navigation
- Sorting, storing, remembering important information
- Task and time management
- Means of communication & problem solving

Hypertext & Hypermedia

Video link: https://youtu.be/wTlEod3tQ2A

Content Brainstorm

What does this DL skill look like in your content area and how can you explicitly teach this skill?

Work Time

Integrate this DL skill into your curriculum, instruction and assessment

Information Literacy

Information Literacy

"The use of cognitive skills to evaluate and filter erroneous, biased and irrelevant information while trying to assimilate information and make new meaning"

Eshet-Alkalai, 2004 & 2012

Information Literacy Skills

- Effectively research and locate valid, relevant information
- Critically evaluate information & sources
- Filter irrelevant, erroneous, and biased material
- Synthesize select information into learner's knowledge and create new meaning

Information Literacy Instructional Concepts

- Website evaluation tools
- Effective research skills
- Avoiding plagiarism
- Critical thinking skills
- Reading & writing strategies
- Summarizing & paraphrasing

Content Brainstorm

What does this DL skill look like in your content area and how can you explicitly teach this skill?

Work Time

Integrate this DL skill into your curriculum, instruction and assessment

Socio-Emotional Literacy

Socio-Emotional Literacy

"Having emotional and analytical maturity to evaluate information, think abstractly and collaborate to share data and co-construct knowledge with others; also have a high degree of information and branching literacy"

Eshet-Alkalai, 2004 & 2012

Social-Emotional Skills

- Collaboration & communicate with peers
- Co-construct knoweldge
- Cyberspace and cybersecurity awareness
- Avoid "traps"
- Appropriately sharing data and knowledge
- Evaluate information

Socio-Emotional Instructional Concepts

Lessons to combine content with:

- digital citizenship
- self-management & awareness
- relationship building
- collaborative learning skills
- responsible decision making
- critical thinking
- tech tools for collaboration (blog, social media, GAFE, etc.)

Content Brainstorm

What does this DL skill look like in your content area and how can you explicitly teach this skill?

Work Time

Integrate this DL skill into your curriculum, instruction and assessment

Real-Time Thinking Skills

Real-Time Thinking Skills

"The ability to process simultaneous stimuli, split attention and react to a variety of information while executing specific tasks; respond to feedback in real-time; synchronize multimedia stimuli into new knowledge or product "

Eshet-Alkalai, 2004 & 2012

Real-Time Thinking Skills

- Process simultaneous stimuli
- Split attention & react appropriately
- Execute multiple tasks effectively & switch between tasks
- Respond to real-time feedback
- Synthesize information from multiple sources into new knowledge/product

Real-time Thinking Skills Instructional Concepts

Lessons that integrate content & technology such as:

- Online "games"
- Project based learning Collaborative group projects & learning
- Multimedia environment with multiple means of action, engagement & expression

Content Brainstorm

What does this DL skill look like in your content area and how can you explicitly teach this skill?

Work Time

Integrate this DL skill into your curriculum, instruction and assessment

Day 2 Evaluation

Please take a moment to complete the evaluation for today' session. Results will be shared during the next Interim Session.

Technology Professional Development Support Plan (TPDSP)

Day 3

Digital Literacy Professional Development & Administrative Support

Objectives: Day 3

- Participate in peer sharing process: "Repeat This / Solve This" and Tech Slam
- Determine next steps to continue building site school capacity for digital literacy skills integration

Repeat This / Solve This

Repeat This

What are your digital literacy success stories?

- Consider success w/any of the 6 DL skills
- Which one is most useful/replicable to peers to progress DL
- Be specific in details
- Don't forget to discuss the rocks in your path

Repeat This

Template Categories:

- Presenter
- Target/Objective Addressed
- General Description
- Nuts & Bolts
- Things to Watch out Far
- Participants

Work Time

Repeat This Protocol

Take Turns (per person)

Sharing Protocol

- 10 minutes to share w/questions
- Be specific –share details
- Be honest & useful

Listening Protocol

- Use note-taking tool
- Ask responsible questions
- Push for constructive conversation

Round 1: Repeat This

Small Group Sharing

- Assign Timekeeper
- 10 minutes per person
- Active participation

Solve This

Template Categories:

- Presenter
- Target/Objective Blocked
- General Description
- Solution Space
- Parting Thoughts

Solve This Protocol

Take Turns (per person)

