An Exploration of Teacher, School and District Leaders' Perspectives Regarding the Integration of Instructional Technology in an Alternative Middle School: A Descriptive Case Study

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An Exploration of Teacher, School and District Leaders’ Perspectives Regarding the Integration of Instructional Technology in an Alternative Middle School:

A Descriptive Case Study

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A Dissertation
Presented to
the Faculty of the Morgridge College of Education
University of Denver

———

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

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by
Lauren M. Kohl

August 2017

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Abstract

The promise of using instructional technology to enhance student learning has been a dream and a goal for more than 30 years. During these past few decades, the reasoning has shifted from providing word processing, to supporting information access, to preparing students to become global citizens in our continually evolving technological world. While many educators are successful in these endeavors, there is still a disparity across the spectrum of consistent, intentional technology integration for learning. This varies not only from school district to school district, but between schools within districts, as well as from classroom to classroom. There has been an exponential increase in the number of devices available to students, even more so recently due to online state assessment requirements. However, the mere availability and accessibility of devices does not necessarily correlate to technology use in classrooms, or increased student achievement.

This descriptive case study sought to explore educator perspectives regarding the integration of instructional technology in one alternative middle school. Through participant observations and interviews, several themes emerged answering this inquiry. The most prevalent themes included having purposeful/intentional use of technology with
a focus on content, being cognizant of the amount of students’ screen time and making sure there is balance, the importance of personal human connections, and ensuring an equitable, culturally responsive system where every student has access to technology.

However, perceptions of the realization of these themes differ based on the educator’s job role. Based on the evidence and discussion regarding this specific case study, the shared perceptions included a district-wide vision and intentional purpose for using technology to enhance content learning, a district-wide commitment to providing both technical and professional development supports, and a district-wide mission to provide learning environments that support students’ needs. Evidence also brought to light discrepancies between perceptions and the reality of equity and access for students, as well as how the alternative school students are included in the district’s mission to educate all students for the future.
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Chapter 1: Introduction

Background

In his 2009 address to Congress, President Barack Obama stated that education is the key to America’s economic growth and prosperity and to the United States’ ability to compete in the global economy (U.S. Department of Education, 2011). The National Education Technology Plan (U.S. Department of Education, 2016), asserts that technology can transform learning experiences, with equity and accessibility as a main focus. As explained in the National Education Technology Plan (U.S. Department of Education, 2011), America wants to develop inquisitive, creative, resourceful thinkers; informed citizens; effective problem-solvers; groundbreaking pioneers; and visionary leaders. “Thus, the new mission of schools is to prepare students to work at jobs that do not yet exist, creating ideas and solutions for products that have not yet been identified, using technologies that have not yet been invented” (Darling-Hammond, 2010, p. 2).

School leaders across the U.S. are faced with continuing pressures to improve student achievement, ever-shrinking budgets, and integration of 21st century technology and information and media literacy practices as described below. The Partnership for 21st Century Skills (P21, 2015) is a national organization whose mission is to support educators with tools and resources to ensure students are equipped with 21st Century Readiness. In 2008, the organization (P21, 2015) created a framework of 21st Century Skills, which in simple terms, defines 21st century skills by fusing the 3Rs (reading,
writing, and arithmetic) with the 4Cs (critical thinking and problem solving, communication, collaboration, and creativity and innovation). The framework also includes skills related to life and career as well as information, media and technology. Aside from some very slight changes since 2008, such as adding Economics and making a few updates to the English and World Languages key subject categories, the framework has essentially remained the same since its creation.


International Society for Technology in Education

Nearly 40 years ago, a group of K-12 and college educators joined together to create the International Society for Technology in Education (ISTE) as a means to change the landscape of learning with the support of technology (ISTE, 2017). In 1998, the group shared the first iteration of student standards which were focused on how technology tools could support student learning. An updated version of the student standards, the National Educational Technology Standards for Students (NETS-S) were
released in 2007, shifting the focus from tools to skills and expertise (Apple, 2007). ISTE (2016) recently revised student standards and launched the refreshed version at their national conference in June 2016. The new student standards shifted from actions students might take to characteristics of future-ready learning, which include Empowered Learner, Digital Citizen, Knowledge Constructor, Innovative Designer, Computational Thinker, Creative Communicator and Global Collaborator.

Since the 2008 release of ISTE’s National Educational Technology Standards for Teachers (Standards-T), schools have received additional pressure to bridge the gap between traditional teaching and technology-infused instruction, in an effort to graduate post-secondary ready, globally-competitive citizens (ISTE, 2008). Refreshed teacher standards (ISTE, 2017), now referred to as Educator Standards, announced at the 2017 ISTE conference include:

1. Learner – Educators continually improve their practice by learning from and with others and exploring proven and promising practices that leverage technology to improve student learning.

2. Leader – Educators seek out opportunities for leadership to support student empowerment and success and to improve teaching and learning.

3. Citizen – Educators inspire students to positively contribute to and responsibly participate in the digital world.

4. Collaborator – Educators dedicate time to collaborate with both colleagues and students to improve practice, discover and share resources and ideas, and solve problems.
5. Designer – Educators design authentic, learner-driven activities and environments that recognize and accommodate learner variability.

6. Facilitator – Educators facilitate learning with technology to support student achievement of the 2016 ISTE Standards for Students.

7. Analyst – Educators understand and use data to drive their instruction and support students in achieving their learning goals.

Each of these categories includes three to four indicators further defining the standards.

In order to incorporate 21st century teaching and learning models into current practices, school administrators must align a vision for school improvement with a strategic plan for implementation, training, funding and sustainability, while giving their teachers the tools and time they need to most effectively integrate technology (U.S. Department of Education, 2016). As a framework for this effort, ISTE launched Educational Technology Standards for Administrators (Standards-A), which included visionary leadership, support of a digital age learning culture, excellence in professional practice, systemic improvement and digital citizenship (ISTE, 2009). Administrator Standards include Visionary Leadership, Digital Age Learning Culture, and Excellence in Professional Practice, Systemic Improvement and Digital Citizenship (ISTE, 2017).

This descriptive case study explores educator perspectives regarding the integration of instructional technology for the next generation of learners.

The Future of Technology in the Classroom

Varian and Lyman (2003) assert that between 1999 and 2003, there was more new knowledge created in the world than the amount created during the entire history of man
prior to that time frame. Darling-Hammond (2013) notes that early twentieth century jobs requiring higher level thinking accounted for approximately 5% of all jobs, while 70% of today’s jobs require higher level thinking skills. Darling-Hammond emphasizes the importance of today’s schools providing students with the essential 21st century skills (frame, investigate, and solve problems using digital tools and information resources) in order to be qualified for the global workforce (Bellanca & Brandt, 2010).

Darling Hammond (2010) suggests:

Education can no longer be focused primarily on the transmission of pieces of information that, once memorized, comprise a stable storehouse of knowledge. Instead, schools must teach disciplinary knowledge in ways that focus on central concepts and help students learn how to think critically and learn for themselves, so that they can use knowledge in new situations and manage the demands of changing information, technologies, jobs, and social conditions (p. 4).

There is wide-spread agreement among researchers, including Christensen (2008), Darling-Hammond (2010) and Schlechty (2001); that instructional technology continues to rapidly evolve. Williams, Karousou and Mackness (2011) explain that there has been an exponential increase in the development and use of interaction and communication technologies such as blogs, emails, texts, and tweets, which have gone from zero to numbers in the billions in the past decade. Digital cognitive enhancement, provided by laptop computers, online databases, three-dimensional virtual simulations, online collaboration tools, PDAs, and a range of other context-specific tools, is a reality in every profession, even in nontechnical fields such as law and the humanities (Prensky, 2009, para. 5). Looi et al. (2009) discuss the access and use of lightweight, handheld mobile devices, more commonly referred to as “bring your own device” (BYOD) which affords
opportunities for personalized and differentiated learning. Similarly, Ackerman & Krupp (2012) offer suggestions to those considering a BYOD, bring your own technology (BYOT) or bring your own computer (BYOC) policy. The abundance of devices provides ample opportunities for enhancing K-12 instructional activities while enabling differentiated instruction personalized learning experiences.

Garza Mitchell (2011) defines instructional technology not as the tools or hardware, but the process that involves planning, implementing, evaluating and managing the use of technology to enhance teaching and learning. However, the pace at which technology advances can leave schools and administrators wondering how effective technology can be in supporting high-quality instruction (Butler & Sellbom, 2002).

According to Hauge, Norenes and Vedøy (2014), “The task of leadership in general, and leading colleagues in professional work in particular, requires careful planning and skillful orchestration of human, cultural and technological resources in schools” (p. 357).

**Technological Pedagogical Content Knowledge**

Technological Pedagogical Content Knowledge (TPACK, 2013) is one framework in which researchers identify the connections between technology, pedagogy and teacher content knowledge. TPACK grounds the use of instructional technology with a theoretical perspective (Mishra & Koehler, 2006). Hsu (2015) explains that the true value of TPACK is that it ensures more effective subject content instruction with consideration of pedagogical needs and use of appropriate technologies for accommodating students’ learning needs.
The TPACK framework allows us to make sense of the complex web of relationships that exist when teachers attempt to apply technology to the teaching of subject matter. Though separating the three concepts and their relationships may be difficult in practice, the TPACK approach helps us identify important components of teacher knowledge that are relevant to the thoughtful integration of technology in education (Mishra & Koehler, 2006, p. 1044).

Figure 2. Technological Pedagogical Content Knowledge Overview. (Reproduced by permission of the publisher, © 2013 by tpack.org)

**SAMR Model**

Romrell, Kidder and Wood (2014) explain that Dr. Ruben Puentedura created the SAMR framework in 2006 as a way to evaluate the level of technological adoption and use as it relates to learning activities in classrooms. SAMR stands for four levels of classification: substitution, augmentation, modification, and redefinition. The SAMR framework shows how technology adoption in education can move beyond the substitution of existing educational activities and assessment practices to create new
experiences previously impossible or difficult with prior technology (Cochrane, Antonczak, Keegan, & Narayan, 2014).

Figure 3. SAMR Model (PuenteDura, 2014).

Hamilton, Rosenberg and Akcauglu (2014) assert that despite its increasing popularity among practitioners, the SAMR model is not currently represented in the extant literature. They add that the SAMR model fails to address issues such as context, the dynamic nature of teaching and learning, and teachers’ understanding of the relationships between technology, teaching and learning (Hamilton et al., 2014). However, Jacobs-Israel and Moorefield-Lang (2013, p. 18) explain, “Together with the SAMR model, educators can effectively scaffold the necessary skills to take students through the stages of technology integration and adoption, helping them become creators of their own knowledge.”
**Next Generation Learning Vision**

In response to the need to prepare students for the future demands of society and the economy, to prepare educators with the means to create and maximize learning opportunities, and to ensure systems are in place to support these efforts, the Colorado Education Initiative (2016) created the Next Generation Learning Vision. Components of the Vision include learning environment characteristics that are: Personal and Personalized, Competency-Based, Co-Created, Safe and Healthy, and Time-, Talent-, and Technology-enabled.

**Culturally Responsive Education**

While the ISTE Standards (ISTE, 2017) and P21 Framework (P21, 2016) are constructed to thoroughly list and describe student outcomes, and the SAMR model similarly describes outcomes, neither of these models incorporate what the student is bringing to the learning process. However, the P21 Framework (P21, 2016) does speak to the idea of equity by suggesting that 21st century learning environments should “allow equitable access to quality learning tools, technologies and resources.” Singleton and Linton (2006) assert, “All students can benefit from a focus on equity because an equitable school system is one that works to address the needs of each individual child” (p. 46). Lindsey, Robins and Terrell (2003) suggest that for students to best learn, “They must feel appreciated as individuals, within the context of their own distinctive ethnic, linguistic, and socioeconomic backgrounds, and with their own particular gender, sexual orientation, and sensory and physical abilities” (p.15).
Stembridge (2015) defines Culturally Responsive Education (CRE) as a pedagogy for closing equity gaps because it seeks to engage students by drawing on their academic knowledge as well as their social and cultural identities. With equity as the goal, teachers backward plan using six Culturally Responsive Education (Stembridge, 2015) themes identified as Relationships, Asset-Focused Factors, Cultural Identity, Vulnerability, Rigor, and Engagement.

**The Pedagogic Core**

The Organisation for Economic Co-operation and Development (OECD, 2013) is an international organization whose mission is to promote policies that will improve the economic and social well-being of people around the world. The OECD has conducted research in a variety of areas, including 35+ years in the study of technology in education. The OECD (2013) states that innovative learning environments are comprised of four main components. According to Istance and Kools (2013), the Pedagogic Core, shown below in Figure 4, is like a circle as it involves linking relationships between the core elements over time. Compared to the TPACK (2013) Framework, The Pedagogic Core (Istance & Kools, 2013) includes Content, Teachers (similar to Pedagogy), Resources (similar to Technology), but with the added element of Learners, which are also the basis for the Culturally Responsive Education themes.
Figure 4. The Pedagogic Core: Elements and Dynamics (Istance & Kools, 2013).

Statement of Problem

This study brings to light one of the main issues facing the U.S. education system today: American schools, despite the billions of dollars invested in educational and instructional technology, have failed to evolve from 20th century teaching methods and practices. Teachers have implemented the use of computers in the most common-sense way—to sustain their existing practices and pedagogies rather than to displace them (Christensen, 2008). Through his research, November (as cited in Bellanca & Brandt, 2010, p. 277) found that students are often given the same assignments they received before the technology was implemented. Similarly, American schools are failing to graduate students prepared with 21st century skills to thrive in today’s global workforce, due to multiple complex issues including the achievement gap, inequitable educational resources, the changing landscape of global workforce requirements, lack of a strong national plan, and lack of support for our educators (Darling-Hammond, 2010).
The U.S. Department of Education (2010) asserts that the current education system is challenged with leveraging learning and modern technology to create engaging, relevant, and personalized learning experiences for all learners that mirror students’ daily lives and the reality of their futures. Additionally, the 2016 National Education Technology Plan highlights not only the Digital Divide, referring to the gap of Internet accessibility at home for many students, but also the Digital Use Divide in which student technology use ranges from transforming learning to completing traditional assignments with an electronic device (U.S. Department of Education, 2016).

Researchers (Christensen, 2008; Darling-Hammond, 2010; Schlechty, 2001) argue for the need to provide student-centric teaching, to make drastic and innovative changes to teaching methodologies, and to graduate students with the skills needed to be competitive in the future global workforce. In contrast to traditional classroom instruction, a classroom infused with instructional technology requires teachers to shift from a lecturer to a coach role and empower students to take control of their own learning (U.S. Department of Education, 2010, p. 8). The U.S. Department of Education’s mission is to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access (U.S. Department of Education, 2015).

**Purpose of Study**

The purpose of this study is to understand how leaders are implementing the shift from 20th to 21st century learning experiences. More specifically, this case study sought
to explore educator perspectives regarding the integration of instructional technology in one alternative middle school.

**Research Question**

The research question is:

1. What are the perceptions of educational leaders relative to the integration of instructional technology at one alternative middle school?
Chapter 2: Review of the Literature

Introduction

Students today are expected to graduate from high school prepared to be competitive in the global workforce with proficiency in 21st century skills (critical thinking and problem solving, communication, collaboration, creativity and innovation). Darling-Hammond (2010) explains that while these skills are not new, they were not envisioned for students in the early 1900s’ school system.

That system was based on the factory model then made popular by Henry Ford’s assembly line. The notion was that one could organize all of the facts needed into a set body of knowledge and divide it up neatly into the 12 years of schooling, doling out the information through graded textbooks and testing it regularly (Darling-Hammond, 2010, p. 4).

To compound the situation, Shields (2013) discusses the many challenges students and their families face such as homelessness, racism, health problems, and inequity. Shields’ (2013) asserts that it is the responsibility of educational leaders to educate all students for individual intellectual excellence, global citizenship, reflection and critical thinking around current issues, and with the ability to sort out fact from fiction.

Darling-Hammond (2010) adds that today the United States is faced with large race- and class-based academic achievement gaps, shrinking high school graduation and college participation rates. At a time when advances in science and technology fields are
fueling economic growth in other countries, U.S. students rank near the bottom of industrialized countries in math and science (Darling-Hammond, 2010). McLeod (2013) and November (2012) argue that now is the time for major innovative changes in the delivery of education, through the use of student-centric, technology-informed means.

The National Education Technology Plan (U.S. Department of Education, 2016) asserts that, through effective use, technology has the power to transform learning. “It can help affirm and advance relationships between educators and students, reinvent our approaches to learning and collaboration, shrink long-standing equity and accessibility gaps, and adapt learning experiences to meet the needs of learners” (p. 1).

The International Center for Leadership in Education created a Rigor Relevance Framework based on Bloom’s Taxonomy to examine curriculum, instruction and assessment (ICLE, 2016). Nearly a decade ago, a new set of 3Rs emerged: Rigor, Relevance and Relationships and became an essential part of teaching. According to McNulty and Quaglia (2007), without one of these three components, teachers will not be able to best prepare students for future success in school and in life. Sofo (2008) discussed a fourth R, Reflection, added to complete the continuous improvement cycle. Díaz-Rico (2014) adds that by 2025, 25% of learners will be initially classified as English learners, thus prompting additional discussions on innovative learning environments for all learners.

Search Description

To locate research studies to include in this synthesis, keyword searches were conducted using the Educational Resources Information Center (ERIC) database, the
largest educational database in the world. Initial searches were conducted with articles dating from 2000 to present. Subsequent searches were made with articles dating from 2010 to present, due to the rapid changes in instructional technology and related pedagogy. The searches included the following words and word combinations: educational technology, instructional technology, blended learning, digital learning, online learning, 21st century skills, 21st century teaching, 21st century learning, 21st century framework, 1:1 computers, 1:1 program, next generation, generation z, innovative learning environments, culturally responsive education, culturally responsive teaching, technology adoption, technology implementation and technology integration. Additional searches of the same keywords were conducted using Google Scholar.

Peer-reviewed, published research articles were located in journals such as: The Turkish Online Journal of Educational Technology; Journal of Technology, Learning and Assessment; Learning, Innovation & Tech; TechTrends; Journal of Technology and Teacher Education; Educause Quarterly; Journal of Educational Computing Research; Journal of Research on Technology in Education; Journal of Computer Assisted Learning; Technology in Education; Educational Technology; Educational Technology Research and Development; Educational Researcher; Technology & Learning; Distance Learning; Technology, Pedagogy and Education; American Educational Research Journal; and Educational Administration Quarterly.

Conceptual Framework

As a framework for the study, several 21st century learning frameworks were integrated into the TPACK (TPACK, 2013) model to show the complexity of the many
components involved in creating a 21st century or Next Generation learning environment. As shown in Figure 5 below, the conceptual framework incorporates the TPACK (2016), SAMR (Puentedura, 2016), P21 Framework (P21.org, 2016), and Culturally Responsive Education Themes (Stembridge, 2015). While we are nearly two decades into the 21st century, the researcher determined that 21st century teaching and learning has evolved over the past 17 years and the label “21st century learning” is outdated. Instead, given that the current generation of students is called the Next Generation (Posnick & Goodwin, 2015); the researcher is identifying the current learning environment “Next Generation Teaching and Learning”. In addition, the researcher has included Culturally Responsive Education (CRE) (Stembridge, 2015) as the foundational component of the conceptual framework, thus suggesting not only the importance of including students as a main element, but also that the CRE student-centered themes: Relationships, Engagement, Cultural Identity, Rigor, Vulnerability, and Asset-Focused Factors (Stembridge, 2015) are essential to support student learning in this environment. Based on this model, the Teaching Dimensions Observation Protocol (TDOP, 2016), an observational protocol was used during school and classroom visits to provide descriptive information. The TDOP focuses on instructional behavior and the use of instructional technology, which align with the Pedagogy, Technology and CRE categories in the conceptual framework. Observational data were collected on the TDOP template (see Appendix G) using the TDOP code bank (see Appendix H).
Today’s Learners

There is currently little research on Generation Z, also known as the Next Generation, however they are starting to get noticed. Posnick-Goodwin (2010) identifies Generation Z to be those born between the early 1990s and the early 2000s, current high school and undergraduate students who have lived entirely in a digital era. Sparks and Honey (2014), whose mission is to help organizations become more culturally relevant, published a report highlighting Generation Z’s common factors. According to the report, this group, aged less than 19 years old, makes up of approximately 25% of the population. In addition, they are entrepreneurial and responsible, use more anonymous
social media such as Snapchat, and have lived in a digital world their whole lives (Sparks & Honey, 2014).

Igel and Urquhart (2012) describe Generation Z members to be smarter, more self-directed and process information quicker than previous generations. Marron (2015) adds that members of Generation Z are inquisitive, globally aware, and feel obligated to change the status quo. In order to effectively teach, older instructors need to understand Generation Z (Marron, 2015).

21st Century Teaching

The National Education Technology Plan (U.S. Department of Education, 2010) suggests that the necessary 21st-century competencies (critical thinking, complex problem solving, collaboration, and multimedia communication) (P21, 2015) should be integrated into all content areas enabling students to adapt to our rapidly changing world throughout their lives. In 2010, the state where this study takes place adopted Reading, Writing and Communicating Standards that integrate 21st century skills and post-secondary workforce readiness competencies (Colorado Department of Education, 2015).

How we need to learn includes using the technology that professionals in various disciplines use. Professionals routinely use the Web and tools, such as wikis, blogs, and digital content for the research, collaboration, and communication demanded in their jobs. They gather data and analyze the data using inquiry and visualization tools. They use graphical and 3D modeling tools for design. For students, using these real-world tools creates learning opportunities that allow them to grapple with real-world problems, opportunities that prepare them to be more productive members of a globally competitive workforce (U.S. Department of Education, 2010, p. 9).

Educators can help students become digitally proficient by helping students learn with new technologies, with the teacher taking the role of guide, context provider, and
quality controller (Prensky, 2009). Boyer and Crippen (2014) explain that the educational community must collaborate to promote the advancement of teaching and learning while understanding that educational reform of this magnitude will take time, patience, and perseverance.

**Digital Learning**

Thirty years ago, Apple Classrooms of Tomorrow, a ten-year research study analyzing the impact of the use of technology in teaching and learning, sparked an educational shift (Ringstaff, Yocum and Marsh, 1996). The past few decades have seen a steady increase not only in 1:1 laptop programs, but in student-accessible technology worldwide (Dunleavy, Dexter & Heinecke, 2007). The focus has shifted from the use or type of technology to one of online, blended, or “digital” learning. Technology allows teachers to differentiate instruction more efficiently by providing a wider variety of avenues for learning that reach students of divergent readiness levels, interests and learning styles (Pitler, Hubbell, Kuhn, & Malenoski, 2007, page 3). Thoughtfully used technology can help educators deliver differentiated, individualized and personalized instruction (Bayse, 2014).

The broader digital learning landscape continues to develop as it incorporates new digital technologies and products as well as how these resources are used (Watson, Pape, Murin, Gemin and Vashaw, 2014). However, Watson et al. (2014) explain that state policies slow growth and adoption of digital learning, and seat-time requirements for student funding remain an impediment in many states.
Connected Learning and #Techquity

As recently introduced concepts, there is little research on Connected Learning and #Techquity; however, they are becoming popular topics of conversation on websites such as Educator Innovator, Connected Learning and Twitter. According to their report, Ito et al. (2013) explain:

Connected learning addresses the gap between in-school and out-of-school learning, intergenerational disconnects, and new equity gaps arising from the privatization of learning. In doing so, connected learning taps the opportunities provided by digital media to more easily link home, school, community and peer contexts of learning; support peer and intergenerational connections based on shared interests; and create more connections with non-dominant youth, drawing from capacities of diverse communities (p. 4).

Connected Learning (2016) suggests that today’s learning should be equitable, social and participatory, drawing on student interests, digital age connectivity, and inspiring mentors. Along the lines of equity, the term Techquity emerged during an impromptu discussion Joe Dillon, an Education Technology Coordinator in Aurora Public Schools, initiated on Twitter. In a blog (Educator Innovator, 2014) he explains:

A number of educators expressed interest in creating a hashtag focused on equity issues in educational technology, and having a twitter chat devoted to these issues. Before we got to the discussion we needed a snappy hashtag. In a flurry of tweets, we quickly eliminated #EdTechequity and #tequity as hashtags, the former because it had too many characters, the latter because it looked graphically too much like “tequila.” We settled on #techquity”.

Technology Resources

The use of technology in schools has grown in various ways during the past 20 years; public school internet access went from 35%-100% since the mid-1990s (Greenhow, Robelia and Hughes, 2009). Similarly, many schools implemented 1:1
device, such as laptops or iPads, programs. Dawson, Cavanaugh, and Ritzhaupt (2008) explain that common goals for laptop initiatives included supporting student achievement, shifting teaching practices to more student-centered, positively impacting the digital divide, and home-school connection improvement. Schools world-wide have implemented the use of iPads from preschool through college. Malone (2011) reported that Apple sold more than 19 million iPads since their launch, has an iPad education website, and offers over 140,000 apps through their iTunes store. Since the iPad popularity explosion, tablets have emerged from competitors such as Amazon, Google, HP, and Nook, each offering their own specific, proprietary app stores.

Inan and Lowther (2010) suggest that technology can be grouped into three broad categories: technology for instructional preparation (internet use for accessing online gradebooks and finding resources; creation of lesson plans, presentations, student assignments; and email for communicating), technology for instructional delivery (projectors or smart boards, PowerPoint or Prezi presentations, and YouTube videos), and technology as a learning tool (online applications, downloaded software, and search engines). Glover, Miller, Averis and Door (2004) explained that interactive whiteboards (IWB) provided an answer to some pupil disinterest because they offer bright presentation combined with flexibility as they enable the creation of electronic documents, activities, interactive calculators, maps, stopwatches, and video files of lessons for activity. IWBs are a viable alternative to online virtual technology which mirrors cloud computing without accessing the Internet. Colleges and universities have implemented the use of IWBs as teacher education programs recognized the need to
prepare teachers how to use the boards as well as their usefulness and efficiency (Blue & Ticotta, 2011).

Cloud computing and interactive whiteboards make it possible for learners to interact, simulate, collaborate, and document learning experiences and real world problem-solving (Blue & Tirotta, 2011). “Cloud computing” refers to the “large scale distributed computing paradigm…in which a pool of abstracted, virtualized, dynamically-scalable, manage computing power, storage, platforms, and services are delivered on demand to external customers over the Internet” (Foster, Zhao, Raicu & Lu, 2009, p. 1). Mousannif, Khalil, and Kotsis (2013) explain that some cloud providers, such as (G Suite) Google Apps for Education, offer a suite of free electronic services to educators and students which include email, calendars, document storage/creation/sharing, and website development.

Williams et al. (2011) explain that ICT has morphed into the social software of Web 2.0 and the augmented reality of cloud-based Web 3.0, changing beyond recognition, providing global open access at extremely low cost, for not only consuming, producing, and distributing texts and artifacts but for interaction, communication, and networking. Web 2.0 includes social networks, media sharing, collaborative knowledge development and blogs, such as Facebook, YouTube, Wikipedia, and Twitter (Greenhow et al., 2009). Williams et al. (2011) explain:

There is a need for a shift from a monolithic environment in which everything must be controlled and predictable to a more pluralistic learning ecology in which both prescriptive and emergent application domains and modes of learning have their place (p. 55).
Growth in K-12 online learning has exploded over the last decade (Horn, 2010). Initially it filled a need by offering advanced courses not offered in schools, a variety of courses not offered in rural areas, remedial courses students needed to pass to graduate, as well as home schooling opportunities (Horn, 2010). Blended learning opportunities began to increase as schools combined and online component with regular face-to-face instruction (Watson et al., 2014). The Christensen Institute (2013) identifies hybrid schools to be existing schools with new classroom models. The following graphic highlights several current popular models of blended learning:


The Flipped Classroom: A Blended Learning Model

The flipped classroom model was the brainchild of two high school science teachers from Woodland Park, Colorado, Jonathan Bergmann and Aaron Sams (Bergmann & Sams, 2011). They noticed that students were missing a lot of class time due to sports and activities. In their rural district, students spent much time travelling between schools for events; missing a lot of class time, many students struggled to keep up. Bergmann and Sams’ (2011) own words explain the impetus for change:

As we discussed the potential of such software (video recording a PowerPoint presentation) we realized this might be a way for our students who missed class to not miss out on learning. So in the spring of 2007, we began to record our live lessons using screen capture software. We posted our lectures online so our students could access them. When we did this, YouTube was just getting started and the world of online video was just in its infancy (p. 1).

Initially, the vodcasts, or video recordings of class lectures, were created to help students access the learning they missed during absences. This however, created a new problem as the as students realized they could skip class and simply watch the online lectures. The increasing student absences made the teachers reflect upon when their help was most needed. They determined they were most needed when students were struggling, not during lectures. It was at this point they decided to switch things around (Schaffhauser, 2009, p. 1).

Schaffhauser (2009) explained that students then were required to watch the videos the night before class, allowing the two teachers to support students as they worked on classroom assignments and labs. To accommodate for the various internet and
bandwidth challenges, the teachers burned videos onto DVDs or flash drives, allowing all students access.

Bergmann and Sams (2011) explained that in the initial flipped classroom model, videos replaced direct instruction, students got more one-on-one time to work with their teacher, and traditional class work (the lecture) is done at home via teacher-created videos and traditional homework (assigned problems) became class work. Over time, refining, and articulation, student/teacher interaction and personalized contact time increased. They (2011) found that students became more engaged and took responsibility for their own personalized learning.

**Flexible Instructional Days**

Pennsylvania’s Department of Education recently created a pilot program blended learning model which offers school districts additional options and flexibility in dealing with loss of instructional days due to severe weather (Pennsylvania School Boards Association, 2014). The Department (2015) explains that local education agencies may apply for the use of Flexible Instructional Days based on a number of criteria included in a thoroughly designed plan. As noted by Eller (2014), acting Pennsylvania Secretary of Education Carolyn Dumaresq explained that the 21st century American education system continues to adapt to and actively use technology for the delivery of instruction and educational materials. When students are prevented from physically attending school, the Flexible Instructional Days program provides schools the option of delivering instruction through the use of digital technology (Eller, 2014).
Instructional Technology Criticism

Williams et al. (2011) assert:

The debate on networks, connectivism, learner autonomy, and even emergence often has normative overtones as if these things are an end in themselves; the implicit assumption is that if only everyone had the Internet and everyone got connected to everyone else, learning would flourish (p. 41).

Similarly, November (as cited in Bellanca & Brandt, 2010, p.277) asserts that in the rush to incorporate technology, educators have lowered the quality of student work. Other opponents claim the lack of student growth as related to technology. Watson et al. (2014) explain that the research on digital instruction improving student outcomes is split; often times the data show a lack of significant difference in outcomes, or are insufficient to fully address the study.

Mills and Tincher (2002) suggest that technology should be as transparent as a pencil, meaning the focus in classrooms should be on teaching and learning as opposed to the technology. Similarly, Ferriter and Garry (2010) warn that while giving students the opportunity to use instructional technology is important, educators must realize that “21st century learning depends on nothing more than identifying the ways that new digital tools can facilitate authentic, student-centered experiences” with the skills many teachers have been using for years (Ferriter & Garry, 2010, p. 6).

According to McDowelle (2009), the concept of transformative leadership continues to evolve and remains a vital and important part of the current leadership literature. Shields (2013) asserts that our constantly changing, volatile, uncertain, complex and ambiguous world needs courageous, transformative leaders. She charges
these leaders with “responsibility to truly educate all students for individual intellectual excellence and for global citizenship...help them reflect on and act on critically important issues of our times...and sort out truth from fiction” (p. 9).

**Culturally Responsive Education**

Gay (2010) defines Culturally Responsive Teaching as “a means for unleashing the higher learning potentials of ethnically diverse students by simultaneously cultivating their academic and psychosocial abilities” (p. 21). Stembridge (2015) asserts that students who are most vulnerable to underperformance are supported best by instruction that deliberately designs learning experiences to leverage their assets, scaffold their learning, and bridge their academic and social identities. The themes of Culturally Responsive Education, which include Relationships, Engagement, Cultural Identity, Asset-Focused Factors, Vulnerability and Rigor, are the foundation for teaching and learning experiences that have the greatest potential for closing equity gaps (Stembridge, 2015).

**Adaptive/Change Leadership**

There are a multitude of books on educational leadership, each stressing the idea that change needs to occur. Most system change occurs as a response to disturbances in the system’s environment, internal or external (Fullan, 2004). Wagner, Kegan, Lahey, Lemons, Garnier, Helsing, Howell and Rasmussen (2006) explain that our education system was not designed to develop and equip students for today’s world, thus we need to rethink and redesign. Senge (2000) notes that schools can no longer prepare students to fit in a world of twenty years ago, as that world no longer exists. Heifetz, Grashow and
Linsky (2009) suggest that the need for change presented itself around the turn of the millennium as the world became a global society and all members must learn to collaborate and compete. As schools are expected to compensate for the shifts in society that affect children, Senge (2000) explains that effective school leaders seek to lead change to keep up with these demands.

Similarly, each of these authors, in addition to a multitude of others, created a formula to make change. Fullan’s (2004) five-part Framework for Leadership incorporates the leader’s ability to show moral purpose, understand change and the process of change, build relationships, create and share knowledge, and make coherence of the change journey. According to Wagner et al. (2006), change occurs when leaders create a vision of success, commit to the challenge, generate momentum for change, explore individual immunities to change, and relating the parts to the whole. Senge’s (2000) Five Disciplines, which include Personal Mastery, Mental Models, Shared Vision, Team Learning, and Systems Thinking, are his framework for supporting change. Adaptive leadership asks the leader to diagnose and mobilize the system, see oneself as a system and deploy oneself (Heifetz et al., 2009). While each of these leading change descriptions is very high-level, the general themes include identifying the problem, committing to the work, creating and sharing a vision, inspiring others and collaboratively working together to accomplish the difficult.

**Educational Leadership and Technology Implementation**

The National Education Technology Plan (U.S. Department of Education, 2016) discusses leadership as a main component, “Taking full advantage of technology to
transform learning requires strong leadership capable of creating a shared vision of which all members of the community feel a part” (p. 39). Hauge et al. (2014) explain that school leadership studies typically focus on the school principal. However, they explain that researchers should look at school leadership, which may also include teacher teams, department heads, and the teachers leading their classrooms. In every case, these leaders are facing similar challenges. According to Hargreaves (as cited in Bellanca & Brandt, 2010), educators are faced with four major change imperatives: developing 21st century skills for an innovative and creative economy, a social justice imperative to reduce inequalities the world over, changes in education to allow for technological solutions regarding future sustainable living, and producing a new generation of responsible, skilled leaders to renew the workforce.

Leadership is a crucial component to successfully implement change. According to Fullan (2004), no successful large-scale change or school reform effort has advanced without the support of school leaders. Continuous, committed, and active leadership that sets direction and develops vision and strategies is required for organizational change to succeed (Luo, Hilty, Worley & Yager, 2006). Educational leaders must understand and deliver the notion that technology integration is not about the technology; it is about leading the change in pedagogy by integrating technology to meet the needs of students (Afshari, Bakar, Luan, Samah, & Fooi, 2008).

Leaders are often charged with delivering technology implementation in the face of budget cuts. Overbaugh and Lu (2008) explain that to increase the availability of technology in schools, the Enhancing Education Through Technology (EETT) program
Schepers and Wetzels (2005) found that there is a positive relationship between transformational leadership and technology usage. They add that if a leader encourages creativity and open-mindedness, employees will be more used to experimenting with new technologies and procedure. In researching the impetus for change through innovative classroom practices, Wong, Li, Choi and Lee (2008) found that leadership and fostering a collaborative and innovative climate were fundamental to technology integration and pedagogical innovations.

**Change and Technology Integration**

Once a vision for technology use has been established, leaders must consider teacher readiness. Adoption or diffusion also can be characterized as a normal distribution or bell curve. Rogers’ (2003) research on innovation indicates that when implementing programs, about 2.5% of the staff will be innovators, 13.5% are early adopters, 34% comprise an early majority and 34% a late majority, with 16% called laggards (Butler & Sellbom, 2002, p. 23). While many teachers embrace new innovations, others resist it. Teaching with technology causes teachers to confront their established beliefs about instruction and their traditional roles as classroom teachers (Wentworth, 2006).
Lee (2006) explains that teachers need to reconsider a lifetime of habits, replacing or at least modifying their daily methods in order to integrate instructional technology into their practice. In his study, teachers were pushed beyond their comfort zone to consider how they could generate a higher degree of classroom interaction (Lee, 2006). Inan and Lowther (2010) found that along with computer availability, teachers’ readiness, beliefs and computer proficiency were the most significant factors in implementing effective technology integration.

In reviewing progress over the last 20 years, a study by Culp, Honey, and Mandinach (2005) found that teachers’ professional development is the most important aspect of information and communication technology (ICT) integration, and it has been repeatedly identified as top priority in education policies. As school leaders develop professional development regarding technology integration and pedagogical change, Ertmer (2005) suggests the consideration of ongoing stakeholder conversations, supporting small communities of practice, providing opportunities for demonstration classroom observations, gradually introduce new technologies, and a system for ongoing teacher support.

Once the vision, tools, and training have been established, then leaders must address sustainability. Glover et al. (2004) explain that to move from novelty to a culture of use, schools must develop a plan for resource management, available support for teachers, create an ongoing professional development program, and monitor effectiveness of the program.
Professional Development for Teachers

The expectation districts have for technology use and the way in which district personnel monitor teacher integration progress is one of the biggest challenges in any technology implementation. Schlechty (2001) explains that with a technological change, the work remains the same; it is how the work is done that is different. Teachers need more than workshops; teachers need opportunities to practice, observe, coach, and to be coached. Additionally, teachers must know what the expectations are regarding the new technology and leaders must provide the proper training and support. School leaders must stay abreast of the latest news and research surrounding the chosen technology tools.

Diaz et al. (2009) discuss the Net Generation (those born between the early 1980s and early 1990s) and Millennial students (those born between the early 1980s and early 2000s) revealing their differing characteristics, needs, learning expectations and styles, ideal learning spaces and supports. Just as student populations change, so do faculty members. Educators need ongoing support to keep up with an increasingly technological workplace and classroom.

Technology Adoption Process

Technology adoption is a process (Oncu, Delialioglu & Brown, 2008) that has been both difficult and time consuming (Burns & Polman, 2006). Rogers (2003) described the process as beginning with awareness of technology and ending with implementation and confirmation. While securing adequate resources may be a challenge in itself, school leaders must also assess technology needs, obtain appropriate products
and services, adapt the existing infrastructure if needed, and create an adoption plan to include training teachers why and how to integrate (Bleakley & Mangin, 2013, p. 20).

Oncu et al. (2008) explained that teachers’ characteristics and attitudes, as well as their school environment, affect the adoption process positively or negatively. The five criteria most affecting teacher technology integration included accessibility and availability, applicability, influence of colleagues, teachers’ skills/knowledge, and students’ skills/knowledge (Oncu et al., 2008).

Bleakley and Mangin (2013) found that integration was most successful when staff members could make connections between the use of technology and the vision for instructional improvement. Similarly, Cakir (2012) asserted that in addition to having a positive attitude toward innovation, school leaders must also encourage teachers and students to incorporate the innovations into learning.

**Conclusion**

For this study, the researcher investigated the use of instructional technology from inception, to implementation, to current practice. The case study positioned the researcher in the field to learn about the culture of the district, the school site, and participants, acknowledging personal bias, while ethically studying and reporting findings.

The expectations for 21st century teaching have changed, even since the beginning of the 21st century. The complex characteristics and needs of our learners have also changed. No longer will a one-size-fits-all model work. In addition to the advancements of technological tools, our student populations bring a wide spectrum of languages,
cultures, assets, interests, and needs. Our school leaders need to be courageous to lead equitable change efforts, embrace interconnectedness and global awareness, while supporting teachers in their role to develop skilled, educated world citizens.
Chapter 3: Methodology

Purpose of the Study and Research Question

The purpose of this study was to determine how leaders are implementing the shift from 20th to 21st century learning experiences. More specifically, this case study sought to explore educator perspectives regarding the integration of instructional technology. The research question was:

1. What are the perceptions of educational leaders relative to the integration of instructional technology at one alternative middle school?

Rationale for Case Study

A qualitative case study design was used to examine the current state of 21st century middle school learning environments in a medium-sized suburban school district. This design provided opportunities for the researcher to experience firsthand the culture of the district and school and their practices related to innovative teaching and learning. Denzin and Lincoln (2013) explain that qualitative research involves a set of complex interpretive practices as it places the observer in the world. More specifically, fieldwork is a way of seeing (Wolcott, 2008).

Creswell (2014) defines case study design as a qualitative approach in which the investigator develops an in-depth analysis of a case, bounded by time and activity, such as a program, event, activity or process. This discipline draws from philosophy,
psychology and education. Stake (1995) explains that case study is the study of the particularity and complexity of a single case. Commonly used to study psychology, sociology, political science, anthropology, social work, business, education, nursing, and community planning, Yin (2014) asserts that case studies contribute to our knowledge of individual, group, organizational, social, political, and related phenomena.

The case study is preferred in examining contemporary events, but when the relevant behaviors cannot be manipulated. The case study relies on many of the same techniques as a history, but it adds two sources of evidence not usually included in the historian’s repertoire: direct observation of the events being studied and interviews of the persons involved in the events. Again, although case studies and histories can overlap, the case study’s unique strength is its ability to deal with a full variety of evidence—documents, artifacts, interviews, and observations—beyond what might be available in a conventional historical study” (Yin, 2009, page 11).

The case study method was ideal as it provided one school’s account of its lived experience through the collection of evidence such as interviews and documentation. It provided the researcher the opportunity to uncover details from the participants’ actual experiences. The fieldwork for this study was completed over two weeks in the spring of 2017. During this timeframe, the researcher collected the following types of data: classroom observations, open-ended audio recorded interviews, and any relevant artifacts. Study protocols were developed and carefully followed to ensure that the researcher’s beliefs related to instructional technology and digital learning do not impact participant data or the analysis of that data.
Significance of the Study

Nearly 20 years ago, President Bill Clinton announced a transformative vision for computing in schools that included computers available to all students, interconnected classrooms, utilizing engaging educational software, and having technologically savvy teachers (Christensen, 2008). President Clinton’s first two mandates have been fulfilled for the most part, but the second two are slowly progressing. Christensen (2008) asserts that while schools have spent billions of dollars on technology, teaching and learning has largely remained unchanged. November (as cited in Bellanca & Brandt, 2010, p.278) asserts that educators need to determine which skills that we teach today will outlast future technology changes.

Several innovative blended learning models have developed over the past decade. One such model that weaves technology into the learning process is the flipped classroom. According to Gannod (2007) a flipped or inverted classroom model blends the use of technology with hands-on activities by replacing teacher lectures with in-class activities, such as laboratories. More simply stated, students view video class lectures as homework and traditional homework becomes in-class work. Student-centric learning combines content in customized sequences while integrating intelligence types and preferred learning paces and spaces (Christensen, 2008).

The findings from this research will inform state education departments, middle school classroom teachers and administrators, teacher and principal preparation programs, as well as school district leaders about how the Next Generation learning environments can be used to maximize learning and increase student engagement.
Sample

Through extensive networking with local metropolitan area school district technology leaders and 21st century learning organizations, one district was identified as a promising study location. On their website, Peakview School District self-identifies as leading the country in 21st century teaching and learning. Additionally, after initial visits and conversations with current and former district leaders, the researcher found significant support when proposing the research question and study methodology.

Peakview School District is medium-sized, serving a population of approximately 16,000 students as of the October 1, 2015 student count. Demographically, students are 73% White, 17% Hispanic, 4% two or more races, 3% Asian, 1% African American/Black, less than 1% American Indian/Alaskan Native, and less than 1% Native Hawaiian/Pacific Islander. The district’s student gender breakdown is 49% female and 51% male. The district’s K-12 free and reduced lunch eligibility percent is 18. The district employs 1,080 teachers, 81% female and 19% male, 77% White, 3% Hispanic, <1% two or more races, <1% Asian, <1% African American/Black, <1% American Indian/Native Alaskan, and 0% Native Hawaiian/Pacific Islander. Teachers’ average number of years of experience is 12, and nearly 80% of teachers have earned a master’s degree.

Peakview, which refers to itself as a premiere school district, prides itself on its longstanding tradition of excellence, having received the state department of education’s highest accreditation level for the past six years. Additionally, Peakview labels itself as a
destination district, drawing 20% of its students from outside of its boundaries. The district celebrates its staff, community, business partner, and volunteer involvement.

Instructional technology-supporting district, school and teacher leaders were the targeted participants for this study. Upon study approval, the researcher sent out recruitment emails to the district’s Director of Technology and the school principal. The researcher attended a district board meeting, at which a technology teacher/STEAM coach presented a variety of technology tools that she currently uses with students. The researcher wanted to include her in the interview process, and initially chose the middle school that she supports as the target study site; however, a different school accepted the research request.

Endeavor Middle School embraced the opportunity to participate in this study. Endeavor is an alternative middle school, serving approximately 80 students. Families opt-in to the program at their own will. The school provides a variety of teaching and learning approaches to meet the needs of their unique students. In addition to standard content area learning, Endeavor also provides mindfulness training, restorative justice, and social-emotional development in its programming. As part of the district initiative of 1:1 devices in middle school, all students have access to Chromebooks on a daily basis.

The recruitment email (Appendix C) highlights details of the study, asks for consideration for participating in the study, as well as the goal of observing and interviewing three same-grade classroom teachers and the technology teacher/coach. The method of interviewing classroom teachers, the technology coach, and district/school leaders was chosen as it provides opportunity for triangulation. Creswell (2014) explains
that the process of converging several perspectives from participants adds validity to the study.

**Data Collection**

Qualitative research involves the studied use and collection of a variety of empirical materials including interviews, artifacts, observations that describe routine and problematic moments and meanings in individuals’ lives (Denzin & Lincoln, 2013). Yin (2009) explains that qualitative study evidence may come from at least two of the following six sources: documents, archival records, interviews, direct observation, participant-observation, and physical artifacts. Similarly, Wolcott (2008) describes the three qualitative research categories as participant observation, interviewing and archival research. He later relabeled these activities as: experiencing, enquiring and examining.

The fieldwork for this study included all three. As Wolcott (2008) explains, experiencing is what is gained through participant observation, enquiring occurs by asking what is going on, and examining focuses on what has already been produced by others. The evidence collected should represent information about actual human events and behavior, not merely others’ perceptions and attitudes. Along with the data collected, the researcher should have a database in which to organize evidence as well as a chain of evidence connecting the questions, data and conclusions (Yin, 2009).

**Observations**

Yin (2009) explains:

Observational evidence is often useful in providing additional information about the topic being studied. If a case study is about a new technology or a school curriculum, for instance, observations of the technology or curriculum at work are
invaluable aids for understanding the actual uses of the technology or curriculum or any potential problems being encountered (p. 110).

Upon case study proposal approval, university IRB approval, and the school district granting research approval, the researcher requested opportunities to observe classroom instruction activities related to the Next Generation learning.

Stake (1995) explains that while observing, the researcher should thoroughly document the events to provide a relatively incontestable description, thus being useful in later analysis and reporting. The researcher collected field notes using the Teaching Dimensions Observation Protocol (TDOP) (TDOP, 2016). The TDOP was selected as it closely aligns with this study’s conceptual framework, capturing the nature of the learning environment. The TDOP’s six dimensions of teaching to be observed include instructional practices, student-teacher dialogue, instructional technology, potential student cognitive engagement, pedagogical strategies, and students’ time-on-task (TDOP, 2016).