Sharing Protocol

- 5 minutes to share
- 15 minutes for peer feedback
- Listen to grow

Listening Protocol

- Use note-taking tool
- Ask responsible questions
- Push for constructive conversation

Work Time

Round 2: Solve This

Small Group Sharing

- Assign Timekeeper
- 5 minutes per person
- 15 minutes peer feedback
- Active participation

Tech Slam

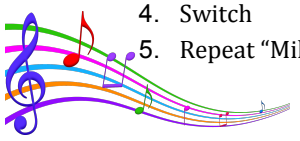
Tech Success

Consider all the new ways you have used technology since the first training. Write a brief description of your success story to share with a peer.

Milling to Music

(Sharing Protocol)

1. Stand & roam the room
2. When music stops…find your nearest partner
3. Partner A Share: Partner B Listen
4. Switch
5. Repeat "Milling to Music"



Reflection

3◆2◆1 Reflection

3 Things I Learned…

2 Aha's or insights

1 Question I still have

Ideas for next steps...

Determining Next Steps

Process

- Post-it Brainstorm
- List Group Label
- Summary Statements
- Organize Statements

Post-it Note Brainstorm

Individual

Write 2-6 post-it notes, each with a different idea for next steps

In silence…

◆List
◆Group
◆Label

1. First teacher lay out post-it notes – 1 per colored paper
2. Second teacher add/group – either on same colored paper or new colored paper
3. Repeat for each teacher until all post-its are sorted

Label & Summarize

1. Discuss categories (colored paper groups) and re-organize if necessary
2. Label/Title each group of post-it notes
3. Write a statement that summarizes the group of notes
4. Continue for each group of notes

Organize / Prioritize

1. Order the labeled groups numerical or by priority
2. Label/Identify the order
3. Submit to administration

Digital Literacy PD Evaluation

Kindra X. Sabado

Day 3 Evaluation

Please take a moment to complete the evaluation for today' session. Results will be shared during the next Interim Session.

Technology Professional Development Support Plan (TPDSP)

Interim Sessions

Digital Literacy Professional Development & Administrative Support

Objectives: Interim Session

- Briefly review key concepts from previous meeting
- Share successes and challenges in shifting pedagogical practices to include digital literacy
- Determine next steps to support the schoolwide shift

Key Concepts from Meetings

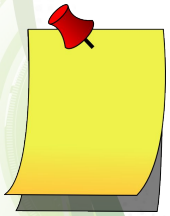
Day 1 Concepts

- TPACK
- Photo-Visual Literacy
- Reproduction Literacy

Day 2 Concepts

- Branching Literacy
- Information Literacy
- Socio-Emotional Literacy
- Real-Time Thinking

Review of Key Concepts



1. Select one concept from the last training and define in your own words
2. Be prepared to share your definition(s)

Table Sharing

1. Select one concept from the previous training
2. Briefly describe how you designed your lesson to integrate/address this new skill.
3. Identify a success or challenge you encountered

Share your responses with your elbow partner at the same table.

Group Sharing

Select a member of your group to share their example or an example from the table

Feedback from Evaluation(s)

Insert results from Day 1 Evaluation for discussion here

Additional PD

1.
2.
3.
4.

Additional Admin Support

1.
2.
3.
4.

Exit Pass

1. What are you going to investigate and attempt next related to digital literacy skills integration?
2. What immediate support do you need from administration to be successful?

Mahalo Nui Loa

Kindra X. Sabado

References

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Digital Literacy Skills Professional Development Evaluation

Day 1 Evaluation: Introduction to TPACK and Digital Literacy

Thank you for your participation in this Digital Literacy Skills Professional Development session. This evaluation will provide valuable feedback on the effectiveness of this three-day session and information will be used to make further improvements. Please complete the evaluation below for Day 1 of this training program. Results will be shared with you during the next Interim Session. Your input is greatly appreciated.

Content	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The objectives of the training were clearly defined.					
2. The content of the training was well organized and informative.					
3. The supplemental materials were relevant and informative.					
4. The facilitator was knowledgeable and organized.					
5. The facilitator was able to respond appropriately to my questions.					
6. The learning strategies during the training were useful in helping me process new knowledge.					
7. Objectives of the training were met.					
Learning					
8. The training helped me gain new knowledge and skills.					
9. The training enhanced my knowledge and understanding of TPACK.					
10. The training enhanced my knowledge and understanding of Photo-visual Literacy.					
11. The training enhanced my knowledge and understanding of Reproduction Literacy.					