Following the classroom observations, the researcher scheduled interviews with the observed teachers using questions from Appendix B, as well as interviewed school and district leaders using questions from Appendix A to gain their perspective.

Interviews

Interviewing is a dynamic process as it incorporates technique, ethics, theory, method, intuition, collaboration, and openness to vulnerability (Madison, 2012). According to Stake (1995), qualitative researchers pride themselves in incorporating multiple views of the case with the interview as the path to providing multiple realities.
Well-informed interviewees can provide important insights into such affairs or events, as well as the prior history of such situations, helping you to identify other relevant sources of evidence (Yin, 2009). Stake (1995) explains that the purpose of interviewing is to obtain description, linkage and/or explanation, not simple yes and no answers.

Given the nature of the study, a purposive sample of participants was selected. The researcher conducted three classroom observations and then interviewed each of the teachers observed. These teachers were suggested by the school principal due to their experience with instructional technology. In addition, the researcher interviewed three school/building leaders due to their willingness to participate in the study. These participants included:

- District Director of Technology;
- School Principal;
- District Technology Coach;
- Three classroom teachers.

The role of the district technology coach is multi-faceted. This position not only provides district trainings on a variety of technology-related topics, but they also provide 1:1, small group, large group, and school-wide professional development based on school and/or individual needs. In addition, the coach delivers trainings at state and national conferences. The technology coach also provides support via phone and blogs. This participant provided an interesting perspective as they have first-hand experience in seeing what is happening at the district, school and classroom levels.
Madison (2012) describes the interview as a window to individual subjectivity and collective belonging. The researcher conducted interviews with administrators and teachers at their places of work at a time at their convenience. Interviews were scheduled for no more than 45 minutes per person and lasted between 15-40 minutes. Interviews were audio-recorded with the researcher’s iPhone using the Voice Memos app. As soon as possible after each interview, recordings were transcribed. Participants were provided with an electronic copy of their own transcripts and were offered the opportunity to provide additional clarification as desired.

**Instrumentation**

As Yin (2009) suggests, the researcher created a list of substantive questions reflecting the actual line of inquiry. In essence, these are reminders to the investigator regarding the information to be collected and why (Yin, 2009). Through this lens, as well as based on the literature review, a list of interview questions was compiled. Yin (2009) explains that while the majority of data collected may be information from individuals, study conclusions cannot be based entirely on interviews. The researcher created lists of interview questions, targeted towards each of the participant categories (Appendices B-E).

**Archived document review**

For case studies, the most important use of documents is to corroborate and augment evidence from other sources (Yin, 2009). Wolcott (2008) explains any document that proves valuable as a source of information can rightfully be considered an archive. Prior to scheduled interviews, the researcher requested of the school principal
any available documents related to providing innovative 21st century/Next Generation learning environments. The researcher was provided with a copy of the school’s program information, but found little language related to technology. Content related to the district’s 1:1 initiative, technology take-home program, and the Student Code of Conduct were located on the district website.

**Confidentiality**

Upon committee approval of the study proposal, the researcher submitted the required documentation and information to the University’s Institutional Review Board. Upon receiving IRB approval and district approval to conduct the study, potential participants were contacted by email to explain the study and request their participation as stated in Appendix C, “Research Participant Request Email Template. As thoroughly explained in Appendix D, “University of Denver Social, Behavioral, and Educational Research Informed Consent Form”, participants were informed about the nature of the study as well as information related to confidentiality, data storage, and future use of data. Participants were also informed that participation in the study was voluntary and could be discontinued at any time.

**Data Analysis**

Yin (2009) explains that data analysis consists of examining, categorizing, tabulating, testing, or otherwise recombining evidence, to draw empirically based conclusions. The interview audio recordings transcriptions, as well as observational notes, were coded and categorized into emergent themes, using research software Dedoose. Saldaña (2013) defines a code in qualitative inquiry to be a word or short
phrase that symbolically assigns a summative, salient, essence-capturing and/or evocative attribute to a portion of language-based or visual data (p. 3). Coding was done in two phases: descriptive coding and pattern coding. Miles, Huberman, and Saldaña (2014) explain that descriptive codes assign labels to data to summarize in a word or short phrase, most often a noun, the basic topic of a passage of qualitative data (p. 74). In the second cycle, pattern coding was utilized. Pattern codes are explanatory or inferential codes that identify an emergent theme, configuration, or explanation (Miles, Huberman, and Saldaña, 2014, p. 86).

After interview transcripts were uploaded into Dedoose, the researcher created descriptive codes based on the conceptual framework as well as interview question categories such as Content, Pedagogy, Technology, ISTE Standards, P21 Skills, SAMR model, and Culturally Responsive Education. This provided a broad categorization of themes. The next step was to identify pattern codes. The researcher read the transcripts several times to identify more specific themes such as Equity, Learning Environment, Professional Development, Personal Connections, Teacher Initiative, and Teacher Desire to Learn. Dedoose provided a table with the most commonly occurring themes, listing the number of times each was identified in transcripts; however, this was the extent of the program’s analysis.

**Secondary Data Analysis**

Following the initial coding and theme identification, a separate and secondary analysis of the themes was conducted and associated with the conceptual framework of this study. Each of the conceptual framework’s main components, which include
Content/P21 Skills, Pedagogy, Technology, Culturally Responsive Education, SAMR, and the ISTE Standards for Students, Educators, and Administrators, were expanded to include their respective main sub-categories or elements and/or the themes that emerged from the initial data analysis, providing opportunities for deeper data categorization as shown in Figure 7 below.

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<tr>
<th>Content / P21 Skills</th>
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<th>Technology</th>
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<td>Core Subjects/standards</td>
<td>Critical Thinking</td>
<td>Problem Solving</td>
<td>Communication</td>
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<td>Access/Evaluate Use Info</td>
<td>Technology Use</td>
<td>Flexibility &amp; Adaptability</td>
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<td>Social/Emotional Skills</td>
<td>Learning Environment</td>
<td>Flexibility &amp; Adaptability</td>
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<td>Delineation</td>
<td>Desire to Learn/Iniative</td>
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<td>Rigor</td>
<td>Vulnerability</td>
<td>Equity</td>
</tr>
</tbody>
</table>

**Figure 7.** Conceptual Framework Sub-Categories.

This expanded look into the connections, or lack thereof, between the data and the conceptual framework provided interesting insights regarding participants’ perceptions.

The final case study discussed the essence of what the school district, school, and participants have done and/or experienced related to supporting and creating a learning environment that fosters the use of instructional technology for today’s learners.

Additionally, the case analyzed how teacher, principal and district leaders perceive their work, particularly in the alternative school setting, and the related implications. The
district’s website generally speaks to the work and achievements of their traditional schools, but fails to include discussions of these same topics at the alternative schools.

**Anticipated Limitations**

This study has several limitations. The original study design included research at a traditional middle school site; however, while the opportunity to participate was offered to the traditional middle schools, the alternative middle school volunteered to participate. Similarly, at the school site, the opportunity to participate in the study was offered to the teaching staff and those who volunteered took part in the study. Different results may have occurred had a traditional school, traditional school principal, and teachers participated.

Another limitation includes the data collection timeframe. Data were collected during a two-week period in the spring of 2017. A longer data collection timeframe may have offered different results. Each of the participants offered for the researcher to visit anytime. Had data collection occurred in other classes or at other times of the day or week, different results may have occurred.

Since the focus is on three teachers and their learning environments, results cannot be generalized to any other school or district. Similarly, with such a small, purposive sample population, the researcher only captured the lived experiences of involved leadership and teachers. Classroom observations were limited to one class period for each teacher.

Additionally, the researcher brings bias to the study. The researcher refrained from commenting during interviews, solely capturing the participants’ responses.
Standard qualitative designs call for the person most responsible for interpretations to be in the field, making observations, exercising subjective judgment, analyzing and synthesizing, all the while realizing their own consciousness (Stake, 1995, p. 41). Madison (2012) asserts that positionality is vital as it forces the researcher to acknowledge her own power, privilege and biases while denouncing the power struggles that surround our study participants. Yin (2009) explains that the traditional research assistant is not likely to introduce bias into the research and advises for the researcher to be open to contrary findings.

Each researcher brings with them her own assumptions, beliefs and experiences. French social theorist Pierre Bourdieu (1977) referred to this as habitus, which is characterized by a set of acquired sensibilities, dispositions, and schemata that have been culturally acquired as opposed to biological instinct (Madison, 2012, p. 16). Bourdieu (1977) describes the relation between the habitus as a socially constituted system of cognitive and motivating structures, and the socially structured situation in which the agents’ interests are defined, and with them the objective functions and subjective motivations of their practices (p. 76). Prior to the study, this researcher had worked at various education levels from preschool through undergraduate as well as in the telecom industry. The researcher has experienced technology integration first hand.

As a professional working within the field of study, the researcher recognized that her beliefs may impact the study. As a proponent of instructional technology, digital learning and transformative leadership, the researcher believes that each piece can work
together to positively impact innovative instruction and student achievement by enabling
differentiation and student-centered learning.

**Outcome of Study**

This research provides insight into a set of perceptions regarding environmental,
resource, and educator qualities and/or characteristics enabling the creation and use of
technologically enhanced learning environments, specifically in an alternative school
setting. The findings also show areas which are lacking connections to 21st century
teaching and learning frameworks. While the results of a case study are not
generalizable, they are transferrable. The learnings may provide educators a framework
for using knowledge, resources and mindsets to develop and prepare every student for the
transition into post-secondary global citizenship.
Chapter 4: Study Findings

Overview

While there are many opinions on the ideal and current states of the use of instructional technology in education, it is important to understand the actuality of this vision. The case study sought to explore educator perspectives regarding the integration of instructional technology in an alternative middle school. The question that guided this study was: What are the perceptions of educational leaders relative to the integration of instructional technology at one alternative middle school? Given the district’s self-labeling of “leading the country in 21st century teaching and learning” as stated on their website, as well as their vision and reasoning behind launching a 1:1 program at the middle school level, this study focused on the actualization of that plan, specifically in the alternative school setting.

Peakview School District originally launched their 1:1 program nearly a decade ago in all fifth grade classrooms. The program expanded up through the middle and high schools. Endeavor Middle School operated somewhat differently. Leah, the school principal explained that while devices have been available to students in classrooms for the past decade, they were not assigned to students until two years ago. Previously, laptops were stored on carts in each classroom and were used as needed, and now students carry and use their assigned device throughout the day. Endeavor also
implemented a policy that students would not take Chromebooks home unless a parent signed an access permission slip and students checked them out for specific purpose.

Initially, the researcher proposed to conduct the study at a traditional middle school site; however, the district’s alternative middle school accepted the opportunity to participate. In addition to the alternative school’s principal and three teachers, a district technology coach and the district director of technology all agreed to participate in the study. The original study design was to observe three same grade level teachers; however, given the small size of the school, most teachers taught classes in multiple grade levels. Also, the teachers that agreed to participate in the study included one math and two science teachers. The researcher observed each of the three teachers for a class period, and interviewed all six of the study participants.

Participants shared their knowledge and understanding during the interview process. Interviews were audio recorded, transcribed, and uploaded into Dedoose, a qualitative data analysis program. Additionally, teachers shared their classroom experience during direct observations. Classroom observations were documented using the TDOP code bank (TDOP, 2016), as shown in Appendix H, and data collection sheets to identify teaching and learning behaviors in the classroom. Miles, Huberman, and Saldaña (2014) assert that raw data must be processed to be prepared for analysis. They explain that coding is used to retrieve and categorize similar data, identify themes, and set the stage for further analysis and study conclusions. Following classroom visits, observational data were entered into the TDOP website, which provided a table of the frequency of codes observed, as shown in Figure 8 later in this chapter.
Participants’ Combined Data

As explained in Chapter 3, coding and theming of interview transcripts were processed using Dedoose, a qualitative data analysis program. Descriptive and pattern coding were conducted. First, initial codes were selected based on the main categories from the conceptual framework. Then, based on several readings of the interview transcripts, additional codes were identified based on common topics discussed such as professional development, equity, types of devices and resources. Through coding and analysis of the participants’ combined data, the following themes emerged:

- The instructional focus is on the content not on the tools, meaning technology use should be very intentional;
- There must be balance, specifically teachers and parents should be cognizant of screen time;
- Personal human interaction is essential;
- Equity and access are important factors.
- Teachers’ technology proficiency level;
- The learning environment;
- Parent supports.

Participants’ Disaggregated Data

The themes that emerged from the initial data analysis represented broad categories, so the researcher determined it would provide additional information to expand these categories to include their respective sub-categories, as shown in Figure 7 in Chapter 3. Secondly, data were sorted by teacher, principal, and district-level leaders to
identify themes between and among participants. The following sub-categories were most common across all participants’ interview data:

- **Content/P21 Skills**: Content is the focus not the tools, Student Technology Use;
- **Pedagogy**: Learning Environment, Teacher Flexibility and Adaptability, Teacher Technology Use/Proficiency;
- **Technology**: Technology Tools/Devices;
- **CRE**: No major themes represented;
- **SAMR**: No major themes represented;
- **ISTE-S**: Students as Empowered Learners;
- **ISTE-E**: Leader, Designer, Facilitator;
- **ISTE-A**: Visionary Leadership, Digital Age Learning Culture.

**TDOP Findings**

During the classroom observations, the researcher documented evidence using the TDOP. The purpose of using the TDOP was to focus on the characteristics and nature of the learning environment rather than judging or evaluating the quality of instruction (TDOP, 2016). The protocol enabled the observer to note a variety of codes categorized in six dimensions: Instructional Practices, Student-Teacher Dialogue, Instructional Technology, Potential Student Cognitive Engagement, Pedagogical Strategies, and Students’ Time-on-Task. The observation is coded in two-minute intervals, meaning every two minutes the observer marks the codes observed. In addition, the observer can
take observational notes, however this is challenging given the quick data collection timing.

Figure 8 gives an overall summary snapshot of all three classroom observations and the observed codes in each dimension.

Figure 8. TDOP Observation Overview.
While the TDOP only requires the observer to identify environmental characteristics by pre-determined codes, as shown in Appendix H, the researcher also took notes based on the classroom setup, type of lesson, materials used, and interactions to give a holistic view of what occurred during each class period. TDOP data provide an additional lens with which to corroborate or question interview data, which is discussed later in this chapter.

**Interactions with Participants**

Obtaining IRB approval was cumbersome as the university required school district approval prior to granting study approval and the district required university approval prior to granting access. Thus, the university provided a contingent study approval based on the receipt of district approval. The district granted access after receiving the contingent university IRB approval, and then the university fully approved the study upon receiving the approval letter from the district. The researcher forwarded the finalized university IRB approval notice to the district and was then contacted by the school district’s Director of Technology who connected the researcher with the principal of the participating school, as well as with a district technology coach. Introductory emails were sent to the three district leaders.

The researcher was invited by the principal to meet and see the school. The school is located in a quiet neighborhood with a picturesque mountain view setting. A child care facility is directly across the street from the school. The School Resource Officer’s (SRO) district security vehicle was frequently parked in front of the school. Each of the secondary schools in the district employ an SRO to assist with behavior and intervention
supports, as well as being available in the event of an emergency. Upon arriving at the entrance, visitors were required to push a button to notify the office and gain access to the school. The researcher checked in with the school secretary, who was the only staff member in the office. A student, who was filling out a reflection form in the waiting area, was also present. The principal arrived, introduced herself, and offered a tour of the school.

Endeavor has a familial atmosphere. As we walked around, the principal greeted each person we came to and introduced me to both staff and students. She explained my role as a visitor and researcher, and everyone acknowledged and then went about their business. Staff welcomed me to visit anytime. Everyone is on a first name basis, including students and adults. We visited the gym, the cafeteria, and most of the classrooms. We also saw a decompression room where both students and staff could go to calm down. It featured a variety of things like quiet music, aromatherapy, comfortable chairs, and dimmed lighting. The principal explained that the decompression room is unique to the school; however, other schools in the district are interested in replicating it at other sites.

In addition, to support the social emotional needs of students, Endeavor’s entire staff received professional development in restorative practices, Discovery training, building relationships, gang-related information and supports, as well as agreed upon common language for discipline. Other available training included relaxation and meditation techniques, yoga for youth, and brain breaks to help students transition from lunch back to the classroom.
Next to this area were a few more classrooms which housed an entry transition program for new students to the building. My host explained that the building also housed the alternative high school, but we did not visit that area. After our tour, the principal asked if the school would work for the study, to which the researcher acknowledged.

The principal explained that she made an announcement about the study at a staff meeting and asked if anyone would be interested in participating; several teachers responded affirmatively. She forwarded the names of willing participants to the researcher. The researcher sent out introductory emails to three teachers and upon receipt of interest from participants via email, consent forms were then sent to participants. Following receipt of signed consent forms, appointments were made for both classroom observations and interviews. Data were collected over two weeks in the spring of 2017. Interviews were held in the offices and classrooms of the participants and varied from 15-45 minutes, depending on the extent of the participants’ answers to interview questions. Classroom observations averaged 45 minutes in length, and all teacher interviews occurred directly following classroom observations.

All of the participants were inviting and hospitable to the researcher and supportive of the study, many saying that the researcher was welcome to visit anytime. Additionally, all participants seemed passionate about their work and school and were eager to share their responses.
Jordan’s Classroom

Jordan is an energetic, third-year middle school science teacher, who self-identified as a “techie”. He teaches in a transitional classroom to previously expelled and/or at-risk students who are just entering the alternative school program. According to the handbook, the program provides both rigorous academic curriculum, as well as strong social-emotional supports, and is designed to meet each student’s individual needs. The mission of the program includes supporting a purposeful community, building meaningful relationships, providing an engaging learning environment, and focuses on academic and personal success.

Jordan’s classroom was fairly small with three tables arranged in a U-shape facing a whiteboard with a projector. The researcher sat in the back of the room at a small desk. On the day of the observation, five students were present. The goal of this particular class was the explanation of the transfer of energy. Jordan presented the researcher with a copy of the investigation sheet titled, “Energy Transformations on a Roller Coaster”. The majority of the 40-minute class included a lot of interactive conversation between the teacher and students, and also student-to-student. Student attention spans were short; however student engagement remained high during the lesson. Jordan kept them on task with a lot of redirecting, humor and emphasizing important points. After some lecturing, the teacher demonstrated the lesson’s concepts by showing students how a marble moved along a ramp, which resembled part of a miniature roller coaster track. The height and slope of the ramp were altered a few times. Students were able to interact with one another and make predictions during the demonstrations. Technology use was minimal,
however Jordan used an iPhone to video record the marble as it moved along the “roller coaster” ramp in slow motion. Students made predictions and then discussed their findings.

**Sophie’s Classroom**

During the visit to Sophie’s classroom, an 8th grade math class was in session, a course she has been teaching for nine years. Her classroom is set up with two rows of tables facing one another, with a dry-erase white board at one end of the room and a Smart Board, one type of interactive white board, at the other end. The researcher sat at the far corner of the room at one of the connected tables.

The goal for this particular lesson was for students to write multiple equivalent expressions for a swimming pool perimeter. Sophie presented the researcher with a handout that asked students to calculate the number of tiles it would take to create a swimming pool border. Students were to create a Google Drawing using Virtual Graph Paper to complete the assignment. On the day of the observation, eight students were in attendance. Sophie briefly modeled the lesson on the Smart Board, demonstrating how students could use the digital tools to complete their work. Questions were posed to students and there were student-to-teacher and peer interactions throughout the class. After the demonstration, students opened up their Chromebooks and began their assignment. Sophie checked in regularly with students and occasionally sat between two students offering support. The class lasted about 30 minutes.
Reise’s Classroom

Reise is a middle school science teacher who has been teaching this course for the past three years. The classroom is a science lab with tall tables arranged in three rows facing the front of the room. The room’s perimeter was filled with an array of investigative materials including a couple glass tanks with a variety of creatures.

Upon arriving to the classroom, Reise was leading the class of nine students in their “morning circle”. This was an opportunity for students to share how they were doing social/emotionally and their prediction for how engaged they thought they were going to be that class. After the check-in, students moved to their tables.

Reise’s class had the highest and most diverse use of technology of the three observed. Students signed in to Google Classroom to access a graphic organizer, and then they watched a movie on eclipses on the Smart Board at the front of the class, with much interactive discussion throughout the course of the 40-minute class. Students were highly engaged as they moved between their graphic organizer, watching various content related video clips, completing an exit ticket, and participating in a game show-like quiz on Kahoot! One student shared his exit ticket on the Smart Board near the end of class.

Presentation of Study Findings by Themes

The personal accounts of all of the participants revealed a commitment to their students and community as well as the need for a well-rounded educational experience, both academically and social-emotionally. While all participants spoke of the need for students to have access to technological tools, the larger focus was on the 21st century
skills needed to be successful throughout their education and life, specifically critical thinking and problem solving.

As the conceptual framework was developed from the TPACK (TPACK, 2013) model, Technology, Pedagogy and Content were major categories, with multiple sub-categories as shown earlier in Figure 7. Other leadership and environmental factors were also present throughout the study. Similar to the conceptual framework, most categories/themes did not exist in isolation; instead they exist as part of an intertwined system.

Excerpts from interview transcripts are organized and discussed below based on themes. Participant names have been changed into pseudonyms to protect their identities.

**Instructional focus is on the content not on the tools.**

District leaders shared a firm commitment to and vision for the intentional use of technology for learning. Director of Technology Kevin, explained:

It’s pretty clear that technology when purposefully deployed with intent in instructional context it works. So that’s always been our model. You can’t throw kids and devices in a room and think it’s going to be great; it’s intentionality, context, and clarity of expectations.

District Technology Coach Tawnie, confirmed that vision while adding the content focus:

I can only speak to obviously this district, I'm not speaking to generally what happening in education, but I think that here, our focus is always the content standards and we try not to get distracted with the tech. And when we implement
technology here in the district, it's always how does technology support what you're working on.

Similarly, science teacher Jordan stated, “Kids understand technology, so when you can implement it well it engages them in a different way.” When thinking about intentionally planning with technology in mind, Reise, a fellow science teacher, shared:

I have to look at them and see if they are going to increase efficiency in the classroom or add something to it, are they going to help students, and is it going to help with like organization and having students being able to get something done. So I don’t just add everything that comes along.

Expanding on the district’s expectation for instructional technology use, Kevin explained:

Our district will never say to its teachers or students “You need 45 minutes of technology a day. Or you should be on your computer five times a day.” We trust our teachers to build it into the most instructionally valid environments. Having said that, I can’t picture a world where kids aren’t using devices ubiquitously for the rest of their life. So a teacher who ignores all digital pieces is doing a kid a disservice.

**ISTE Standards for Students.**

While none of the participants explicitly named ISTE Standards (ISTE, 2016) as something they intentionally addressed in their lesson planning, many of the themes (Empowered Learner, Digital Citizen, Knowledge Constructor, Innovative Designer,
Computational Thinker, Creative Communicator and Global Collaborator) were discussed in various ways.

Jordan highlighted Empowered Learner, Digital Citizen and Knowledge Constructor:

The second piece of that Next Generation student, as far as technology is concerned, is using internet properly and safely. And I’m not necessarily talking about like sites that you could get on that are inappropriate, I’m talking about the things that they see pop up on Facebook like “This was just discovered.” Well no it was not. And I can’t tell you how many times a day I get hit with fake facts that they read off of Facebook or Twitter or whatever, YouTube. “Well, no I saw it on this!” What was the source? And so at the end of every year, right before summer, I teach a segment that’s not in any of the standards that is just on wading through the bogus of the internet. Check your sources, be inquisitive, be skeptical to a healthy degree, and try to play off of that innate skepticism that teenagers have and applying that to the things that they’re bombarded with 100X and hour when they’re on social media. Is it true, who said it, what was their bias, how can you tell a good source from a bad source? I would love to see that get implemented, not just in science, but throughout all aspects of school. How do we find credible information? I think history classes do it the best out of any subject because they teach about primary sources and things like that as part of their curriculum. I wish more standards had that integrated into them.
Math teacher Sophie, explained how students are Computational Thinkers and Knowledge Constructors:

I think having open-ended prompts and questions to getting students to think about a problem and then seeing where different students go with it, and then leading them through questioning back to kind of where you want them to get to in the end. But I think open-ended questions get kids more excited, that are accessible to every student regardless of where they are cognitively, how much they know about math.

Tawnie added the opportunity for being a Global Collaborator:

Even those Next Generation learners, I think some of the basics of being a good reader, knowing how to write and express your thinking, being good with math and understanding...we always seem to think this Next Generation learning - I think you still need to have this basic understanding, so maybe making sure they have those solid understandings, and then from my lens, using technology to be able to extend and connect and collaborate with others and learn from others and not just in your classroom walls.

**P21 Skills.**

and Concepts. In addition, P21 includes Life and Career Skills as well as other 21st century themes (P21, 2015). P21 Skills were commonly mentioned across participants.

Kevin discussed the need for Initiative and Self-Direction:

The characteristics of Next Generation learners and the ideal 21st century, the Next Generation learners have to be just incredibly voracious learners, ambitious, self-starters, they have to demonstrate initiative because they’re going to have to go out and get jobs. I don’t think things are just going to be waiting for them.

Leah, the school principal, discussed not only the need for Critical Thinking and Problem Solving, but also the importance of Social and Cross-Cultural Skills:

I think the availability of being able to pick up your cell phone and Google anything you need to for facts or philosophy is part of what our society does now, and so the need to know all of that at the top of your finger isn’t as important anymore as it is what you do with it and how do you make meaning from that and how do you pull together all of these different data sources and have an opinion that you can defend. I feel like our students are absolutely digital natives and I do think what you’re seeing with that obviously much more strength in some technology areas and accessing things and what an older generation may say non-traditional methods, however, with that I think we’re losing some of the other pieces. So I think we’re losing some of that emotional regulation. I think students need to be able to manage their emotions, have self-control, I think is honestly the most critical there was actually a research study out of Harvard recently that also supports that that students who aren't able to regulate are going
to struggle more in life so I would say that's most critical along with that social
skills being able to work with people, problem solve, think differently about a
situation.

Tawnie similarly highlighted Critical Thinking and Problem Solving, but also
added Communication and Collaboration:

I think that goes right down to they say 21st century skills, which we're almost
two decades in here. A big one is probably problem solving which is the ability
obviously to have a problem that no one's going to give you directions on and you
have to just figure out how to make sense of it using your resources. So I think a
lot of it has to do with understanding what resources you have, how to use those
resources, so you can problem solve. So I think problem solving tends to have
kids go back to all the grades they’ve had and all the resources they’ve used and
think how did this now all apply to this new, brand new question. So all those
research skills and study skills, obviously reading and writing, are all tightly
mixed in. So obviously there's a whole list but if I had to nail it down to one
problem solving would be right there, obviously with collaboration,
communication, those things.

Kevin discussed his vision of the future and the importance for students to have
the Life and Career Skills: Flexibility and Adaptability:

I think the next 20 to 30 years for our kids will bring tremendous challenge and
tremendous opportunity. And I think about how technology is disrupting current
industries and I'll give you a couple examples. And not that I’m a futurist but I
look at things like Amazon Go, which are these little pop-up stores that have no human being working them and you walk in and you use your phone to scan out. And everything is RFID, which is radio frequency tagged and it talks to your app. I look at Uber disrupting traditional transportation, and I think Uber in turn will be disrupted by autonomous cars. I look at Sears announcing they don’t know how solid their future is. And I think about the millions of people who have been employed or are currently employed, and that was an avenue for employment and I just see that those traditional employers face massive challenges. So to be ready for that I think our kids have to be incredibly adaptive and fluid learners. I think they have to think of literacy as far more than five paragraph essays and narrative and expository text and I don’t think coding can be taken outside the context.

**Balance.**

Balance/the amount of screen time was another common theme. Leah discussed the need to give students 21st century and technology skills while still ensuring they are getting their social/emotional needs met:

I think we’re losing some of the social skills and being able to have face to face conversations, how to resolve conflict in an appropriate manner and not over social media and the flare up that can come from that…so I think a 21st century teacher can walk that tight rope between the two. They have that experience to know these important skills that are necessary today to be successful. They were needed 20 years ago to be successful and they’ll be needed 20 years in the future. But then also being able to incorporate, so students can hear that, so using student
language of using technology to help them understand that while still getting at these other areas.

Tawnie expressed the need to continue to question our intentionality of use:

Right now we are trying to encourage our teachers to say when parents see their kids doing homework, we’re just asking questions, we’re not putting value judgments on anything. But we’re saying are kids doing some on paper, are they doing some on the computer, or is like everything online all the time? And if that’s what’s happening, let’s ask ourselves some other questions.

Leah added concerns about the cumulative amount of screen time:

We’ve had a lot of discussion with staff and with families in our parent advisory groups of screen time is very real and so it doesn’t matter if it’s screen time for an academic purpose, or if it’s screen time for video games, I mean it does matter, but it’s still accumulative effect if a kid’s still on a computer you know having screen time for hours upon hours each day.

The need for balancing time on a device with social opportunities was a common theme. Tawnie added:

We’re informing them, trying to educate them, give them choices for their family, how to talk about screen time, all of this stuff. So I think the vision of balance and how do we make sure that technology doesn’t get in the way of a kid growing up and having friends outside and having those awkward moments outside of school when there’s no one to talk to. It’s ok to feel awkward. You can’t just always have your device and feel like oh I look busy, or I need to get outside.
Kevin summarized the need for balance and connecting with others:

I’ll tell you, and I’ll contradict myself a little bit, we’re starting to get some pushback on technology. The reason for that is concerns around screen time and that digital isolation, digital introspection that when a kid is plugged in in solitary, that’s not great practice, that’s not good for the kids, that’s not good for the teacher. We have some of our very, very best teachers who are very strong with technology, and enthusiastic, powering down devices and taking digital breaks, and building instructional practices where kids turn to their neighbor and work shoulder to shoulder with no keyboards, and it’s wonderful. So I think maybe that’s that transcendent piece where a teacher is really strong with technology but strong enough to know when it’s not the right tool.

**Personal human interaction.**

The importance and impact of personal connections came up frequently in interview conversations, both between students and adults, and also adult-to-adult.

**Student to adult.**

Sophie discussed characteristics of typical students that choose to enroll in the alternative school and their needs:

So a majority of the students who come to our program don't do well academically for various reasons, whether that be social emotional, personal issues going on outside of school, maybe they do have cognitive needs in certain areas. So by coming here we’re able to build relationships with them, to help them want to succeed academically. Many come to us not caring or wanting to
succeed academically, so we try to show, relate to them how academics are going to be important in their future. For instance a couple weeks ago we took them, split up our kids into different groups, and took them on like different career runs, like some of us went to a culinary school and cooked a meal, some went to a mechanics shop, fire station, Aveda, just to get them out there to see why would getting good grades in school be important If you wanted a career like this, even at the middle school age, when I think normally high school kids do that. But because I think of what our students have been through we try to relate even years and years from now why it's important to do that.

Expanding on how teachers are connecting with students, Sophie explained:

We do like a circle where we go around every Monday morning I do. I think all teachers do it differently. Some teachers do it every day. We go around, students give their name and number on a scale from 1 to 10 as to how they're doing on a daily basis. That way we can find out where they are emotionally. Do they need support somewhere else? Can they be in class? And I think for us giving them that care or wanting to make sure they're okay to be in school, that builds trust and then they just in turn do better with the relationships that we have with our kids.

From a higher level district perspective, Kevin shared the shift of the teacher being the keeper of knowledge to now being a facilitator or coach in the social learning environment:

The 21st century teacher has to come to reconciliation with the fact that he or she is no longer the sage on the stage, that the world of content that surrounds kids is
deeper and in some ways more enticing than what a teacher can produce. So how does he or she the teacher leverage those resources and build those collaborative environments where the human environment and the interdependencies are leveraged. Education is a very, very social context.

While the National Education Technology Plan (U.S. Department of Education, 2016) suggests that technology increasingly is being used to personalize learning, Tawnie expressed the importance of human connection in learning:

I really still believe that a teacher needs to be a part of that, that the personal connection is so vital. So it would never turn into such a personalized education to where you’re on a computer that’s personalizing everything for you so that you don’t have an actual human contact – somebody who cares about and can see how you’ve grown and can give you personal feedback.

Adult to Adult.

As a district instructional technology coach, Tawnie discussed building relationships and trust with teachers which in turn supported their professional learning:

When I work with teachers my initial practice is to take somebody where they are. And if you take somebody where they are, you start building a relationship with them because you can see that they feel that you’re like “Yeah, I used to be like that. I used to not know that. What’s going on? OK, we’ll take it from there.” And then they start to ask you the questions and start to grow because they feel safe with you. So I think that even though the expectations are that the teachers are increasing 21st century technologies and stuff, it’s just not always the case.
It’s not happening with every teacher. But I think you get the best bang out of your buck if they believe that you’re going to take it from where they are, it’s totally ok, and we’re just going to take it from here. I feel they tend to bloom a little faster and want to grow when they feel there’s somebody they can trust. So most of the people who come to you seek you out? I’m basically on request, all day, all year. Many times it’s the principal who wants me in. Many times is a group or a department. Many times it’s from stuff we share out in the district and they’re like “Oh, I’d like to follow up on that or I’d like to try this.” But I would say many times it’s all over the board. Lots are really savvy. Some are like “I’ve never done anything; I’d like to try to do this thing that I just saw.” So no one has to work with me. It’s nice that I’m not an evaluator. That they know I’m literally just there to help make them a rock star, help them enhance whatever it is they’re doing.

Kevin also discussed the power of adults connecting to support one another, but specifically the power that comes from colleagues learning from one another:

I think the district looks for those bright eyed teachers that show spark and show commitment and then we have a robust range of professional development practices and innovative colleagues. We have some great professional development providers in our district, but the most profound professional development that happens for a teacher happens across the hallway. It is that water cooler talk. It is that shoulder to shoulder work. It’s that drop in observation that changes teachers’ practice. All of our professional developers,
we don’t always get in at the heat of the moment, in the classroom side by side, that’s when teachers change practice. We have a value as instructional technologists to co-teach with teachers, to go shoulder to shoulder, and that’s a very powerful model of professional development. I think a lot of times it happens by peers. I think there’s value for conferences, there’s value for workshops, but those are spring boards to get back to that classroom practice.

**Equity and access.**

While Peakview School District is comprised of a predominantly White student population, as well as having a low free and reduced lunch rate of 10%, they are seeing increases in diversity, both culturally and socio-economically. Endeavor Middle School’s demographics are quite different. While White students are still the majority, the percentage of Hispanic students is significant compared to the district at large. Additionally, compared to the district’s 10%, approximately one-third of Endeavor’s students receive special education services. Finally, the district identifies 1% of its student population as homeless, compared to Endeavor’s 10%.

Equity and access are sub-categories in ISTE Standards, P21 Skills, as well as are the basis for Culturally Responsive Education. According to ISTE (2017), administrators and educators should advocate for equitable access to educational technology. Similarly, the P21 Framework (P21, 2015) suggests that learning environments should allow equitable access to quality learning tools, technologies and resources. Not surprising, equity and access to technology were mentioned by all participants; however this varied based on job role. Tawnie explained:
I think equity would be another theme. I think our district has talked a lot about equity and supporting our schools that have higher free and reduced lunch. And how we can support those schools in a more significant way to give those students who maybe haven’t had the support initially to be successful. So sometimes with technology...we were just working with the ELA teachers and how regarding changing up from English to Spanish and using our translators and just making sure that even families are informed or have wifi at home to make sure that the technology that we’re pushing out doesn’t create another divide. So I think that we also have that forefront theme to make sure that we are providing equity in our schools, or at least be aware of it and try to address those needs.

Leah added, “We work with a lot of families who have a lot of financial struggles. So, most of our students do not have computer access when they go home. Many of them do not have internet access. And so it’s trying to respond appropriately.” She later explained that while the district’s 1:1 program allows students to take Chromebooks home, the school staff had a discussion several years ago about this policy. The district shared a Risk Management Department study that found devices were more likely to have damage if students did not have a specific school-related purpose for using them at home. It is Endeavor’s philosophy to not assign nightly homework; however Leah shared that students are able to check out Chromebooks for extended periods of time whether they have homework or not. She added that many students do not want to take the Chromebooks home. The district’s 1:1 policy requires a parent or guardian to sign a permission slip which outlines their responsibility in the event of damage; the district will
fix issues for free for the first incident, but families are responsible for a $50 repair fee for additional damage incidents.

In response to meeting the needs of students and families, Leah described a program that the local library has recently implemented:

Trying to get resources to families, for instance, our local library has hot spots that students can check out just like a book, and so even just getting that information out to parents, because that broadens – that’s a game changer – of talking to parents about that versus spending hundreds on a data plan on your phone when if you can have a hot spot for Wi-Fi at your house, how that can reduce costs elsewhere while still giving your child access to the technology that they may need for school. They can check them out for a couple of weeks, and then they can keep checking them out. So they’ve just started piloting it to see how it works. I think it’s a great idea. I think it’s fantastic.

Kevin shared some additional ways schools are providing students access to learning based on their needs:

The augmentative technologies that 10 years ago or even five years ago that lived in special ed, are now generally available to all kids, and I’ll give you a simple example. There used to be software that only special ed kids had and that was speech to text. You speak into the computer and it would produce digital text or word processing. But now that’s built into Google Docs. It’s fully available so a teacher can leverage that and understand a powerful instructional strategy is brainstorming, kids like to talk, so a kid who is a reluctant writer who can
brainstorm and get that down. It’s there; you’re 90% of the way there. So the tyranny of the blank piece of paper goes away because it’s already pre-populated with some things. So those augmentative technologies keep getting better and better, and by the way they’re free. It’s really great. But then the ability to, and this will sound kind of reductionist, but to do drills and do some reinforcement, technology is incredibly patient. So if a kid needs 25 minutes to do math computations and needs many, many passes to get through the automation or the automaticity of getting math facts down, the computer can wait as long as the kid can stay engaged. We think in terms of parents, think about reading to your kid or doing math worksheets with your kids, it’s hard to stay engaged and focused with your kids, but the computer is always patient. So those are pretty neat things.

All of the school-based participants in the study talked about the challenges they have relative to providing 1:1 Chromebook access to their alternative school students.

Jordan explained:

I think that there’s a good debate out there on whether or not we should allow students to bring those Chromebooks home, and we don’t allow (students in this program) to bring them home, cause lots of things happen at our students’ homes. So those Chromebooks stay here. But some of the other middle schools students do have permission to take them home. If all the students had them at home, I could assign different things for them to do outside of class, whether that was a graded homework assignment or something to keep them busy and give them an option for giving them something other than what they might have been doing
otherwise. So I think it’s a great debate to have for what 1:1 will look like in the future and for what devices will be used for that 1:1.

Similarly, Leah shared:

That’s where every other middle school checks out their Chromebooks for the entire year and students take them home. That also concerns me about access when you have lack of supervision sometimes at home. So, students can check out their Chromebooks if there’s a purpose, but other than that they leave them here at school. They check them out in the afternoon and check them in the next morning. So it’s been a little bit of a balance. It’s very different from an affluent population where maybe some of that access has been there.

Interestingly, there have been different conversations at the district level regarding equity and access. Leah explained:

We’re not going to please everybody and not everybody’s pleased with the 1:1 device and it’s expensive and how do we keep it going forward. And the Chromebooks are an affordable option, they aren’t probably holding up as well as sometimes people wish they would and so then it gets into all of those other sustainability pieces where I think the vision makes sense but then how do you continue to sustain it. And I’ve heard colleagues say “Give us that same amount of money and let us put it into staffing because our kids will bring their own computers” for instance in more affluent communities. But then how to not create that have and have not – any more of that imbalance. It has been an interesting dialogue at the district level.
Teachers’ technology proficiency level.

Another common discussion topic was teachers’ proficiency level in regard to using technology. This came up in a variety of ways: general knowledge, expectations, and derailing a lesson when used poorly. As a building leader, Leah explained:

I think it’s an expectation that all teachers at this point have to use technology. Gone are the days of I don’t check my email because I don’t know how to do it. It just, I feel like, that’s a non-negotiable at this point in a 21st century school.

As a coach traveling across the district, Tawnie shared about conversations that happen regarding someone’s tech proficiency reputation:

I cannot speak to hiring practices since I do not hire at the buildings. I do however hear teachers talk to me and wonder. I just had an instructional coach say “I really like this teacher. They’re at another building, but I know that building is not that savvy and we’re really savvy. I don’t know if she’ll match us.” So conversations are happening. So I would probably say the outcome of that was - sometimes teachers match the environment they’re in because the vibe they got from her was that she would rise to the occasion. So they tried not to think of maybe what her website and stuff looked like now, but maybe if she were in a group where everyone’s doing it, she would jump in and obviously do the same thing. That’s kind of where it ended, but there was that conversation of “This is how we do stuff. It’s all this way. Is that going to work?” But I’m glad to hear they went with their gut. I don’t know what they’ve decided, because they
haven’t made a decision yet. It’s nice to feel that they thought that, many times you do, you just match the environment you’re in.

While there is an expectation of basic technology use proficiency, Kevin discussed the optimal time in a teacher’s career when proficiency level and use increases:

It’s interesting; teachers can’t even get hired unless they have some skills with technology. Even the application process is online and I know that’s a pretty low bar in terms of technology and proficiency but I will tell you, I can’t speak for every principal, but it’s on their mind. In this district, the principal hires their own instructional staff. Whether they overtly post must be strong with technology - that’s a look for, that’s an ask. Here’s something I’ve learned, it’s not always the youngest teachers who are the most proficient with technology. In fact, sometimes it’s that teacher who has 3-5 years or 4-6 years under his or her belt who’s established that reputation, who’s established that classroom practice, who understands how instruction works. They are the most innovative. I really think those first broad brush strokes and stereotypes at 23 year old teachers coming straight from college, sometimes it’s best for them to not use technology. There is just so much to learn and not that the technology is so much an additive piece, but you need to work on relationships, you need to work with your colleagues, you need to figure out where the copy machine is, how to time a bathroom break. But the classroom management and the tone with students is really critical. Technology can fold into that after that’s established. But huge brush strokes again. I see teachers work through that and by years 4 and 5 they
say “Yeah, I’ve taught this lesson a few times and I know there’s this resource out here called something.com or XYZ or I’m gonna use some programming to teach the logic of algebra…” Those pieces get cemented really nicely. But having said that, we have teachers that are 30 year veterans who are our most creative and innovative.

Conversely, Jordan explains the problems that occur when non-proficient teachers attempt to incorporate technology use:

Sometimes technology can get in the way of the classroom especially when teachers aren’t comfortable with using it…I’m also a firm believer that “Don’t use the tech if you don’t know how to use it.” Otherwise you spend half the class trying to get it to work and it doesn’t work, and then your whole lesson plan is ruined. I hear that from teachers a lot as the tech coach, “I tried to use the technology but I couldn’t.” So it’s good if you can use it as a tool and a resource, and it can kill a class lesson if you don’t.

Similarly, when school-based instructional coaches are not confident and proficient with technology use, they can halt growth in this area, as Tawnie shares, “And if a teacher says ‘how would you incorporate technology’ and this coach has nothing. I think that can die there.”

**Parent supports.**

The theme of parent supports predominantly came from district leaders. Tawnie explained:
We’re trying to use that as our education piece for parents. When your student is using a device at home, do you know that there are parent controls? Do you know that you can have a family media plan? Do you know that there are actually calculators that you can share with your five year old and say “You’re going to sleep for 12 hours, and then you’re going to play outside, and now you’re going to do homework, now you’re going to do this, and then look how much time is left - there’s only 45 minutes, so you really only have 45 minutes on the computer.”

You can have these conversations, so resources with families, so that the integration is valuable and parents have information on how to make good decisions around their family and choices. I think that really our big, I mean at least for me a as a parent, I can do all the good things for my kid as a parent, but as soon as my kid goes to a neighbor’s house and they don’t have any rules and they play Assassin’s Creed, it doesn’t really help that my son and I had the conversation if the neighbor…so the more we can get the community and the families engaged and educated in choices and balances what may or may not be appropriate using common sense media as a tool for age appropriate things that we’ll start to have a more common conversation.

Also identifying a need to support parents and continue to ask questions, Kevin added:

A big theme this year was screen time and how can we set some norms and give parents some resources so that they set some boundaries with their kids and figure out that balance point for them as families. We were having those conversations
internally with our teachers and students between 7 o’clock and 3 o’clock but we all know that kids when they go home have a different environment. So how can parents support the schools and schools support the parents? Most importantly, what’s good for kids? How much screen time is appropriate?

In preparation for student participating in the 1:1 program, schools are sharing information and resources with families. Tawnie explained:

Right now we’re working with, slowly, our 3rd grade teachers are now saying at back to school night we’re gonna do a family technology “Hey guess what, you’re 3rd grader is now going to have a computer at school, here are the expectations, here are some family resources, here’s a media plan that you guys can fill out at home, here’s some other…” There’s so many resources online. Lots of different things for families who may never have thought about this have something to start with. And then our 3rd graders’ teachers can at least feel like they know what parents have been given so that the conversation can be something not like “I have to educate my whole parent community” but that the district is providing like a baseline of something. Because I think once you're in middle school and high school, if you don’t start making those family rules and guidelines early, if all of a sudden you’re making a brand new rule in 7th grade is probably not going to work that awesome. So I think our 3rd grade, just requested actually, this past month to do that.
Pedagogy.

As a major component of the TPACK Framework (TPACK, 2013), the theme of pedagogy was interwoven throughout interview conversations. However, several supporting themes emerged as well: Adaptability, Initiative, Desire to Learn, ISTE standards for teachers, Digital Age Work, and the SAMR model.

Adaptability.

The importance of teachers being adaptable was a common theme. Tawnie shared her perspective on the ever-changing world and teachers’ response to that:

Somewhere in that I would say comfortable with change. The classic teacher or anyone, it could be anyone in this department, or at minimum a parent, a kid. I don't think age has anything to do with it, but you know they like how it was five years ago. Well that's just not how it is anymore. So I think being comfortable with change and continual learning, knowing that like because you leave school doesn't mean you're done. If you're not comfortable with that then you will be identified as a person who is backwards, or difficult, or won't change, or wants it the old way, and probably I would say that's not just with technology or 21st century learning but that's just overall with everything. Some people who are like “oh my bank statements are now online” you know everything, so change would be that quality. I think that would be change and adaptation as well as things are moving and changing. I would say you know obviously we use Google and that thing is changing every 5 minutes.
Teachers were asked what they would do if they were transferred to a classroom, school or district with limited or no technology resources. All answered with how they would adapt. Jordan expressed:

If I transferred to a district with limited tech resources I would first see what I had to work with. If there were no computers for students, I would modify my classes to be much more group-project based where we find other options for researching topics, graphing, and other tech heavy skills. As a group, they could utilize a smaller amount of technology effectively. I would also most likely bring in my own tech to get the students some exposure to these skills which are essential for most workplaces. If students had cell phones, I would try to incorporate the use of those phones in my classes. There are many ed tech apps that are freely available for students and educators so that would be a natural way to use unconventional tech in the classroom. Plus, if students are using their phones for a science lab to collect data, they won't be using them for other distractions. It is fun for the kids and it achieves the goal of my classroom so I'd call that a win win.