Reflecting Day 1 training content and materials, do you have any comments or suggestions for the following?

Areas of strength:

Areas for growth:

Digital Literacy Skills Professional Development Evaluation

Suggestions for additional professional development:

What support to do you need from administration to successfully integrate digital literacy skills into your instruction?

Additional Comments:

Digital Literacy Skills Professional Development Evaluation

Day 2 Evaluation: Digital Literacy Continued

Thank you for your participation in this Digital Literacy Skills Professional Development session. This evaluation will provide valuable feedback on the effectiveness of this three-day session and information will be used to make further improvements. Please complete the evaluation below for Day 2 of this training program. Results will be shared with you during the next Interim Session. Your input is greatly appreciated.

Content	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
12. The objectives of the training were clearly defined.					
13. The content of the training was well organized and informative.					
14. The supplemental materials were relevant and informative.					
15. The facilitator was knowledgeable and organized.					
16. The facilitator was able to respond appropriately to my questions.					
17. The learning strategies during the training were useful in helping me process new knowledge.					
18. Objectives of the training were met.					
Learning					
19. The training helped me gain new knowledge and skills.					
20. The training enhanced my knowledge and understanding of Branching Literacy.					
21. The training enhanced my knowledge and understanding of Information Literacy.					
22. The training enhanced my knowledge and understanding of Socio-emotional Literacy.					
23. The training enhanced my knowledge and understanding of Real-time Thinking Skills					
24. Based on my new knowledge of TPACK and digital literacy skills, I will be able to successful shift some of my teaching practices.					

Digital Literacy Skills Professional Development Evaluation

Reflecting Day 2 training content and materials, do you have any comments or suggestions for the following?

Areas of strength:

Areas for growth:

Suggestions for additional professional development:

What support to do you need from administration to successfully integrate digital literacy skills into your instruction?

Additional Comments:

Digital Literacy Skills Professional Development Evaluation

Day 3 Evaluation: Review, Repeat This / Solve This, & Next Steps

Thank you for your participation in this Digital Literacy Skills Professional Development session. This evaluation will provide valuable feedback on the effectiveness of this three-day session and information will be used to make further improvements. Please complete the evaluation below for Day 3 of this training program. Results will be shared with you during the next Interim Session. Your input is greatly appreciated.

Content	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
25. The objectives of the training were clearly defined.					
26. The content of the training was well organized and informative.					
27. The supplemental materials were relevant and informative.					
28. The facilitator was knowledgeable and organized.					
29. The facilitator was able to respond appropriately to my questions.					
30. The learning strategies during the training were useful in helping me process new knowledge.					
31. Objectives of the training were met.					
Learning					
32. The training helped me gain new knowledge and skills.					
33. The "Repeat This" process was useful.					
34. The "Solve This" process was useful.					
35. The Tech Slam was useful.					
36. I would like more time to collaborate with peers and learn from how they have changed their pedagogical practices.					
37. Based on my new knowledge of TPACK and digital literacy skills, I will be able to successful shift some of my teaching practices.					

Digital Literacy Skills Professional Development Evaluation

Reflecting the three-day training, do you have any suggestions for the following? Information will be used to guide next steps.

I would like more examples and information about the following digital literacy skills: (Check no more than 2)

- TPACK
- Photo-visual Literacy
- Reproduction Literacy
- Branching Literacy
- Information Literacy
- Socio-Emotional Literacy
- Real-Time Thinking

Additional professional development suggestions:

Additional administrative support:

Suggestions to improve digital literacy skills integration into current practices:

Other Comments:

Appendix B: Digital Literacy Focus Group Interview Protocol

Problem: Teachers are not adapting pedagogy to effectively integrate digital literacy skills into authentic student learning.

Purpose: This qualitative case study will explore teachers' knowledge, perceptions, current practices and challenges related to integrating digital literacy skills in order to design a effective support plan.