Sophie added:

I would use my own laptop to have my classroom discussions. I’d bring that in. I don't know. I guess write some grants, try to write as many grants as I could to try to get technology and there are...I currently have two that I'm waiting on right now. I think we'll find out in like May but I'm asking for like 30 wireless mice because our students get frustrated with like the mouse pad and being accurate,
and then just some new graphing calculators. I don't know what I would do. It would be hard.

Reise shared:

Well that would be my first year here because my projector didn’t work and none of our Chromebooks worked. It was fine. You can make it work. You can definitely have a classroom without those tech tools. I definitely have textbooks, there are library resources, things like that that they can still learn from, plus they can listen to me, which they get really excited about. But it’s just different. I even have old overheads from teachers past that they left behind. But they are still just as good for visualization, it just takes a little more prep to get ready for class because you have to make sure that like your overheads are all in order, and that you have everything printed, and that no one forgot to get new ink for the printer and things like that. Would you be satisfied with that or what would you do? I think some things I would be a little sad about like especially with the reading. I like them being able to listen to it as they read, but annotation would be the same. I require them to annotate texts, so whether they are doing it on paper or on the computer that would be the same. So some of those assist tools I would miss, also the missing assignments would increase. You know even in class I had them have an organized notebook that they always kept in class yet still assignments would disappear.
**Initiative.**

Another common pedagogy theme was teacher initiative, specifically finding a gap and filling that need. Jordan explained:

I use whatever can help. So I am always trying to research new tools. Today I just downloaded a new iPhone app that just came out. I think it’s called Labs for You that kids can do a physics lab on their phone and it guides them through it. And their phone is this incredible computer – it has to be an iPhone – that has an accelerometer and you can use the camera as a light sensor. These tools that are barely even used by like the apps they use on their phone, but I have all of them download it, if they have iPhones, then I can be like go tell me about this or that. There’s an app that you take a picture of a tree leaf and it can identify it and so we can have outdoor labs if I was teaching biology that semester or we can go identify the leaves in our backyard.

With regard to adding a needed content unit, Jordan shared:

I’m ok with breaking off of standards a little bit for a week or two to get kids real information. During my master’s program, I saw that need and I worked with my mentor teacher with actually every new unit we started, I had the idea to give them a real article and a fake article relating to say like cellular division or like climate change, something like that. And they had to find which one was a bias source and which one was the actual scholarly source. Is there any good information in the bad source example? It definitely hits good learning ideas, but it’s just not technically in the standards. But it definitely hits things that they will
use throughout life, let alone school. And so I still have all those articles saved up but I try to replenish with new articles as they come up. That was specifically in biology that I did my student teaching in and so those articles don’t really apply to physical science. That’s how I came up with the idea. It was really effective at a traditional school doing that, and the need was just as present in that traditional school in Washington as it is in the most restrictive alternative setting in this district. I think a lot of adults could benefit from it too.

**Desire to Learn.**

Similar to initiative, teachers’ desire to learn was a topic mentioned by all study participants. In discussing hiring practices, Leah shared:

I’m not saying they have to be some amazing, innovative user of technology but they need to be able to use some things like Google Classroom and they need to know about some of the assessment – like some of the quizzes you can create that are fun with kids online, I mean some of those things that are really important, or if they don’t know how to do those things, they need to show an extreme readiness and willingness of “I just need the professional development” so if we had a teacher who maybe had been teaching for a while and coming from out of state for instance, then I know this is a great environment to be in because there’s so much help and support, so it would either be they’d have those skills or they had a strong willingness to develop them.
As a math teacher, Sophie wanted to incorporate more technology, but struggled with finding resources that would support student learning in meaningful ways. However, she persisted:

I just recently started doing Google Classroom. I never have in the past because I didn't know how I could incorporate math with technology like online, like having students do their assignments online aside from like using Google Docs. And then I started getting into Google Drawings and we started to create and construct some graphs and visual representations, and that's been useful. We've been working on activities like those since January.

Summarizing the characteristics of teachers who continually seek out ways to incorporate technology intentionally, Kevin offers, “So that gets to the heart of a good teacher - is it learned or is it DNA or is it some combination. I do think there’s some combination.”

**ISTE-Standards for Teachers.**

Similar to the discussion on ISTE standards for students, none of the study participants mentioned ISTE or any of the standards. However, there was evidence across the interviews that the work being done could be categorized by the teacher standards: Facilitate and inspire student learning and creativity, Digital age learning experiences and assessments, Model digital age work, Digital citizenship and responsibility, Engage in professional growth and leadership. Each of the teachers shared a variety of examples that touched each of these areas.

Jordan shared:
So, I am definitely a techie. My first year I taught a course about Apple TV in the classroom, like a professional development course to my staff and I love Apple TV, it’s probably my favorite form of tech in the class. There’s so much you can do with it – infinite amount of apps on iPhones and iPads and Mac that I can stream right up to my screen. I use my phone as a mobile doc cam so that it’s not just writing things down on a table that’s then projected up to a screen. It’s I can put the kids’ faces up on the board or like today I videotaped that in slow motion. When iPhones got “slo mo”, that changed my science class for sure. I was able to show no matter the weight of an object, it accelerates the same from gravity, and I had students drop really heavy things right next to really light things and they saw them hit the ground at the exact same time in slow motion and it changed everything from just words that I’m giving them to actually seeing themselves doing it. And especially for those visual learners, that was huge, just mind blowing. So I don’t get to use Apple TV every day, but when it is used, I feel like it is an incredible tool for educators that they can have in the classroom.

Reise added:

I don’t always do everything on the computer, but I think it’s really neat to add technology where it helps like organization or it helps students with reading especially because we have a lot of students who don’t have a lot of confidence in their reading ability. Whether they are good at it or not, they don’t have a lot of confidence, so being able to listen to it at the same time without other students
looking at it weird because everyone could have their headphones on. That kind of thing is really great for students.

Reise also explained some ways in which Digital Age Work has been incorporated in the classroom:

So you can see I use Google Classroom a lot. What’s nice about it is that there are no lost assignments. Very easy for students and parents, because parents can look at their Google Classroom, to see what assignments are missing or incomplete. I always allow made up work, pretty much anytime until that last week of school. And so they can say I only got a 50% on this, I can go back and redo it. So it’s really improved student organization and my organization too, because I can change around assignments pretty quickly. I can also do neat things and push their screens to a different website if I want to at the same time. So if I want them to all look at a diagram, I can push all of their screens to the same diagram. So it’s pretty neat. It’s also great for like sub plans, because the kids know they need to get in there, they check their assignment, they have a routine, they do their Do Now, their assignments and then check their exit ticket every day. Technology is also great for films and I also love the reading passages. I use Newszilla and Discovery Education a lot for reading passages. Newszilla is great because they can change the level of reading and the language to better suit them. And they can also annotate and take notes on there. And same with Discovery. And they both have an audio option, so kids can listen as they read along.
Because I want them to improve their reading skills but I also want them to feel confident with the knowledge.

Similarly, Kevin explained how a district committee had oversight for the instructional technology work happening:

About stakeholder support, one of the things this district does really, really well is that we have an ETAC committee - Educational Technology Advisory Committee where we have about 40 members that’s comprised of students, teachers, and yes students are part of that, administrators, board members, parents as a constituency, and together we work on vision-building and set - it’s the steering committee - so we set the culture and the direction of learning technologies in the district. So to do that, to inform those stakeholders, we bring them to site visits once a month, we have innovative teachers present their work to the committee, we debrief, we talk about the issues of the day whether it’s new legislation, what technology should look like for students.

**SAMR.**

SAMR (PuenteDurra, 2014) was another minor pedagogy theme that emerged in the data analysis. SAMR (Substitution, Augmentation, Modification, and Redefinition) refers to the level of technology infusion that supports digital learning experiences.

Kevin shared his thoughts on the continuum of technology implementation:

I think that this district does a good job, and I’m proud of the way we use technology. When I talk about how “we”, that’s a collective “we” and there’s gradation and continuation among real, creative, advanced, adaptive, facile
teachers to folks who use technology in pretty limited modalities. I do think there’s a continuum to that in that a lot of teacher will go through to try to expedite things, they’ll use technology to try to automate processes. When I think about the SAMR model, substitution, augmentation, I do think that there’s a lot of truth to that.

Sophie explained her experience in seeing how other teachers were implementing the use of technology:

Does district curriculum play into that at all? No, I think a majority at least of high school math teachers in our district use Google Classroom, but I think it's just like a lot of work sheets that I have. I work with a lot of other middle and high school math teachers and I think a lot of their assignments are like on paper but they just have them online, more for like students to go on like when I'm gone, I can go and print can print this off and do it.

Again, noting the need for balance and intentionality, Kevin summarizes:

The curriculum piece - the presence of digital curriculum is one step towards technology adoption, but we have great teachers who do great things on paper and pencil curriculum and use the technology as an augmentative or supplemental piece, or an extension piece. So to that end, here is where technology really shines is in lesson plan adoption, so for kids to do an extension or a deeper dive or to take a further step in the research realms of a project, just in time is really an exciting use of technology, and likewise, technology as a modification or an intervention is really, really powerful when used in a targeted way.
Technology.

As another major component of the TPACK is Technology. Technology was mentioned in a variety of ways including the types of devices and resources used, professional development opportunities, and current and desired supports.

Devices/Resources.

Leah discussed the adoption of the 1:1 program and curricular resources, including digital options:

I feel like our district has really responded. I feel like even bringing in the 1:1 ratio, all of our new curriculum that we’ve been purchasing over the last I think five years that I know of, one of the key components that’s part of our curriculum approval process is that there’s a digital component to it. So that students can access, so that it just makes sense. Textbooks change so quickly and with the digital content what we’re seeing is many of the textbook companies are updating their online at least once a year where textbooks you have to change 20% of your content before you can do a new revision and so much obviously would change from that. So the difference of it used to be what does the paper textbook look like to what is the online component – which is so much more important. Also just being able to bring in those multiple resources that it’s not just about one curriculum, which we used to really have to have it about one because it was so expensive. I feel like today with resources you’re able to pick and choose a little bit but more of what different methods can we throw in that would make, that would strengthen the students’ educational experience and I think that with the
1:1 ratio that makes it much more possible and you just see them, you see technology more embedded throughout.

From a teacher perspective, Jordan shared the benefits of having 1:1 access to Chromebooks:

In the last couple years we have fully integrated the 1:1 with Chromebooks. It has definitely opened up the options for students and teachers to give different types of assignments. We do a ton of internet-based research in my class, like our pick a planet project that we’re going to be moving into once we do space. Lots of great internet research that might have been more difficult if you had to rent out the computer lab or something like that, reserve the computer on wheels or the “cow” cart. Things like that, where if you wanted it, you didn’t have access to it that day necessarily and you had to lesson plan around it. Now you can say go grab your Chromebooks and that’s been the biggest impact on the students in the classroom.

Professional Development – Focus.

A major theme across interview conversations was the availability of targeted professional development. District leaders expressed learning opportunities that focused on the content areas and the ways in which technology could be intentionally used to enhance learning. Tawnie asserted that it’s not about the technology:

That informs my practice that I go to plenty of tech conferences throughout the year, I present at lots of conferences throughout the year, but I feel that I'm always honing into content and that’s just the influence of my district. So that if you go
to a session for me, it's informing that I'm always like in writing this is what this looks like or and reading this is what this looks like. And I think I have found that I really liked that our district has done it that way, and I like that it's really influenced my practice that way because when I go many times to conferences or professional development and it's just “here’s this tool and look how cool it is and amazing” but then there's no ties to why is it instructionally sound. Show me an instructional practice on why kids would learn better this way than this way and I think that the more you can ground teachers to the instructional strategies and their standards, the more they'll buy in to try something because you've made the connections for them. So that's why I think those two things influence my practice just because they are district-wide themes and I need to be able to support those and I firmly believe in those things.

**Professional Development - Differentiated.**

Similarly, several participants discussed the opportunities for professional development based on the needs of an individual teacher, team, staff, or content area. Leah shared some of the options available:

Our district, I feel is very responsive and robust. We have technology support people who are teachers and they are very innovative and have a lot of skills around technology. So they will come into schools and provide targeted professional development either at the teacher level or at the school level, whatever works the most, they run different institutes.
As the original focus area of the 1:1 launch was literacy, Tawnie discussed the need and shift to offering more variety in trainings, based on content area:

But in last few years since we’ve gone 1:1, or expanded past language arts with devices, our social studies, science and math teachers have all been like “Well where’s our Inspired Science, where’s our Inspired Math, where’s our Inspired…” So we’ve done, this summer again we’ll have a 6-12 middle school and high school focus so it’s just “Hey if you’re a science teacher, here’s your strand of everything science as a science teacher that you want to know. We did that specifically. It could just be my preference, but you can’t have generic sessions and have a math teacher and a science teacher and an English teacher and they all get the same thing. You want to use their time wisely and feel like you’ve differentiated enough that they feel like you’ve taken the time to really focus in on their needs. So we really try to do content strands. Which again focuses back on their content standards, which focuses back on all of those things we want them to keep focusing on and just how then does technology enhance that.

Jordan confirmed the availability and variety of professional development opportunities:

I think we are aptly trained on the technology that we are using, whether that training is by computer coaches like myself or we also use an online program for science called Discovery Education and I went to a three day training over the summer just on using Discovering Ed, so you are expected to have a little bit of
educational experience with technology coming in but ensuring that we know how to use the tech that we have at the time.

Leah specified training was tailored to the user’s need and access point:

For instance, I think it was three years ago, I know they offered it many years, but three years ago many of our teachers went to the Google Classroom Institute. So it was a way, a jumping off point, so they have it all scaffolded and they have it tiered based on “Do you know how to get on your email easily?” or is that a struggle, so they can help to break that out.

*Professional Development – Adaptability.*

Tawnie reiterated the need for teachers to be adaptable, as things are constantly changing:

So you know as we are trying to give professional development to teachers we say “well today it looks like this and so today these are the things you need to know” and we’ve really said many times how to speak like that because many times it’s the next day and “It doesn't look like this anymore.” “OK, and what does it look like now? How do we need to work on that?” It’s with everything. Things are always changing.

While the district seems to be responding to teacher needs, Sophie expressed that professional development offerings also need to adapt:

I just feel like there’s so much more that can be done or needs to be done in regards to math and technology in student work. Like not the technology that
teachers use in the classroom necessarily, but like how can students use tools
online to show their thinking.

**Technology Resources.**

In addition to professional development trainings, the district also shares ideas
through a blog and newsletter, and connects teachers in other ways. Reise shared, “I do
go to a lot of Tech Talks, and the district is really great about that. We used to do a Tech
Tuesday every week and it was fun and I learned something new.” Sophie continued to
rally for math teachers:

I mean I need some more support. I'm on this teacher leadership thing for like the
district for like middle school math teachers and we just went to a conference last
week and I’m thinking awesome I'm going to learn all these new ways to use
technology in the math classroom and there weren't any lectures on technology, so
I’m telling our district technology lady “I want to go like one where we can learn
more stuff online.” So I feel like there's definitely a need for support for math
teachers in that way. I feel like a lot more needs to be done with mathematics and
tools that students can use to show their thinking, do their work online.

**Supports.**

While some participants mentioned a few issues with devices not working or
getting old, this did not appear to be problematic. However, Kevin expressed the
importance of having a solid infrastructure:

Teachers are really, really smart in this district and other places, so if technology
does not have a solid infrastructure, they will not use it. Think about it, if your
wireless is slow, or if it doesn’t connect, or it’s dropping, or devices are broken, or out of date, that’s just very, very frustrating for anyone and teachers can’t be put in a position where they can’t rely on their technology. So the infrastructure must go across...infrastructure I would define as in terms of bandwidth and wireless access, and current - not state of the art - but current reliable machines.

**Leadership and staff culture.**

In addition to leadership and building expectations around teacher technology proficiency, Tawnie discussed the idea that technology will not improve teaching and the influence that instructional coaches have of teachers:

We also work pretty closely with our instructional coaches. And I think instructional coaches are one of the key points in how a school moves forward with technology. I think they can make or break it. I would say that at our buildings, the instructional coaches who don’t move forward, who are not ready, who are not comfortable with change or technology, they can’t model for our teachers. And so they’re modeling...there’s nothing wrong with traditional paper/pencil...a good strategy is a good strategy, and I would say that technology doesn’t improve your teaching, it just magnifies your teaching. If you’re a bad teacher, it’s going to magnify that you’re a bad teacher. If you’re a good teacher, it’s going to magnify that you’re a good teacher. It doesn’t make you better or worse. But I would say as an instructional coach, if they’re not comfortable with technology and the leader there, the expectation is that you’re not modeling that for them so you’re not encouraging anybody else to use it. You don’t instantly
make connections of how these things would work, so your in-building person who has so much power to make change and you can see these buildings just slide backwards. While you have instructional coaches who you can tell are totally comfortable with change. “Oh yeah, that change, I noticed that yesterday and then I just changed and did this.” That’s amazing. So everything they’re doing, you can see the influence in their building, all grade levels: K-5, 6-8, 9-12.

**Program Implementation.**

Another common theme was that of technology implementation. While it has been several years since the launch of the 1:1 program, all of the participants made reference to how this practice has influenced and evolved teaching and learning. Leah explained:

> Just the use of Google Classroom I feel that five years ago that was pretty cutting edge and very innovative for certain teachers who felt comfortable with it and now I feel like it’s a very common practice that the majority of teachers use because it makes sense, especially in a 1:1 ratio school.

Jordan described his role as a building tech coach and how he has seen change:

> I like helping out teachers who aren’t as strong in technology gain a tool that’s easy to use and especially like today in art, we had a teacher who isn’t very comfortable with technology using that doc cam that I described. And it was fun for her and the kids were able to actually see what she was working on instead of all piling round her. It just made for a great lesson. I’ve definitely seen that change over time for other teachers.
From a district leadership perspective, Kevin explained the process from conception and related data results:

We presented it to that ETAC committee as we moved forward and we worked through the logistics of the policy, and what-ifs and how do we do this. And the reception was really good. I do have data I’m happy to share with you about the parental response to our middle schoolers, teacher response and student response. I can recap it: 75% of our parents say kids are more engaged, 80% say they’re more prepared for school that their organizational skills have improved. Parents tell us almost with 95% concordance that their kids are getting 21st century skills. So it’s really good. I’m not saying every parent is happy with the model every time and parents do take on some liability about dropped devices and so forth, but it’s really been good. So we have some internal measurements in the form of surveys to gauge that satisfaction.

Reise added this summary, “I think that next generation students don’t see computers and phones as machines but as an extension of the way they connect to the world.”

**Culturally Responsive Education.**

The district overall is not highly culturally or socio-economically diverse, however, this is changing. As of 2016, the district’s student population was approximately 73% White, 18% Hispanic, 4% two or more races, 3% Asian, and 1% Black. Kevin explains:
The district has always been high performing district. We are accredited with distinction, and are proud given our diverse population. Our learning results are excellent in all of our content areas. We’ve been doing writing with technology for so long that we don’t have control groups. That’s the digital world that they’re in. Our demographics continue to change and grow, some numbers have doubled. Our alternative school population has also grown. The demand has grown and our schools have expanded based on their needs and learning styles. That is a diversity piece that is on the increase that categorically is true across the state and probably across the country for that matter.

Given this shift, another common theme was responding to the needs of the community. Culturally Responsive Education (Stembridge, 2015) looks at how Engagement, Relationships, Cultural Identity, Vulnerability, Asset-Focused Factors, and Rigor are addressed in the planning and delivery of learning experiences. While many of these themes were not specifically mentioned, many were addressed in conversations. Leah shared:

I think we have to respond to our society and what’s going on around it…so informing our practice; it’s just trying to be responsible. It’s trying to – again it’s that balance of – we have to meet it because that’s where society is so we need to move forward with it and how do we keep our kids safe and build their skills because in some ways things are moving so much faster that what students are able to take it in.
In thinking about the vision for students based on their needs, Jordan explained: Honestly the district’s vision and our school are a little bit different. Not in that the foundation of both visions is we want what’s best for the student. And for the vast majority of the district that’s college in the future, for a lot of our kids that’s not the future that they’re anticipating. So our vision is whatever is best for them post-high school, and I think the district would also say that. But what that means for the vast majority is college, and if a school is not getting 98% college admissions that’s frowned upon, things like that. And for us we don’t even come close to a 98% college admission, but if you look at tech ed programs and career paths like those, we are incredibly successful. So that is our vision for all students to prepare them to succeed after they leave this very supportive environment.

Kevin described how the alternative school has adapted to meet the very unique needs of its students and families:

I think the teachers at the alternative school have really leveraged those kind of things where the kids have to use each other as resources to accomplish things. I think there’s more flexibility in instructional spaces and learning styles. There’s certainly more tools that a teacher has at her or his preparedness which could include a textbook now has video on demand, distance learning, digital simulations, digital assets or resources. I think we know more about learners than we did 10 years ago, about how the brain works, about adolescence, about the relationship between mental health and I think about like Maslow’s...which is not a new thing...but I think we’re thinking if kids don’t eat they’re not learning, and
if kids don’t feel safe they’re not learning, if kids have crisis at home they’re not learning, and I think we’re doing a much, much better job with that. Not that the challenge is going away; it’s real and it’s getting more real.

Reise touched on Relationships and Asset-Focused Factors:

We can help next generation students connect to the classroom by using technology such as: Class discussions or dialog, dialog between teacher and student, having students create podcasts or vines, etc. But the best way to connect with any student is to be interested in what they are interested in; hopefully this will lead students to be interested in what you’re interested in.

Sophie highlighted Engagement:

My goal is to make things as engaging as possible. I still teach the same curriculum that all the other traditional schools do. I don't necessarily use the books, like at all, which I think most teachers may. I try to make activities more hands-on, more contextual to real life: why do we have to solve a system of equations by graphing, why this useful? So a lot of times when I have to teach like algebraic reasoning or just problems using algebra, we’ll first relate it to some real-life contextual situations before we take it fully into the algebra.

Kevin summarized by sharing, “Just in time learning, personalized learning, really getting the kid, based on data, the resources and the environment they need to be in at that time.”
Learning environment.

While all participants shared their current learning environment characteristics, each was asked: If you had unlimited funds and magic, how would you envision the ideal learning environment for students and teachers? Some described the space; some talked about technology resources; some combined both; and some discussed resources, pedagogy, and structures.

Ideal learning environment - space.

Leah’s vision:

We would have two spaces – I would say that – one of them a more traditional building and one for outdoor experiences. I love the magic, using your word that occurs getting a child out of the building. Getting a child to do things and experience and smell and hear and feel the outdoor world. I feel like more learning takes place on our Wednesdays possibly than the other days just because it’s very non-traditional, you have staff who are passionate about what’s going on and it doesn’t maybe fit directly into one curriculum area but it definitely aligns to standards. So I would see a mixture environment where you could give students those experiences, go cool places, have transportation to get people there, not have to worry about how to fund it, that students would have all of the appropriate gear. I do think I would probably (and I have a bias here – I’ll identify that) every student and teacher having a MacBook Pro would be really cool for some of again the creative things you can do, they’re heartier, meatier and I think just taking down some of the constraints.
**Ideal learning environment - technology.**

Jordan’s vision:

I think I would have 1:1 with Macs, because I am Mac biased. I think the Mac ecosystem plays so nicely with each other that it is intuitive, and even if you’ve never used one before and they’re scary, once you actually start using it you’re like oh, this makes sense. I can press command the first letter of what I want to do and it will work. I love that about Mac and I think they have a great mind for education and they’ve made it a priority for their company over the last 5-10 years especially and the only downside is they’re the most expensive tech company out there. So that’s why it would need to be magic.

**Ideal learning environment - combination.**

Sophie’s vision:

I would hire really smart people at universities to create online tools for students for math and then just have some amazing computers. And Technology, I don't know, if it were me I would do not everything online because I think doing things by hand is still very important, but I feel like there's so much more that could happen.