Digital Literacy Literacy Skills: (a) Photo-visual, (b) Reproduction, (c) Branching, (d) Information, (e) Socio-emotional, and (f) Real-time thinking

Background of the Study

The purpose of this focus group interview today is to explore teachers' perception of digital literacy skills. This focus group interview sessions is designed to determine your perspective on a digital literacy framework and identify challenges and supports you may face in shifting pedagogy to address these skills. You have been identified as a participant for this group from a consent form previously submitted. Please keep in mind that this session is in no way evaluative. The primary goal is to explore your current knowledge and skills related to digital literacy and contribute to a greater body of knowledge. Participation is completely voluntary and all information will be held confidential. Once interviews have been transcribed, members this group will have the opportunity to validate comments and provide commentary.

Introductory Protocol

This interview session will last from 50 – 90 minutes. If time begins to run short, it may be necessary to re-focus discussion and push forward to complete the questioning. To aid in gathering and transcribing accurate information, audio recordings will be used. Once interviews have been transcribed, members this group will have the opportunity to validate comments and provide commentary.

Teacher Information: ***Please complete and submit the information below***

****

Number of year teaching: _____

Number of years at this school: _____

Are you a certified teacher? **Y / N**

Are you currently enrolled in a program to obtain your teaching credential? **Y / N**

Have you had any training related to technology in the past two years? **Y / N**

Focus Group Content Area: _____ Date: _____ Mtg length: _____

# of Participants: _____ Interviewed By: _____

Opening Questions

1. How may years have you been teaching at this high school?
2. How do you think education has changed since you first started teaching?
3. What, in general, comes to mind when you think of technology?
4. What do you believe is the role of technology in high school education?

Research Questions

Research Question
RQ 1: *What are the high school teachers' current level of understanding, knowledge, and skills related to digital literacy?*

We are going to begin with some exploratory questions so that I can gain a better understanding of your background knowledge.

5. How would you define the term digital literacy?

We are going to talk next about some key terms related to a framework for digital literacy. Based on your background knowledge and experience, please define the term to best of your ability.

6. How would you define the term "photo-visual literacy"?
    a. Probes: Does anyone want to add to this definition?; Does anyone have an alternate definition? (ask after each questions in this section)
7. How would you define the term "reproduction literacy"?
8. How would you define the term "branching literacy"?
9. How would you define the term "information literacy"?
10. How would you define the term "socio-emotional literacy"?
11. How would you define the term "real-time thinking skills"?
12. Has anyone ever attended any professional development related to any of these skills?
13. If so, have you applied any of this new knowledge into your curriculum, instruction or assessment?

Research Question
RQ 2: *How are high school teachers currently integrating digital literacy skills into curriculum, instruction and assessment across content areas?*

This next set of questions is related to how you are currently integrating skills related to the digital literacy framework into curriculum, instruction and assessment. To provide context, here is a handout that clearly defines each digital literacy skill. Please use these definitions as the base for your answers.

14. Please take a moment to review the definition for "photo-visual literacy"? Now that we have a clear definition of the term, do you believe that you currently address this in your curriculum? If yes, please describe. (If no for all participants, move on)
    a. Does your instruction address this skill? If yes, please describe.
    b. Does your assessment address this skill? If yes, please describe.

15. Please take a moment to review the definition for "reproduction literacy"? Now that we have a clear definition of the term, do you believe that you currently address this in your curriculum? If yes, please describe. (If no for all participants, move on)
   c. Does your instruction address this skill? If yes, please describe.
   d. Does your assessment address this skill? If yes, please describe.

16. Please take a moment to review the definition for "branching literacy"? Now that we have a clear definition of the term, do you believe that you currently address this in your curriculum? If yes, please describe. (If no for all participants, move on)
   e. Does your instruction address this skill? If yes, please describe.
   f. Does your assessment address this skill? If yes, please describe.

17. Please take a moment to review the definition for "information literacy"? Now that we have a clear definition of the term, do you believe that you currently address this in your curriculum? If yes, please describe. (If no for all participants, move on)
   g. Does your instruction address this skill? If yes, please describe.
   h. Does your assessment address this skill? If yes, please describe.

18. Please take a moment to review the definition for "socio-emotional literacy"? Now that we have a clear definition of the term, do you believe that you currently address this in your curriculum? If yes, please describe. (If no for all participants, move on)
   i. Does your instruction address this skill? If yes, please describe.
   j. Does your assessment address this skill? If yes, please describe.