Reise’s vision:

The ideal learning environment would have: a fully automated greenhouse and teaching area, planetarium, large monitors for students to connect their laptops or Chromebooks to in the classroom, Mice (is that still the plural for mouse computer attachments?) for students to use with their computers, digital
microscopes that could be hooked into monitors or laptops, interactive LED touchscreen rather than a projector, a magic school bus, and virtual reality glasses.

**Ideal learning environment – resources, pedagogy, structures.**

Tawnie’s vision:

I guess I think it would be great if they can talk to experts. I start thinking of all the limitations that are in place. I would say that all the content would be connected to real life learning. So that when they’re doing math, and just like my kid is now, and saying “So when do I need to know the area of a triangle again? When is that important in my life?” and I can give him an example in my career why that’s important but that everything has a real clear connection, or that they’re involved in some kind of project based experience where the skills that they’re learning will eventually come to pass of “Oh, we learned that! We need to know that to do this!” There are so many things. Ok, I’ll answer one for the students. Students could opt/test out of any class they needed to. Test out of anything. Like my kid knows everything about World War 1. He could probably teach a college class on it, but he’s going to have to sit through how many years of world history. Like could he just test out and make an extra class for him, like a course of interest? Or go out in the community and do something connected? So seat time, for me, makes no sense.

Kevin’s vision:

I think this comes back on the personalized learning - how do we demonstrate competency with and without technology and how can we flex student needs in
real time so they’re changing up which teachers they’re visiting and which digital resources they’re getting, and not plodding through 6th grade, 50 minutes of science, 75 minutes of social studies, just more of a very flexible environment. And I certainly don’t have the answer on how to do this but we know that we’re gathering more data around kids and we know that they’re telling us what they need, yet we still have a pretty predictable pathway for them and it’s predicated on what year they were born in. Like the School of One? I don’t know a ton about that program, I think it’s very digital-based, but you do a series of diagnostics on a daily basis and then you get these learning objects coming down and you work through those. I think that’s a great step, but on a social-emotional piece too, like I’m working on conflict resolution, or I’m working on mindfulness or “I didn’t sleep last night, I need a little space over here.” Google has little nap pods. How can we get those kids those resources in time? Or food. As we have impacted populations. What if social studies was always a drop in period? You do this online work, and you do this face to face work, but as you demonstrate mastery, but yet you have needs in geometry, you flex over there.

**Program Implementation.**

The theme of program implementation was present across all conversations. Kevin explained the history of presenting the vision and implementation:

The district has probably 10 years of 1:1 history, and 1:1 is one of those terms that means different things to different people. Ten years ago, we defined 1:1 as a cart of laptops in a classroom, and we defined that as Language Arts. We thought
there were the most natural connections, and extensions, and opportunities to build complementary experiences. That goes back to 2008 and that vision was presented 10 years ago as we the instructional technology people thought that there was a great and natural connection between writing practices, especially process writing, pre-writing, drafting, revisions, editing and publishing, and digital technologies. So we always went into it with a very focused approach that this is the instructional practice of process writing and here’s how these resources draft in behind it.

**Disaggregated Data Themes**

The initial interview transcript coding and emerging theme process provided an overview and summary of several main themes. However, the researcher felt it necessary to drill down deeper into the data in two ways: by job category and by conceptual framework sub-category. By conducting a secondary analysis of the data, the researcher found that there were some variations in the frequency that sub-categories were based on the participants’ job focus. As each category of participants and the extent of their responses varied, frequencies were color-coded based on top 10, then next five highest response rates. Thus, for each group of participants, the ten highest response rates were identified in green. The mid-range of responses, the 11-15th highest response rates, was coded yellow, and minimal responses were not color-coded. Figure 9 displays the frequencies of participant responses as they relate to the conceptual framework sub-categories.
Figure 9. Frequencies of Responses by Conceptual Framework Sub-Category.

Teacher Themes

For the three teachers interviewed, the most frequently occurring themes were focused on teachers designing and facilitating lessons where both teachers and students were using technology and keeping students engaged in their learning. Other themes included how technology enhanced the core subjects and/or content standards. There was a lot of discussion regarding teachers’ personal learning and seeking out different technology tools and resources, teacher flexibility and adaptability, and teacher proficiency in technology use. Differentiation and being able to use technology to modify assignments were occasionally mentioned. Also, teachers talked about the learning environment in a way that focused on inter-personal skills and technology tools as opposed to the physical layout and contents of the classroom.
Conversely, while P21 Skills critical thinking and problem solving were often mentioned, most of the other P21 Skills such as Collaboration, Flexibility and Adaptability, and Social Skills were minimally mentioned or were completed absent in interviews. Similarly, the majority of ISTE Student Standards were rarely mentioned. Also, while teachers often talked about the types of technology in use and how they were incorporating it, none of them mentioned the concept of SAMR. Interestingly, the sub-categories with the highest frequency of response rates included Pedagogy and ISTE Educator Standards. Culturally Responsive Education sub-categories were also minimally represented, except for Engagement and some mention of Equity.

**School Leader Themes**

With only one participant in this category, response frequency rates were obviously smaller than the other two categories. However, high frequency responses were present in a number of sub-categories. Similar to the teachers’ data, there was a lot of discussion regarding how teachers designed and facilitated with the integration of technology in the classroom to support and engage students in their learning. Other frequent themes focused on equity in the sense of providing students focused access to technology while at school. Discussion also included empowering students who otherwise may not have had access at home; this was different from teacher data as teachers only mentioned the policy that students did not take Chromebooks home. Similarly, the school principal stressed the importance of Balance/Screen Time and providing students with the Social Skills and emotional supports they needed. Again, this was not identified by teachers as an issue.
Similar to teacher data, P21 Skills, Culturally Responsive Education, SAMR, and ISTE Student Standards are received minimal or zero response rates. The principal also discussed the learning environment, in alignment with teacher data, to be a collective of spaces and resources that supported the student both social/emotionally as well as academically.

**District Leader Themes**

Given that Instructional Technology is their job focus area, it was not surprising that participant responses were rich with connections to many of the sub-categories. Both participants frequently mentioned that the focus was on the standards and not on the technology tools. Similarly, they both discussed the importance of Balance/Screen Time and the Intentional Use of Technology. Given their roles, there was a lot of attention given to Professional Development, Teacher Technology Proficiency, the need for teachers to have Flexibility and Adaptability, and strong results in the ISTE Educator Standards. Learning Environment was another area that received a lot of discussion. These conversations, however, were more aligned with academic structural supports such as furniture and technology devices, as opposed to a holistic environment.

As leaders of the 1:1 initiative, the researcher assessed district level participant responses with the ISTE Administrator Standards. High frequency levels showed across the category, with the highest sub-categories being Visionary Leadership and Digital Age Learning Culture. Another area to note is that of connecting, educating and engaging stakeholders, which tied in to ISTE-A Visionary Leadership as well as ISTE-E Collaborator Standards.
Content/P21 Skills had the highest frequency in Student Technology Use, Social Skills and Collaboration, but there was little representation in Critical Thinking, Problem Solving, and Analyzing Media. Similar to the other two groups, there was fairly low response frequency in Culturally Responsive Education and ISTE Student Standards.

Collective Common Themes

High Frequency Themes.

Across the three participant groups, common high frequency themes emerged.

- Focus on Core Subjects/Content Standards;
- Support of Student Technology Use;
- Supportive Learning Environment with Flexible and Adaptable Teachers;
- Teachers Designing and Facilitating learning opportunities that respond to student needs and goals;
- Continue to support teachers as they become more proficient in their technology integration and use.

Mid-Level Frequency Themes.

Mid-level frequency themes include:

- Supporting students’ Social/Emotional Skills;
- Ensuring Balance of Screen Time and Intentional Use of Technology;
- Continue to strive for equitable access to devices.

Minimal or Absent Themes.

Several categories and sub-categories were minimally represented or absent from participant interview data. These include:
- Low representation in the P21 Skills
- Low representation in Culturally Responsive Education
- Low representation in SAMR
- Low representation in ISTE Student Standards

**Connecting Observations and Interviews**

While the TDOP provides one snapshot of how instructional technology has been integrated into the classroom, it focuses heavily on pedagogy but makes no mention of content. It is also limited in its connections with several of the conceptual framework sub-categories such as the ISTE Standards. By associating the TDOP codes with interview themes, the researcher sought connections between participant perceptions and the reality of instructional technology integration. Figure 10 shows connections made between the TDOP dimensions and the conceptual framework categories:
<table>
<thead>
<tr>
<th>Conceptual Framework Categories and Sub-categories</th>
<th>TDOP Dimensions/Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content/P21 Skills</td>
<td>Problem solving,</td>
</tr>
<tr>
<td></td>
<td>Students working in</td>
</tr>
<tr>
<td></td>
<td>small groups/Collaborating,</td>
</tr>
<tr>
<td></td>
<td>Peer interactions/Communication</td>
</tr>
<tr>
<td>Pedagogy, Learning Environment, Teacher Technology Use Proficiency</td>
<td>Teaching Methods, Pedagogical Strategies</td>
</tr>
<tr>
<td>Technology</td>
<td>Instructional Technology</td>
</tr>
<tr>
<td>Culturally Responsive Education, Asset-Focused Factors, Relationships, Rigor, Engagement</td>
<td>Teacher humor,</td>
</tr>
<tr>
<td></td>
<td>Connections to own life/specific cases,</td>
</tr>
<tr>
<td></td>
<td>Anecdotes/examples,</td>
</tr>
<tr>
<td></td>
<td>Student Engagement</td>
</tr>
</tbody>
</table>

Figure 10. Conceptual Framework and TDOP Connections.

Figure 11 below lists the combined frequencies of observed TDOP codes. The codes were categorized by conceptual framework themes (Content, Pedagogy, Technology and Culturally Relevant Education) to assist with making connections across multiple data analyses. TDOP codes are listed from highest to lowest frequency across the three classroom observations.
### Frequency Content/P21 Skills

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Content/P21 Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>69%</td>
<td>PS – Students asked to problem solve</td>
</tr>
<tr>
<td>50%</td>
<td>PI – Peer interactions</td>
</tr>
<tr>
<td>46%</td>
<td>DW – Desk work</td>
</tr>
<tr>
<td>43%</td>
<td>SGW – Small group work/discussion</td>
</tr>
<tr>
<td>41%</td>
<td>SQ – Student poses question</td>
</tr>
<tr>
<td>15%</td>
<td>CR – Creating/open-ended idea or product</td>
</tr>
<tr>
<td>4%</td>
<td>SP – Student presentation</td>
</tr>
</tbody>
</table>

### Frequency Pedagogy

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Pedagogy</th>
</tr>
</thead>
<tbody>
<tr>
<td>85%</td>
<td>IDQ – Instructor poses question</td>
</tr>
<tr>
<td>75%</td>
<td>SR – Student responds to teacher question</td>
</tr>
<tr>
<td>44%</td>
<td>L – Lecturing</td>
</tr>
<tr>
<td>40%</td>
<td>LDEM – Lecture/demo of phenomena</td>
</tr>
<tr>
<td>35%</td>
<td>EMP – Emphasis/states something important</td>
</tr>
<tr>
<td>29%</td>
<td>LVIS – Lecture with pre-made visuals</td>
</tr>
<tr>
<td>22%</td>
<td>MM – Multimedia</td>
</tr>
<tr>
<td>19%</td>
<td>WP – Working out problems</td>
</tr>
<tr>
<td>18%</td>
<td>IND – Individual instruction</td>
</tr>
<tr>
<td>16%</td>
<td>SOC-L – Socratic lecture</td>
</tr>
<tr>
<td>15%</td>
<td>ORG – Organization/transitions/ connecting previous learning</td>
</tr>
<tr>
<td>13%</td>
<td>HUM – Humor</td>
</tr>
<tr>
<td>3%</td>
<td>LW – Lecture while writing</td>
</tr>
<tr>
<td>3%</td>
<td>A – Assessment</td>
</tr>
<tr>
<td>1%</td>
<td>IRQ – Instructor rhetorical question</td>
</tr>
<tr>
<td>0%</td>
<td>ICQ – Instructor comprehension question</td>
</tr>
<tr>
<td>0%</td>
<td>AT – Administrative task</td>
</tr>
</tbody>
</table>

### Frequency Technology

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>63%</td>
<td>CB – Chalkboard/whiteboard, smart board</td>
</tr>
<tr>
<td>51%</td>
<td>WEB – Website</td>
</tr>
<tr>
<td>34%</td>
<td>D – Demonstration equipment</td>
</tr>
<tr>
<td>24%</td>
<td>DT – Digital tablet</td>
</tr>
<tr>
<td>16%</td>
<td>M – Movie/video</td>
</tr>
<tr>
<td>1%</td>
<td>SI – Simulation</td>
</tr>
<tr>
<td>0%</td>
<td>PP – PowerPoint or other digital slides</td>
</tr>
<tr>
<td>0%</td>
<td>OP – Overhead projector/transparencies</td>
</tr>
<tr>
<td>0%</td>
<td>CL – Clicker response systems</td>
</tr>
</tbody>
</table>

### Frequency Culturally Relevant Education

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Culturally Relevant Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>62%</td>
<td>HI – High 50-75%</td>
</tr>
<tr>
<td>24%</td>
<td>VHI – Very high 75%+</td>
</tr>
<tr>
<td>22%</td>
<td>ANEX – Anecdote/example</td>
</tr>
<tr>
<td>18%</td>
<td>CNL – Connections to own life/specific cases</td>
</tr>
<tr>
<td>13%</td>
<td>MED – Medium 25-50%</td>
</tr>
<tr>
<td>0%</td>
<td>LO – Low, less than 25%</td>
</tr>
</tbody>
</table>

*Figure 11. Frequency of TDOP codes observed.*
Teacher Themes with TDOP

Each of the observed teachers presented not only a passion for their subject area, but also spoke of the ways they designed their lessons to engage students, including the various resources and devices used. This was evident in the TDOP data which showed that teachers were incorporating Smart Boards, Chromebooks, iPhones, Google Classroom, and several websites with online tools, quizzes and movies geared toward content learning. TDOP data showed the variety of pedagogical strategies teachers incorporated such as posing questions, making real-life connections, and giving students problem solving opportunities. Each of the teachers presented confidence in the use of technology and each shared ideas for seeking out new resources and tools to connect students with learning. Differentiation was evident in the classroom as teachers adjusted assignments to accommodate student needs. Learning environment was another theme that connected observations with interviews. Each of the teachers provided a supportive environment, both socially and academically.

The TDOP provided some limitations as it mainly focused on what the teacher was doing. It provides opportunity to observe how students are interacting verbally and looks at time-on-task, but it does not consider ISTE Standards or P21 Skills such as critical thinking, flexibility and adaptability, and social skills. These sub-categories were also minimally mentioned or were completed absent in interviews.

Similarly, while the TDOP does not specify the themes of Culturally Responsive Education, except for Engagement, there was observational evidence of Relationships, Rigor, Vulnerability and Asset-Focused Factors. Also, similar to the TDOP’s major
focus on pedagogy, all three classrooms were very teacher-led as opposed to being student-driven. Again, data collection was based on one class period each, so this may have looked different on another day.

**Conclusion**

Providing a 21st century learning environment that incorporates the use of instructional technology for learning, while meeting the needs of all students and expectations of stakeholders, is a complex endeavor. The necessary environmental, structural, and resource-laden factors are numerous and interwoven. Compounding this challenge is creating, sharing, implementing and living the vision district-wide. Perceptions of that vision and actualization of it may vary depending on job role. While participants were aligned in many areas, there were discrepancies in others.

Over the course of two weeks, the researcher experienced these learning environments, as well as heard the honest, vulnerable, and committed practices and dreams of its educators. The most prevalent themes that emerged across both data analyses included:

- Purposeful/intentional use of technology with focus on content, Empowering Learners;
- Teachers Designing and Facilitating learning opportunities;
- Providing supportive Learning Environments;
- Balance/cognizant of screen time;
Additional minor themes that were present included:

- Culturally Responsive Education - Personal human connections, Equity, Access, and being culturally responsive;
- Content – P21 Skills, ISTE standards for students;
- Pedagogy – Teacher adaptability, initiative, and desire to learn; Technology proficiency level, ISTE standards for teachers, SAMR model;
- Technology – devices, resources, professional development, and technology supports;
- Collaborating with stakeholders;

While common themes among participants include access to devices, intentional vision and purpose for using the devices to enhance content learning, providing a supportive learning environment to meet student academic and social/emotional needs, and having both technical and professional development supports; better defining each of these categories and their priority seems necessary.

The research question asked, “What are the perceptions of educational leaders relative to the integration of instructional technology at one alternative middle school?” Based on the evidence from this specific case study, educator perceptions vary in some areas, specifically regarding equity and access, clarifying what Next Generation students need to know and be able to do, and measuring instructional technology integration. What is viewed as important or prevalent to some may differ for others. Implications of this include:
• Sending differing messages to stakeholders;
• District leaders not representing the district as a whole;
• Misalignment with or varying interpretations of the district’s mission and vision; and
• Not providing consistent equitable Next Generation learning opportunities to all students.

There are multiple implications based on the study findings. Leadership preparation programs as well as current leaders need to emphasize the importance of revisiting vision, mission and goals each year as well as continuing to live by those standards. Given continual student population diversification, conversations around equity and access need to be ongoing. Leaders need to ensure that their definitions of equity and are inclusive and consistent. Districts and schools should assess their cultural proficiency; in other words, identifying educator biases based on areas such as culture, race, socio-economic status, and disability. Finally, with the many opinions of what 21st century teaching and learning should look like given the variety of frameworks, there may be inconsistencies across classrooms and schools. Continuing this discussion with stakeholders is also essential. Implications of these results are further discussed in Chapter 5.
Chapter 5: Discussion

Overview

In this descriptive case study, the researcher sought a deeper understanding of how leaders are implementing and realizing the shift from 20\textsuperscript{th} to 21\textsuperscript{st} century learning experiences. More specifically, this case study sought to explore educator perspectives regarding the integration of instructional technology in an alternative middle school. This study captured a snapshot of the lived experiences of teachers, coaches, and both school and district leadership.

Through observations and interviews, this collection of educators that spanned content areas as well as school building and district levels provided an overview of how instructional technology was integrated into the learning process as well as its very intentional use and differentiated supports. The Next Generation Teaching and Learning Model (Kohl, 2017) as well as the Literature Review provided a framework for common elements in a 21\textsuperscript{st} century learning system.

Themes that emerged from observations and interviews are discussed in detail in Chapter 4. In the initial data analysis, a collection of global themes emerged. The most prevalent themes included: the purposeful/intentional use of technology, the focus on content as opposed to technology, balance and screen time, equity and access, and having personal human connections. In addition, a commitment to meeting the needs of

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students, the community, and stakeholders was present. However, these were high level connections, thus the researcher determined it would provide more insights if the data were also more deeply linked to the conceptual framework by making connections to its sub-categories.

Data analysis and interpretation are discussed in this chapter. In addition, this chapter includes implications of study findings, limitations, recommendations for future research, and recommendations for educators. The chapter concludes with a closing statement from the researcher.

**Discussion/Implications by Conceptual Framework Themes**

Themes discussed were based on the Next Generation Teaching and Learning Model (Kohl, 2017) conceptual framework and its sub-categories as shown in Table 2. In addition, themes that emerged from the initial data analysis and participant perspectives are included and discussed below.

**High-Frequency Themes Common Across Participants**

**Instructional focus is on the content not on the tools.**

All participants shared a firm commitment to and vision for the intentional use of technology for learning that should be based on the content and not the technology; this was evident in both interviews and observations. Each of the teachers and district leaders discussed professional development opportunities for teachers to learn additional ways to incorporate technology to support their content areas. Interestingly, however, while the district has dedicated an exceptional amount of resources into supporting its 1:1 program,
there is no policy stating how or how often technology should be used. The district trusts teachers to incorporate it when and where it makes sense.

The National Educational Technology Plan (2016) explains the many benefits of incorporating technology into teaching and learning, such as equity and accessibility, research capabilities, closing the digital divide, helping learners pursue passions and interests, moving learning outside of the school walls, and providing engaging and relevant learning experiences. However, when discussing what students should learn, the plan speaks mostly of 21st century skills, and minimally mentions aligning instructional technology to intended educational outcomes.

It is also interesting to note that ISTE (2016) Standards for Students fails to mention content or academic standards. The essence of the ISTE standards is the how of learning instead of the what. ISTE (2016) explains “Because, ultimately, it's not about the technology at all. It's about changing the way learning and teaching takes place to make it more meaningful and impactful for educators and learners around the globe.”

The P21 Framework for 21st Century Learning (P21, 2015) includes not only the key subjects of reading, writing and math, but it also addresses standards and assessments. Content and skills need to be considered together, just as the teaching and practice of basic skills – decoding and arithmetic operations – need to accompany students’ inquiries and applications of what they are learning in real-world contexts (Darling-Hammond, 2010, p. 294).
Support of Student Technology Use.

It is very clear that Peakview School District has made a deep commitment to providing students access to technology. This district website explains that they have 20,000+ computers in use by staff and students. Through interviews, all participants discussed the different types of devices and resources used, their content-based intentional use, professional development opportunities, and current and desired supports. Through observations, there was evidence of students using Chromebooks to do classroom work using Google Classroom, graphic organizers, and other online tools.

Devices/Resources.

While participants discussed the many ways they are incorporating technology, the conversations were never around the idea that students needed to learn a particular device. Instead, participants continually discussed the ways in which these tools could support learning, engage students, challenge them to think critically and problem solve. Other areas worth mentioning are the challenges that come with devices including having replacements in case of damage, keeping kids on task instead of them having an online game up on another tab in the background, and ensuring devices are charged. Additionally, the district vision for the 1:1 program is to provide students access to digital tools that support investigation, communication, collaboration, creativity, modeling, and exploring concepts and content in authentic contexts. Similarly, the district is continually researching future curriculum options, many with digital components.
Supportive Learning Environments.

During classroom visits teachers talked about their current learning environment characteristics. They mentioned aspects such as inquiry-based, challenging, differentiated based on student need, high expectations, student accountability, emotionally supportive, and comfortable. There was little discussion about technology. Evidence of each of these characteristics was present across all classrooms, including technology which was infused throughout the lessons. In the follow up interviews, each teacher was asked, “If you had unlimited funds and magic, how do you envision the ideal learning environment for students and teachers?” Teachers described technology tools and resources, training, and then branched into more magical ideas like adding a greenhouse, planetarium, and Magic School Bus.

The building principal described a dual environment that included both indoor and outdoor spaces, field trip opportunities providing sensory experiences in the outdoor world, and making sure students had all of the supplies and gear they needed. In addition, things like MacBook Pros were added to the wish list.

District leaders discussed the ongoing need for personal connection and included opportunities for students to connect with experts, incorporate project based learning and blended learning, and eliminating seat time in exchange for standards-based competencies. Additionally, there was discussion around just-in-time and personalized learning where students would have access to whatever they needed in that moment. Also, teachers would have more access to professional learning conferences.
In Bellanca and Brandt (2010), Gareth Long asserts that new learning environments should be built and designed with agility in mind, with the capability of continuous reconfiguring. They should support project-based learning and the need for movement during longer lessons and interdisciplinary coursework, in addition to supporting 24/7/365 use.

**Flexible and adaptable teachers designing and facilitating learning.**

**ISTE-Standards for Educators.**

Similar to the discussion on ISTE standards for students, none of the study participants mentioned ISTE or any of the standards. However, there was evidence across the interviews that the work being done could be categorized by the educator standards, which are identified as Learner, Leader, Citizen, Collaborator, Designer, Facilitator, and Analyst (ISTE, 2017). Given these are recently refreshed standards it is not surprising that they were not specifically mentioned. However, each of the teachers shared a variety of examples that touched each of these areas. All of the participants had high frequency connections to about half of the standards. The most common standards were Learner, Leader, Designer and Facilitator. The least commonly mentioned standards were Citizen, Collaborator, and Analyst.

Based on data collected with the TDOP, technology was incorporated in a variety of ways including use of the Smart Board, websites, Chromebooks, iPhone camera used with slow motion, movies demonstrating phenomena, use of online tools/resources, and online formative assessments. Conversations also included discussions about social media and digital citizenship.
While the school district’s website offers links to the ISTE Standards, it is unclear if they are discussed in professional development meetings as something teachers should incorporate into their practice, consider, or if they are even mentioned.

**Adaptability.**

The importance of teachers being adaptable was a common theme across all participants. From the many vignettes shared in interviews, there was a common thread of changing teaching practices as new technologies were introduced. For example, in the study school, teachers received new document cameras that had the capability to zoom in, take pictures, freeze frame and make videos. One teacher’s classroom changed dramatically when she received coaching on how to implement its use. Another example with the 1:1 program is the use of Google Classroom; its use is prevalent throughout the school.

When teacher participants were asked what they would do if they were transferred to a classroom, school or district with limited or no technology resources. All answered with how they would adapt. One teacher discussed modifying their classroom to be more group-based learning where less tech devices could be used in group work. They would also incorporate a Bring Your Own Device (BYOD) program, using students’ phones to enhance learning. Another teacher discussed shifting to different resources such as textbooks, overheads and making copies, but said, “You can make it work.” The third teacher said she would bring in her own laptop and write grants for additional technology resources. All of the teacher participants seemed flexible in both creating engaging
learning experiences as well as adjusting to meet students where they were emotionally each day.

**Initiative/Desire to Learn.**

Another common pedagogy theme was teacher initiative/desire to learn, specifically finding a gap and filling that need. All three teacher participants shared examples of how they reached out to fill a need, solve a problem, or learn new ways to incorporate technology to enhance lessons. Each mentioned continually looking for new phone apps, websites and/or online technology tools to try. Additionally, each teacher discussed a variety of professional development/learning opportunities including Tech Talks, workshops, professional learning communities, and support from the building technology coach. Similarly, each of the leader participants mentioned teacher initiative and desire to learn as qualities that may play a role in the hiring process.

**Professional Development and Technology Proficiency.**

**Professional Development.**

Professional development was a major theme across interview conversations, specifically the availability of targeted professional development based on content areas, differentiation based on user need, and educator adaptability. District leaders frequently mentioned that their offerings are focused on content instead of on the digital tool. Understandably, with the initial 1:1 launch having a literacy focus; it is not surprising that this content was a strength area for professional development. While Tawnie discussed the availability of other content area/technology training options, Sophie stressed that there is still a major need to develop more trainings targeted to math.
Something less clear, based on conversations, was how teachers learn new hardware. Jordan discussed helping other teachers when new document cameras were made available to staff, but interestingly there was little conversation regarding formal training on new hardware in the district. Similarly, although each of the three teacher participants mentioned attending district technology trainings and professional learning communities, they mostly spoke of seeking out new resources and learning on their own. While initiative to learn was seen as a positive for all participants, this could potentially create issues if the new knowledge or tools found by teachers were in conflict with district-approved resources.

It was also noted that the district instructional technology coaches were supportive in the areas of providing trainings based on need, specifically offering opportunities for one-on-one, side-by-side, small group/team, school-wide, as well as district-wide options. During their trainings, the coaches often stress to teachers the need to adapt, as tools and resources are constantly changing.

**Technology Resources and Supports.**

The district’s instructional technology department provides a multitude of online resources such as: upcoming trainings, newsletters, instructional model graphics (TPACK, SAMR), links to ISTE standards, listings of a variety of support options, as well as links to various resources. In addition, the district offers local device repair to schools when they have damaged equipment. When the researcher visited the administration building to conduct interviews, she was introduced to an onsite technician. This person worked in a tech lab and was responsible for repairing defective equipment.
To support their extensive internet needs, Kevin discussed having a solid infrastructure. The district website explains that they have a fiber-optic network with Gigabit connectivity as well as a Wi-Fi service to support BYOD or bring your own device initiatives.

To provide oversight to the district’s vision and mission for their 1:1 initiative, the Educational Technology Advisory Committee meets monthly to plan, advise, guide priorities, and assess and communicate the status of the program to the school board on a regular basis.

**Personal human interaction – Adult to Adult.**

The importance and impact of personal connections came up frequently in interview conversations, both between students and adults, and also adult-to-adult. The district instructional technology coach discussed building relationships and trust with teachers which in turn supported their professional learning. Similarly, the director of technology mentioned the power of adults connecting to support one another, and specifically the power that comes from colleagues learning from one another. He mentioned that some of the best learning comes from watching the teacher across the hall. Darling-Hammond (2010) asserts that teachers are more likely to try classroom practices that have been modeled for them in authentic settings. Rogers (2003) explains that potential adopters look to Early Adopters for advice and information, often considering them “the individual to check with” prior to adopting an innovation. Similarly, the Early Majority group provides interconnectedness in the system’s interpersonal networks.
It is important for schools to continue to foster opportunities for teachers to work and learn together. The P21 Framework (P21.org, 2015) suggests each school “Enables 21st century professional learning communities for teachers that model the kinds of classroom learning that best promotes 21st century skills for students” as well as “Support professional learning communities that enable educators to collaborate, share best practices and integrate 21st century skills into classroom practice.”

**Teachers’ technology proficiency level.**

Another common discussion topic was teachers’ proficiency level in regard to using technology. This was discussed in a variety of ways: general knowledge, expectations, and derailing a lesson when used poorly. However, only one of the study participants mentioned this in regard to formal evaluation. Kevin shared:

> We use a couple different ways to measure technology adoption. In this regard, the state has done a very nice job, and I’m referring to the state’s teacher professional standards rubric. Teachers who are in public schools, depending on their district, there’s a rubric about teacher proficiency and teacher performance. And what I like is that there are five performance descriptors: basic, partially proficient, proficient, accomplished, exemplary. This is a vast simplification but F, D, C, B, A. Kind of along that performance continuum and this is element 3D for your research and teacher performance. But the important piece toward the two highest performance levels is that the students are using the technology to augment their learning, not the teacher using technology to present content because ultimately we need to transfer that ownership to the students. And this is
not an either/or piece, it should be happening simultaneously. Teachers are bringing in digital assets, they’re using their whiteboards, they’re using projectors, they use data collection systems like Google Forms to get information. But then the students are ultimately producing information and deepening their learning with the devices. So that’s our measurement indicator.

None of the teacher participants made a connection to this rubric in their interviews, so it would be interesting to learn if and how this supports their practice and growth in this area.

**Mid-Level Frequency Themes**

**Supporting students’ social/emotional skills.**

Given that the study took place at an alternative school, it was not surprising that the topic of supporting students’ social/emotional needs was prevalent among the principal and teachers. District leaders also frequently mentioned the importance of personal connections for students and not isolating them with technology.

**Personal human interaction - student to adult.**

All of the school-based study participants discussed characteristics of typical students that choose to enroll in the alternative school and how teachers connect with students to address their needs. In discussing the common strategies of successful schools, Darling-Hammond (2010) identifies five features including structures that allow for personalization and strong relationships. She explains:

The schools’ efforts to ensure that students are well known include the construction of small learning communities; continuous, long-term relationships between adults and students; advisory systems that systematically organize
counseling, academic supports, and family connections; and small class sizes and reduced pupil loads that allow them to care effectively for students (Darling-Hammond, 2010, p. 246).

One participant shared the shift of the teacher being the keeper of knowledge to now being a facilitator or coach in the social learning environment. Christensen (2008) explains that with the help of instructional technology resources in the classroom, teachers will have more time to move from student to student, acting as a learning coach and tailoring the learning approach that makes the most sense for the student. This practice was evident in all three classrooms.

With the proliferation of devices and access to students, two participants expressed the importance of human connection and the social nature of learning. Learning is social; teachers should provide a supportive environment that fosters opportunities for interactive learning (Bellanca and Brandt, 2010). One of the district leaders asserted:

I’m detouring a little bit but the research around distance learning programs is very...the research is good, but what it points to is that distance learning is dismal. Course completions are really bad. Student satisfaction with distance is really poor. Student transience in distance programs is incredibly high. So while digital resources are great, students need to feel a deep sense of connection in context and community and teachers have to build that. That’s an incredible challenge for teachers because digital assets can be isolating and individualized, so how can you leverage the best of that in a face to face world.
Balance.

Balance/amount of screen time was another common theme in this study across all conversations. A few participants discussed the need to give students 21st century and technology skills while still ensuring they are getting their social/emotional needs met and having opportunities to connect with others. One participant reiterated the need to continue to ask ourselves about the intentionality of how we are using technology in learning. Intentionality and human contact were main themes that emerged from interviews, thus balance is an important consideration when integrating technology.

In their policy brief, Blum-Ross and Livingstone (2016) discuss several factors related to screen time including the increase of device availability and their addictive nature, parent concerns of online safety and cyberbullying, and concerns regarding potentially negative health and developmental effects from increased screen time. Given these issues, parents were also concerned about providing digital age opportunities for their children so they would not get left behind. While they assert that the assessment of digital needs and issues does not have a one-size-fits-all solution, Blum-Ross and Livingstone (2016, p. 4) suggest:

The emphasis on screen ‘time’ is misleading. Past advice for parents focused on the amount of time children spent with digital media, referencing evidence of the ill effects on children’s physical health. But indicators of wellbeing concerned with social relationships, learning and engagement or self-esteem are harder to measure. We argue that this long-held focus on the quantity of digital media use is now obsolete, and that parents should instead ask themselves and their children questions about screen context (where, when and how digital media are accessed), content (what is being watched or used), and connections (whether and how relationships are facilitated or impeded).
The study district should be acknowledged for recognizing and being cognizant of the need for balance, screen time and intentional use of technology. Additionally, they should be commended for including parents and the community in on the conversation, as well as providing avenues for resources and continued learning.

**Program Implementation.**

Another common theme was the process of implementing the 1:1 program. While it has been several years since the launch of the 1:1 program, all of the participants made reference to how this practice has influenced and evolved teaching and learning.

Implementation began with conversations at the district level with stakeholders. The Educational Technology Advisory Committee, a steering committee was created to set the culture and direction of learning technologies in the district. Nearly 10 years ago, district leaders launched a pilot of the 1:1 program at the fifth grade level. At that time, 1:1 meant a cart of laptops in the classroom, and they chose Language Arts at the best fit. One of the district-level participants explained, “There was a great and natural connection between writing practices, especially process writing, pre-writing, drafting, revisions, editing and publishing, and digital technologies.” The focus has always been on content and how the technology tools could support the learning process.

The initial pilot was closely monitored and the following year the program was expanded to sixth and ninth grade as well. The implementation was systemic. Tawnie explained:

While here our first kick into technology for teachers was Inspired Writing which was 100% writing and the way we supported teachers was a systemic way of
having all fifth graders, so every elementary school was represented, all 6th graders so all middle schools were represented and all 9th graders. So the initiative of technology - every building had buy in, and it was completely content-focused, so all resources were on graphic organizers and pre-writing skills, and how do you draft, and how do you edit, and how do you publish. It was all talking literacy and not talking tech. So I think that language helped teachers.

Today, 1:1 devices are available in this district to all middle and high school students, including check-out for home use. All third-fifth grade students have access to Chromebooks during the school day. With fifth grade teachers being the pilot group, they are now considered the experts with regard to technology integration. Teachers have multiple opportunities to improve their practice including professional development, Tech Talks, requesting one-on-one or team coaching, and many learn from one another.

A teacher participant explained, “I feel like it’s just become part of what we do as not so much something different.” With ten years of 1:1 programming, a solid commitment to being an instructional technology leader, an inclusive steering committee, and a long-standing history of excellence, the district culture is one of providing teachers with all of the tools they need to enhance their teaching with technology.

**Equity and access.**

Equity and access were topics mentioned by all participants. Several interviewees mentioned the affluence of the district at large; however, the student population of the alternative school represented a wider spectrum. One participant mentioned that the
district as a whole is seeing increases in diversity, both culturally and socio-economically; however, the state department of education actually reported 1-3% decreases for free and reduced lunch, special education and gifted and talented student categories from 2011-2016. The district at large maintains a student population of approximately 73% White and 17% Hispanic students. Leah, the school principal, shared that the alternative school’s Hispanic student population is significantly larger than the district average, as is the percentage of students receiving special education services.

This data raises questions around the difference in student demographics between the alternative school and the district. While students choose to opt-in to the alternative program, one might ask about the circumstances with which they are unable to succeed in the traditional school setting. This also suggests possible over-representation of students of color and/or culturally and linguistically diverse learners in the alternative school setting. Similarly, the U.S. Department of Education’s Office of Civil Rights (2014) reports that students of color and students with disabilities have significantly higher rates of suspension and expulsion than White students.

If in fact the district is seeing increases in diversity, Salend and Garrick Duhaney (2005) recommend:

They can strive to be culturally competent educators who support student learning and family involvement by delivering a wide range of effective, culturally responsive services within the general education program and engaging in activities that increase their understanding of diversity and their ability to interact with others in culturally sensitive ways (p. 219).

Darling-Hammond (2010, p. 270) asserts that districts must find ways to foster innovation and responsiveness without compromising equity, access, and the public
The purpose of schools is to prepare citizens who can live, work, and contribute to a common democratic society.

The alternative school faculty shared challenges when considering student access to devices. The school leader discussed the policy:

We work with a lot of families who have a lot of financial struggles. So, most of our students do not have computer access when they go home. Many of them do not have internet access. And so it’s trying to respond appropriately. That’s where every other middle school checks out their Chromebooks for the entire year and students take it home. That also concerns me about access when you have lack of supervision sometimes at home. So students can check out their Chromebooks if there’s a purpose, but other than that they leave them here at school.

Leah further clarified, that the staff came together several years ago to discuss the Chromebook take-home policy. Since the school’s philosophy does not support nightly homework, students have the opportunity and choice to take Chromebooks home, but she explained that many students choose not to and leave them at school. Additionally, many students did not have internet access at home; however, the local library responded by offering students hot spots on a check-out basis.

All school-based participants discussed the fact that their students were generally not allowed to take Chromebooks home as they historically found that devices would get damaged or would not be returned. However, in certain situations, some students were allowed to check them out overnight. Staff made comments such as: “We don’t allow
our students to take their laptops home…our kids wouldn’t bring them back or they would come back messed up.” “Students would take better care of Chromebooks if they had some ownership over them.”

This brings up major concerns not only about the inconsistent understanding of the school’s Chromebook check-out policy, but more significantly about teacher perceptions of students. Blanket statements about the way a student population might do something are discriminatory and are surprisingly alarming given the mission of the alternative school which suggests maximizing student success. Singleton and Linton (2006) explain, “Rarely is intentional discrimination the central problem in the teacher-student relationship; rather, the discrimination includes unquestioned assumptions on the part of the institution within which these interactions take place” (p. 42). Schools should address their biases toward non-dominant cultures and work toward cultural proficiency.

One of the teachers discussed the implications of Chromebooks staying at school: There’s a good debate out there on whether or not we should allow our students to bring those Chromebooks home, and we don’t allow students in this program to bring them home, because lots of things happen at our students’ homes. So those Chromebooks stay here…If all the students had them at home, I could assign different things for them to do outside of class, whether that was a graded homework assignment or something to keep them busy and give them an option for something other than what they might have been doing otherwise.
In their study regarding students’ use and value of technology for learning, Beckman, Bennett, and Lockyer (2013) reported that students with access to fewer technologies in their home field exceedingly valued their school-issued laptop. This presents another equity issue as traditional students in the district have opportunities to engage in collaborative homework assignments, while the alternative school students do not.

Other issues mentioned regarding access included this district leader’s explanation of challenges and solutions:

There have been intermediary challenges and solutions. Four years ago, the district saw the online state assessments coming down the road, and we have a value of how can we be as minimally invasive to the instructional environment and not interrupt schedules and class time and all that kind of stuff around an online test. The solution is the more computers you have, the quicker you can get through testing, and how theoretically how better prepared you are for testing, and so on. So the short side to the solution would have been to put more computers in the classroom, but we quickly realized that we have so many computers in the classroom, it’s not that big of a jump to just go to a 24/7 model. So we heard from teachers. Teachers questioned the amount of access kids had at home, so being in this district in the context of things we’re fairly affluent. We are not the surrounding districts, so we’re more affluent, but we knew there were gaps of access. So if we could guarantee access to students to a device, would they commit more to a digital world, and the results are good, they told us yes if there
was a guaranteed playing field. Teachers do not want to build two sets of lesson plans - one for your digital learner and one for your non-digital learner. That’s an unfair burden to teachers. In fact it’s an unfair burden to the students to compete against the kids with these resources. So equity was certainly one of the reasons behind district implementation, and then just leveraging those resources we felt we had to do.

With so much conversation across participants regarding equity and access, it is difficult to consider the alternative school students as a part of that district vision. The refreshed ISTE Educator Standards (ISTE, 2017) make mention of equitable access in their Leader category: “Advocate for equitable access to educational technology, digital content and learning opportunities to meet the diverse needs of all students.” However, when the district speaks of providing access to all students, this does not seem to be the case. All students may have access to technology during the school day, but alternative school students do not have the extended learning opportunities that traditional students receive.

**Minimal or Absent Themes**

**P21 Skills.**

In reviewing the P21 Framework for 21st Century Learning (P21, 2015), it actually captures many of the themes that emerged from this study. It includes the essence of the original ISTE Standards for Students (ISTE, 2016) such as Creativity and Innovation, Communication and Collaboration, Research and Information Fluency, Critical Thinking, Problem Solving, Decision Making, Digital Citizenship and
Responsibility and Technology Operations and Concepts. In addition, the Framework identifies and emphasizes the importance of Life and Career Skills; Information, Media and Technology Skills; core subjects (reading, writing and math), 21st century themes such as Global Awareness, Economic, Civic, Health and Environmental Literacies; Standards and Assessments; Professional Development, and Learning Environments (P21.org, 2015). Each of the participants mentioned a variety of essential P21 Framework Skills such as: Initiative and Self-Direction, Critical Thinking and Problem Solving, Social and Cross-Cultural Skills, Communication and Collaboration, and the Life and Career Skills of Flexibility and Adaptability.

Bellanca and Brandt (2010) explain that the skills in the P21 Framework are rarely incorporated deliberately throughout the curriculum and are not routinely assessed. They assert that the skills are taught unevenly as they are considered “nice to have” instead of “must haves”. The secondary data analysis results align with this statement. It was found that most participants mentioned Problem Solving and Collaboration, but rarely discussed the majority of the other skills. Similarly, when Problem Solving and Collaboration came up, they were just surface level topics that students were doing. There was little mention about the how or why this was important.

Interestingly, the P21 Framework (P21, 2015) makes minor mention of Equity and Access, and no mention of this study’s other major themes: Intentional Use, Balance of Screen Time, and Personal Human Connections. These themes are less about what students are learning, and more about structures and frameworks. The Framework
discusses students communicating, collaborating, interacting and working with others,
but does not mention building relationships or connecting on a deeper level.

**SAMR.**

SAMR (Puente, 2014), which stands for Substitution, Augmentation,
Modification and Redefinition, is another framework aimed at determining the level of
technology infusion as it supports digital learning experiences. SAMR was another
minor pedagogy theme that was mentioned by two participants in the course of
interviewing. One described the varying levels of technology integration and another
participant explained that while she was truly trying to incorporate technology in
innovative ways, other teachers were on the substitution level – basically just making
worksheets digital. Kevin explained, “It’s when teachers learn how they can create
products and projects that only digital technologies bring to fruition that they fully master
the pedagogy of technology.”

It is unknown if the SAMR model (Puente, 2014) has been shared with
teachers, but this would make for an interesting conversation topic in professional
learning meetings and workshops.

**Culturally Responsive Education.**

While the study district is not highly culturally or socio-economically diverse, this
is reportedly changing. Given this shift, another common theme was responding to the
needs of the community. Culturally Responsive Education (Stembridge, 2015) looks at
how Engagement, Relationships, Cultural Identity, Vulnerability, Asset-Focused Factors,
and Rigor are addressed in the planning and delivery of learning experiences. While
many of these themes were not specifically mentioned, many were addressed in conversations.

Classroom culture and climate are an essential foundation for fostering culturally responsive education. Jay McTighe and Elliott Sief (as cited in Bellanca & Brandt, 2010, p. 167) suggest:

The climate of classrooms devoted to 21st century outcomes encourages intellectual risk taking and active meaning making. Mistakes are seen as growth opportunities, rather than failures. Students engage in the learning process in order to construct meaning, individually and collectively. They are encouraged to ask questions, offer their ideas, discuss their understanding of a principle, give feedback to each other, and create and share their thoughts ad opinions.

This vision would require educators to consider most, if not all, of the culturally responsive education themes while creating the safe learning environment in order for this to be actualized. Stembridge (2015) suggests that teachers should plan lessons with these equity-based questions in mind:

- Cultural Identity – in what ways does instruction make reference to culture?
- Asset-Focused Factors – How are students’ strengths leveraged in instruction?
- Engagement – How does instruction engage students behaviorally, affectively, and cognitively?
- Relationships – How does the lesson and instructional design further build community in the classroom?
- Vulnerability – What environmental risk factors does this student face and what protective factors are in place to mitigate those risks?
• Rigor – In what ways are students led to construct their own meaning and interpretations from content?

On a larger scale, Shields (2013, p. 121) suggests a deeper, broader vision for transforming schools:

• the mandate to effect deep and equitable change;
• the need to deconstruct and reconstruct knowledge frameworks that perpetuate inequity and injustice;
• a focus on emancipation, democracy, equity, and justice;
• the need to address the inequitable distribution of power;
• an emphasis on both private and public (individual and collective) good;
• an emphasis on interdependence, interconnectedness, and global awareness;
• the necessity of balancing critique with promise;
• the call to exhibit moral courage.

Shields’ vision, while seemingly daunting, is an admirable charge that will take time; however it should be at the heart of every school’s work.

**ISTE Standards for Students.**

ISTE (2016) self-proclaims to be the creator and steward of the definitive education technology standards. While none of the study participants explicitly mentioned ISTE or their student standards, many of the themes (Empowered Learner, Digital Citizen, Knowledge Constructor, Innovative Designer, Computational Thinker, Creative Communicator and Global Collaborator) were discussed in various ways. All participants mentioned the need for students to be critical thinkers, collaborators, and
problem solvers. These concepts were part of the original ISTE student standards. The 2016 refreshed standards (ISTE, 2016) go broader and deeper into the vision for how students design and function within their learning environment, and also how they are connecting with the world.

In addition to critical thinking, collaboration, and problem solving, the essence of the interview conversations discussed the need for students to be creative, to responsibly manage social media, to determine what information is credible, to provide opportunities to interact with technology, and have a variety of ways to show and share their thinking. This, of course, is in addition to gaining math, literacy and other content knowledge.

Given the student population at the alternative school, most participants shared the need for students to be able to manage their emotions, have personal connections with adults and other students, as well as balance.

**District Leaders High-Frequency Themes**

**Parent supports.**

The theme of parent supports predominantly came from district leaders. Parent input and feedback are commonplace in the study district and school. Parent surveys are sent out yearly. The alternative school setting works with families who have higher financial struggles, so the school works to respond to their various needs. In addition, the community/local library responded to the need for internet access by providing a program where families could check out hot spots on a regular basis.

One of the biggest concerns among families has been the concern around screen time. The school engages parents in conversations at their Parent Advisory Group
meetings. In addition, the district has responded to parent needs in a number of ways. With students first accessing the 1:1 program in 3rd grade, school staff has informational meetings at the beginning of the year to talk about vision, expectations and boundaries. Parents are given resources such as how to set up a family digital media plan. Another example of responding to parent needs was providing supports and resources around cyberbullying at the high school level. While this was not seen as a huge problem, the schools and district still felt it was important to address.