19. Please take a moment to review the definition for "real-time thinking skills"? Now that we have a clear definition of the term, do you believe that you currently address this in your curriculum? If yes, please describe. (If no for all participants, move on)
   k. Does your instruction address this skill? If yes, please describe.
   l. Does your assessment address this skill? If yes, please describe.

Research Question
RQ 3: *What challenges do teachers currently face in effectively integrating digital literacy skills into authentic learning opportunities?*

20. Considering your content standards and discipline specific literacy, how do you see six digital literacy skills being integrated into your curriculum in the future?
   m. Instruction?
   n. Assessment?

21. Is there one digital literacy skill that seems more important or connected to your discipline than others?

22. In order to successfully shift pedagogical practice to address these six skills, what challenges do you currently face?

23. What challenges do you think your students face?

24. What challenges do you believe you may face in the future?

25. How do you think these challenges can be overcome?

Research Question
RQ 4: *What kind of support, knowledge, and skills do teachers feel is essential for them to initiate or advance their use of technology into curriculum to create discipline specific learning opportunities that build student's digital literacy skills?*

26. In order to successfully shift pedagogical practice to address these six digital literacy skills, what skills do you believe you may need?

27. How do you think these teacher skills can be developed?

28. What knowledge do need?

29. What other types of support do you think you may need?

Appendix C: Digital Literacy Observation Protocol

Problem: Teachers are not adapting pedagogy to effectively integrate digital literacy skills into authentic student learning.

Purpose: This qualitative case study will explore teachers' knowledge, perceptions, current practices and challenges related to integrating digital literacy skills in order to design a effective support plan.

Digital Literacy Literacy Skills: (a) Photo-visual, (b) Reproduction, (c) Branching, (d) Information, (e) Socio-emotional, and (f) Real-time thinking

Observation Content Area: _____ Date:_____/ Time: _____

# of students: _____

Setting (description):

_____

_____

_____

_____

Technology:

_____

_____

_____

_____

Visual (illustration):

Research Question

Research Question
RQ 2: *How are high school teachers currently integrating digital literacy skills into curriculum, instruction and assessment across content areas?*

Teacher:

Actions	Comments/Quotes	Reflective Thoughts

Students:

Actions	**Comments/Quotes**	**Reflective Thoughts**

Appendix D: Document Study Digital Literacy Skill Rubric

Content Area: _____ Date:_____/ Time: _____

Description of Digital Literacy Skills (Eshet, 2012)	Evident	Developing	Not Evident
Photo-visual Literacy Document provides evidence of opportunity for students to analyze visual media and understand instructions and messages within the visual.	Evidence of photo-visual literacy skill development is purposefully integrated into document	There some evidence of photo-visual literacy skill development in the document	There is no evidence of photo-visual literacy skill development in document
Reproduction Literacy Document provides evidence of opportunity for students to integrate and synthesize multiple independent information sources into an authentic, creative interpretation of work.	Evidence of reproduction literacy skill development is purposefully integrated into	There some evidence of reproduction literacy skill development in the document	There is no evidence of reproduction literacy skill development in document
Branching Literacy Document provides evidence of opportunity for students to practice non-linear navigation in the hypermedia environment to develop multidimensional thinking and construct meaning of information from various domains.	Evidence of branching literacy skill development is purposefully integrated into	There some evidence of branching literacy skill development in the document	There is no evidence of branching literacy skill development in document
Information Literacy Document provides evidence of opportunity for students think critically about information and evaluate it to identify bias, erroneous and irrelevant material to make informed decisions about assimilating new information.	Evidence of information literacy skill development is purposefully integrated into	There some evidence of information literacy skill development in the document	There is no evidence of information literacy skill development in document
Socio-emotional Literacy Document provides evidence of opportunity for students demonstrate information and branching literacy while collaborating with peers to share data, think abstractly and co-construct knowledge.	Evidence of socio-emotional literacy skill development is purposefully integrated into	There some evidence of socio-emotional literacy skill development in the document	There is no evidence of socio-emotional literacy skill development in document
Real-time Thinking Skills Document provides evidence of opportunity for students to process and react to simultaneous stimuli, switch between tasks, respond to feedback while creating and coherent product.	Evidence of real-time thinking skill development is purposefully integrated into	There some evidence of real-time thinking skill development in the document	There is no evidence of real-time thinking skill development in document

Appendix E: National Institute of Health Certificate

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Kindra Sabado** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 04/20/2013.

Certification Number: 1166610.