Will Richardson (as cited in Bellanca & Brandt, 2010, p. 301) explains:

These changes require that schools bring parents and community members deeply into the conversation, helping them understand the ways in which our times look drastically different from recent history and explaining the new challenges of preparing students for the 21st century. A first step for schools is to become a node in the parents’ learning network, modeling transparency and sharing, asking for input, and acting as a filter for reading and viewing that parents might find informative or provocative.

**Leadership and staff culture.**

It is clear that the district has embraced the integration of technology and has an expectation that teachers are using it to enhance learning. Multiple supports have been put into place to sustain this program including providing 1:1 devices from 3rd grade through high school, offering a multitude of professional development opportunities as well as other means of learning supports, providing parents with information and resources to make decisions about what is best for their children, a commitment to equity and access, as well as having ongoing conversations about balance between screen time and human connections.
Interesting to note, one participant asserted that school principals do not need to be tech savvy; however, they do need to provide the environment, support and encouragement to keep moving forward. The instructional coach, on the other hand, is a major driver of incorporating instructional technology; they have a lot of influence in their schools. When considering hiring in-district teachers, conversations are held about the potential newcomer’s tech savviness.

**Limitations**

This study had multiple limitations. First and foremost, it was conducted in a self-described affluent school district that implemented a 1:1 device program nearly a decade ago. Data collection took place at an alternative school in the course of two weeks and was based on the school’s desire to take part in the study, as opposed to a more traditional school setting. Participants were selected based on purposive sampling and consisted of three non-language arts teachers. The district is not very culturally diverse, and the school had a small student population.

While many districts and schools do not offer a 1:1 device program, most schools have increased their number of devices in response to the recent online state assessment requirements. It would be interesting to conduct this study in a variety of other districts to compare the conditions for instructional technology integration in teaching. The researcher hypothesizes that many of the study findings would be consistent, such as district/school vision, availability of devices, and professional development offerings. However, the human connection, environmental and equity factors would be of most interest.
Recommendations for Future Research

This study was a small snapshot into looking at the conditions surrounding educators as they integrate technology into their teaching, specifically at an alternative school. All of the following topics were mentioned during participant interviews and would warrant further investigation.

**Student and parent perspective.**

This study solely sought out the experiences and opinions of educators. It would helpful to learn how students and parents view not only the 1:1 initiative experience, but also the use of technology in learning in general, as well as their experience from an alternative school setting lens. It was mentioned by a few participants that some parents prefer their students use non-technology tools in certain circumstances. It would be interesting to get their personal point of view on the district’s vision and delivery of the 1:1 program as well as their suggestions for improvements/changes.

**Techquity.**

#Techquity is a fairly new concept, labeled by Joe Dillon of Aurora Public Schools. When searching #Techquity on Twitter, it has different definitions and meanings for different users. For some, it is about closing the digital divide. For others, it is creating opportunities of equity through technology. Given our conversations around equity and access, it would be beneficial to research this work, particularly looking at it from an alternative school setting lens.
Culturally Responsive Education and Technology.

Dr. Yemi Stembridge (2015) has worked closely with schools across the country to share his experience, thinking and planning with the Culturally Responsive Education themes of Relationships, Rigor, Cultural Identity, Vulnerability, Engagement, and Asset-Focused Factors. Similar to Techquity, it would be enlightening to study the intersection of the CRE themes and instructional technology use.

Culturally and Linguistically Diverse students and Technology.

While the study site was not very culturally diverse, their student population spanned a variety of spectrums such as socio-economic, behaviorally, and academically. In recalling conversations with two of the participants, they discussed technology supports such as students listening to text being read while they followed along reading the text. This idea would help bilingual students who are learning English. Given our growing diverse linguistic population, it would be helpful to learn more about the ways in which technology is supporting our culturally and linguistically diverse students.

Student Achievement Based on Content with and without Technology.

The study district implemented the 1:1 initiative in writing ten years ago. Many of the other content areas have incorporated more and more digital resources and curriculum. However, the math teacher participant struggled with ways to effectively use technology in her content area. She found that sometimes trying to use digital tools took much longer or slowed down the lesson. The district has conducted and been a part of several studies around their writing program, but it would be interesting to learn if and how technology has improved student achievement in other content areas.
**Personalized learning.**

ISTE (2016) has been a huge proponent of personalized learning for some time. With the idea of the one-size-fits-all teaching concept a thing of the past, it is of interest to learn how far the reality of personalized learning has progressed. Computer programs are able to assess and provide students with targeted lessons, but it would be enlightening to know if and how public schools are currently finding success with this concept.

**Mindfulness.**

As an alternative school, the study site deals with behaviorally-struggling students on a regular basis. As part of their programming, students receive lessons on mindfulness. Hornich-Lisciandro (2013) explains that while educators teach students how to organize their “stuff” related to learning, they rarely teach them how to organize their thoughts and soothe their anxieties. Similarly, Shields (2013) discusses how students are faced with a world full of volatility, uncertainty, complexity, and ambiguity. It would be supportive if educators could learn how using mindfulness in schools is benefitting students.

**Recommendations for Educators**

**Teacher and Principal Preparation Programs.**

Recently the researcher taught an Educational Technology for the Early Childhood Classroom course at a local state university. The goal was to give pre-service teachers background on the research behind topics such as screen time, content, and safety. In-service teachers were invited in as guests to share the variety of technology tools they use in their everyday teaching. Surprisingly, many of the college students were
most concerned with learning how to use the interactive whiteboard as opposed to the research or other technology resource options.

Given this knowledge, the study district should be commended for stressing not only the focus on content as opposed to technology tools, but also the reality and need for adaptability. Nothing stays the same for long, especially when it comes to technology. These common themes should be shared in both teacher and principal preparation programs. Additionally, the district was cognizant of creating an inclusive educational technology steering committee comprised of members who represented students, teachers, parents, administrators, district staff, and community members.

The study district was and continues to be very aware of its stakeholders’ needs and expectations, and includes them in the assessing, planning and monitoring of its programming. It is also suggested that those stepping into educator roles be enlightened with teachings around Culturally Responsive Education so that they may lead the work and provide a moral and equitable learning environment for every student.

**Measuring Instructional Technology Use.**

While the study district was very transparent in sharing their achievements and multitude of instructional technology resources, it seemed surprising to learn that they do not “technically” require teachers to use their technology. Posted on the instructional technology website, one can find links to the TPACK Framework, SAMR Model, and the ISTE Standards; however, it seems it is not a requirement for teachers to concern themselves with any of these resources. Tawnie mentioned the district surveys teachers about their technology use, and Kevin shared that the state teacher evaluation system has
a technology standard and associated rubric. However, overall there seemed to be a disconnect between the amount of resources supporting the use of instructional technology and the expectation of use. Also interesting to note, in conversations regarding hiring there was an underlying expectation that teachers have some level of being tech savvy and open to learning. Given the district’s investment in their writing program and 1:1 initiative, it seems there should be more of an expectation regarding the level of instructional technology use. With the many frameworks available, it should be fairly easy for the steering committee to compile a continuum of instructional technology implementation.

**Equity and Culturally Responsive Education.**

Throughout the course of data collection, the theme of equity was a constant. The district’s mission was to ensure equity by providing all students in grades 4-12 access to digital learning. Middle and high school students were further given the opportunity to take Chromebooks home to extend their learning and access. Given the school’s philosophy and policy on allowing students to regularly take the devices home, it seems as though equity stops with the traditional schools.

Teachers at the alternative school believe there is a blanket policy that no alternative middle school students can take home Chromebooks, except on special occasions. This is in conflict with the school leader’s description of the policy. This is an area that is recommended for further investigation. Not allowing alternative school students to take home Chromebooks would be a discriminatory practice that is contrary to the district’s espoused values. ISTE Administrator Standards (ISTE, 2009) list an
element under Digital Leadership that states: “Ensure equitable access to appropriate digital tools and resources to meet the needs of all learners.” Also given some of the staff comments generalizing how students treat the devices, perhaps this is opportunity for coaching.

Given the ongoing diversification of our population, it is recommended that the district have conversations regarding Culturally Responsive Education. The Six Themes of CRE (Stembridge, 2015) provide a framework for planning lessons with students in mind. While Engagement, Relationships and Rigor are areas that are commonly present in teaching, the ideas of Cultural Identity, Asset-Focused Factors and Vulnerability are not. For example, if intentionally planning with students in mind one should be asking questions such as: How does instruction allow students to draw from their cultural knapsack? In what ways are students encouraged to understand their strengths and tendencies as learners? How does the lesson and instructional design encourage appropriate risk-taking? The study of Culturally Responsive Education may serve as a proactive way to accommodate the diversification of student and family populations.

**Cultural Proficiency.**

Given the evolving diversification of students in schools, the school district should consider incorporating a program on cultural proficiency. If schools claim to provide education that supports all learners, they need to investigate the ramifications of that belief. Do all staff members believe that every child can learn and achieve? Do staff members hold discriminatory biases toward particular demographic groups or their
families? By identifying these issues as well as learning ways in which to engage diverse families, schools and students can benefit from its community assets.

Conclusion

The purpose of this study was to explore educator perspectives regarding the integration of instructional technology in an alternative middle school. The research question asked: What are the perceptions of educational leaders relative to the integration of instructional technology at one alternative middle school? The conceptual framework was constructed by integrating several current 21st century learning models, most of which were provided as resources on the study district’s website. The main categories of the framework include Content, Pedagogy, and Technology while integrating the concept of Culturally Responsive Education. The district’s mission and vision discussed educating all students for the future. By interrogating how educator perspectives aligned with the conceptual framework, themes emerged as to their successes and gaps in educating all students for the future.

While many of the conceptual framework’s components were not identified by specific name, participant responses addressed the majority of categories and sub-categories. The secondary round of data analysis provided slightly varied perceptions among participants; however, this information was not surprising given the differing job duties and foci. The researcher found evidence of common perspectives in responses, as well as the omissions of particular categories in participant interview transcripts.

The district demonstrated evidence of a number of positive themes throughout the implementation of their 1:1 program. It was clear that the study participants were
integrating instructional technology for learning, and as one participant stated, “It is just what we do.” The main themes of instructional technology integration were:

- District-wide focus on the intentional use of technology that focused on the content instead of the tools, including the ongoing conversations around balance and screen time;
- Technology use proficiency including professional development, teacher adaptability/initiative/desire to learn, opportunities for adults to learn together and from one another, other tech supports;
- Teachers Designing and Facilitating learning opportunities;
- Providing supportive Learning Environments;
- Collaborating with parents and other stakeholders, providing them with resources;
- District-wide commitment to ensuring equity and access of devices and resources to all students; however, the researcher recommends further investigation into this topic as well as Culturally Responsive Education and Cultural Proficiency.

Alan November believes that “the opportunity before us is to redesign the culture of our schools to empower students to take more responsibility for managing their own learning and to work collaboratively with classmates and people around the world” (In Bellanca & Brandt, 2010, p. 283). This culture of learning vision assumes a few variables: teachers have the knowledge and skills to shift the teaching/learning model;
school systems are structured for this model; and students are properly supported with the content, skills, and resources (including technology use) to realize this dream.

In researching the literature on integrating instructional technology, as compared to the lived experiences of the study participants, there seems to be a large gap with regard to human connection. While it is reiterated over and over that 21st century students need to be able to communicate and collaborate, there was little discussion in the literature about the importance of a safe and supportive learning environment, and more specifically, having a human connection with a caring adult.

Each of the TPACK categories – Technology, Pedagogy, and Content are all important factors in ensuring consistent instructional technology integration. However, it is evident that this is only one piece of a larger puzzle. The P21 Framework for 21st Century Learning captures a multitude of elements that define the skills, knowledge and expertise (including the use of instructional technology) that students need to master to flourish in the global community. Buried in the Framework is the idea of Learning Environment, and specifically teachers should “Create learning practices, human support and physical environments that will support the teaching and learning of 21st century skill outcomes”. This is an area that deserves a much larger emphasis as we prepare our students to be global citizens. While technology provides us with extensive opportunities to learning, organizing, and communicating without the human component, students will fail to realize their maximum potential.

The research question asked, “What are the perceptions of educational leaders relative to the integration of instructional technology at one alternative middle school?”
Based on the evidence and discussion regarding this specific case study, the shared perceptions included a district-wide vision and intentional purpose for using technology to enhance content learning, a district-wide commitment to providing both technical and professional development supports, and a district-wide mission to provide learning environments that support students’ needs. Evidence also brought to light discrepancies between perceptions and the reality of equity and access for students, as well as how the alternative school students are included in the district’s mission to educate all students for the future.
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Appendix A

District and School Leader Interview Questions

Content
- What do students need to know and be able to do to be prepared for their future?

Pedagogy
- How have teaching practices changed in the past five years and what shifts do you foresee in the future? What are the characteristics of Next Generation learners and what qualities does the ideal 21C teacher possess?

Technology
- When thinking about technology use across the district or school, what themes have you noticed and how does that inform your practice?
- What types of modifications (technology infrastructure and resources, curriculum, professional development, etc.) have occurred or are in the process to support 21C teaching and learning?

Culturally Responsive Education
- What is your vision for 21C learning/technology integration and how is this measured?
- How does this vision support your stakeholders (students, families, community)?

Diffusion of Innovation
- What is the history behind district implementation of 1:1 computing, i.e., how was the vision presented to and received/implemented by staff and students?
- What challenges and successes resulted from this shift?

Transformative Leadership
- In thinking about your expectations for teachers and students regarding 21C teaching/learning/technology use, has this changed hiring practices? How has this changed your leadership practice?
- If you had unlimited funds and magic, how do you envision the ideal learning environment for today’s students and teachers?
Appendix B

Teacher Interview Questions Following Classroom Observations

Content
- The district states they are leading the country in 21st century learning; what does that mean to you?
- What is the district/school’s vision for preparing students for their future? What do kids need to know and be able to do?

Pedagogy
- Tell me about your learning environment and your expectations for students.
- How is technology integrated into instruction and how has this changed over time?

Technology
- How do you decide which tech tools/resources you will use in your teaching?
- How would you react if you were transferred to a classroom/school/district with little or no tech resources?

Culturally Responsive Education
- What are the characteristics of a Next Generation student and how do you connect with kids to maximize their learning?

Diffusion of Innovation
- What is the history behind district implementation of 1:1 computing, i.e., how was the vision presented to and received/implemented by staff and students?
- What supports are needed for successful with technology integration?

Transformative Leadership
- If you had unlimited funds and magic, how would you create the ideal learning environment for today’s students and teachers?
Appendix C

Research Participant Request Email Template – Leader

Dear (Potential Participant):

My name is Lauren M. Kohl. I am a doctoral student in Educational Leadership and Policy Studies at the University of Denver. I am preparing to conduct dissertation research and would appreciate your help. The title of my study is: The Petri Dish of Instructional Technology Cultures: A Case Study.

My research question is: Under what conditions do educational leaders (including teachers) integrate instructional technologies for learning? I believe your history with Littleton Public Schools and support of 21st century teaching and learning could help me answer this question. I would like to interview three district/school leaders (Technology Director, Building Leader, and Technology coach) regarding the conditions for instructional technology integration, which would take about 45 minutes per person. Interviews would occur during a time and place of your convenience. I also plan to do observations in three middle school classrooms for one class period each and then arrange to interview the three participating teachers, which would also take about 45 minutes per person.

All prudent measures will be taken to ensure that the confidentiality of all participants will be preserved throughout the entirety of the study. In addition, this study has been reviewed and approved by the University of Denver’s Institutional Review Board (IRB) in accordance with local policies and federal research regulations.

If you have additional questions or concerns regarding this study, please do not hesitate to contact me at 303-263-5702 or my program advisor, Dr. Kristina Hesbol at 303-871-2479. If you would like to talk to someone other than the researchers about this study or your research participant rights, you may contact the Office of Research Compliance at University of Denver by emailing IRBAdmin@du.edu or calling 303-871-2121.

Thank you for your generous consideration for my research request. I look forward to hearing from you.

Sincerely,

Lauren M. Kohl, M.Ed.
coloradolori@yahoo.com
(303) 263-5702
Appendix D

Research Participant Request Email Template – Teacher

Dear (Potential Participant):

My name is Lauren M. Kohl. I am a doctoral student in Educational Leadership and Policy Studies at the University of Denver. I am preparing to conduct dissertation research and would appreciate your help. The title of my study is: The Petri Dish of Instructional Technology Cultures: A Case Study.

My research question is: Under what conditions do educational leaders (including teachers) integrate instructional technologies for learning? I believe your history with Littleton Public Schools and support of 21st century teaching and learning could help me answer this question. I would like to do observations in three classrooms for one class period each and then arrange to interview the three participating teachers, which would take about 45 minutes per person. Interviews would occur during a time and place of your convenience. Additionally, I plan to interview three district/school leaders (Technology Director, Building Leader, Technology coach) also regarding the conditions for instructional technology integration.

All prudent measures will be taken to ensure that the confidentiality of all participants will be preserved throughout the entirety of the study. In addition, this study has been reviewed and approved by the University of Denver’s Institutional Review Board (IRB) in accordance with local policies and federal research regulations.

If you have additional questions or concerns regarding this study, please do not hesitate to contact me at 303-263-5702 or my program advisor, Dr. Kristina Hesbol at 303-871-2479. If you would like to talk to someone other than the researchers about this study or your research participant rights, you may contact the Office of Research Compliance at University of Denver by emailing IRBAdmin@du.edu or calling 303-871-2121.

Thank you for your generous consideration for my research request. I look forward to hearing from you.

Sincerely,

Lauren M. Kohl, M.Ed.
coloradolori@yahoo.com
(303) 263-5702
Appendix E

University of Denver Social, Behavioral, and Educational Research Informed
Consent Form - Leader

University of Denver
Consent Form for Participation in Research

Title of Research Study: The Petri Dish of Instructional Technology Cultures: A Case Study

Researcher(s): Lauren M. Kohl, University of Denver

Study Site: __________ Middle School, __________ Public Schools

Purpose
You are being asked to be in a research study. This form provides you with information about the study. Please read the information below and ask questions about anything you don’t understand before deciding whether or not to take part.

You are invited to participate in a research study that seeks to learn about the conditions under which educational leaders are integrating instructional technology for learning. You are being asked to be in this research study because you are either a district or school leader supporting 21st century teaching and learning, including the integration of instructional technology in your school and/or district.

Procedures
If you participate in this research study, you will be asked to participate in an interview session with the researcher, at a time and location of your convenience, which will include approximately 10 questions. The questions will focus on the conditions under which the school/district is integrating instructional technology. The interview will take no longer than 45 minutes of your time.

Voluntary Participation
Participating in this research study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer any survey question or continue with the interview for any reason without penalty or other benefits to which you are entitled. If you decide to withdraw early from the study, the information or data provided will be destroyed.

Risks or Discomforts
The researcher has taken steps to minimize the risks of this study. Even so, you may still experience some risks related to your participation, even when the researcher is careful to avoid them. These risks may include feeling uncomfortable answering potentially sensitive questions, emotional distress, embarrassment, and/or loss of privacy. If you experience any discomfort, you may discontinue the interview at any time. We respect your right to choose not to answer any questions that make you feel uncomfortable. Refusal to participate or withdrawal from participation will not involve penalty or loss of benefits to which you are otherwise entitled.
Benefits
If you agree to take part in this study, there will be no direct benefit to you. However, information gathered in this study may provide insight to other leaders who are interested in designing and implementing a similar program.

Incentives to participate
You will not receive any forms of incentive for participating in this research project.

Confidentiality
To keep your information safe throughout this study, the researcher will identify your responses by code number only and your responses will be kept separate from information that could identify you. This is done to protect the confidentiality of your responses. Only the researcher will have access to your individual data and any reports generated as a result of this study will use only group averages and paraphrased wording. The interview question responses you provide will be recorded on the researcher’s iPhone and will only be used for educational research purposes. Only the researcher will have access to the recordings. The recordings will be transcribed and then the original recordings will be erased. Recording transcripts will be stored on the researcher’s password-protected computer. The researcher will retain the study data for three years following the completion of the study findings. The data will not be made available to other researchers for other studies following the completion of this research study and will not contain information that could identify you. The results from the research will be shared with district leaders, via the Learning Services Office. The results from the research may be in published articles. Your individual identity will be kept private when information is presented or published about this study.

Questions
If you have any questions about this project or your participation, please feel free to ask questions now or contact Lauren M. Kohl at 303-263-5702 at any time. You may also contact my program advisor, Dr. Kristina Hesbol at 303-871-2479, with questions regarding the study, its purpose, participants, and confidentiality.

If you have any questions or concerns about your research participation or rights as a participant, you may contact the DU Human Research Protections Program by emailing IRBAdmin@du.edu or calling (303) 871-2121 to speak to someone other than the researchers.

Options for Participation
Please initial your choice for the options below:
___ The researcher may audio record me during this study.
___ The researcher may NOT audio record me during this study.

Please take all the time you need to read through this document and decide whether you would like to participate in this research study.

If you agree to participate in this research study, please sign below. You will be given a copy of this form for your records.

Participant Signature ___________________________ Date __________
Appendix F

University of Denver Social, Behavioral, and Educational Research Informed Consent Form – Teacher

Title of Research Study: The Petri Dish of Instructional Technology Cultures: A Case Study

Researcher(s): Lauren M. Kohl, University of Denver

Study Site: _________ Middle School, ____________ Public Schools

Purpose
You are being asked to be in a research study. This form provides you with information about the study. Please read the information below and ask questions about anything you don’t understand before deciding whether or not to take part.

You are invited to participate in a research study that seeks to learn about the conditions under which educational leaders are integrating instructional technology for learning. You are being asked to be in this research study because you are a classroom teacher supporting 21st century teaching and learning, including the integration of instructional technology in your school.

Procedures
If you participate in this research study, the researcher will request permission to observe your classroom for one class period. Then you will be asked to participate in an interview session, which will include approximately 10 questions, at a time and location of your convenience. The questions will focus on the conditions under which you are integrating instructional technology. The interview will take no longer than 45 minutes of your time.

Voluntary Participation
Participating in this research study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to be observed teaching. You may choose not to answer any survey question or continue with the interview for any reason without penalty. If you decide to withdraw early from the study, the information or data provided will be destroyed.

Risks or Discomforts
The researcher has taken steps to minimize the risks of this study. Even so, you may still experience some risks related to your participation, even when the researcher is careful to avoid them. These risks may include feeling uncomfortable answering potentially sensitive questions, emotional distress, embarrassment, and/or loss of privacy. If you experience any discomfort, you may discontinue the interview at any time. We respect your right to choose not to answer any questions that make you feel uncomfortable. Refusal to participate or withdrawal from participation will not involve penalty or loss of benefits to which you are otherwise entitled.

Benefits
If you agree to take part in this study, there will be no direct benefit to you. However, information gathered in this study may provide insight to other leaders who are interested in designing and implementing a similar program.
Incentives to participate
You will not receive any forms of incentive for participating in this research project.

Confidentiality
To keep your information safe throughout this study, the researcher will identify your responses by code number only and your responses will be kept separate from information that could identify you. This is done to protect the confidentiality of your responses. Only the researcher will have access to your individual data and any reports generated as a result of this study will use only group averages and paraphrased wording.

The interview question responses you provide will be recorded on the researcher’s iPhone and will only be used for educational research purposes. Only the researcher will have access to the recordings. The recordings will be transcribed and then the original recordings will be erased. Recording transcripts will be stored on the researcher’s password-protected computer. The researcher will retain the study data for three years following the completion of the study findings. The data will not be made available to other researchers for other studies following the completion of this research study and will not contain information that could identify you. The results from the research will be shared with district leaders, via the Learning Services Office. The results from the research may be in published articles. Your individual identity will be kept private when information is presented or published about this study.

Questions
If you have any questions about this project or your participation, please feel free to ask questions now or contact Lauren M. Kohl at 303-263-5702 at any time. You may also contact my program advisor, Dr. Kristina Hesbol at 303-871-2479, with questions regarding the study, its purpose, participants, and confidentiality.

If you have any questions or concerns about your research participation or rights as a participant, you may contact the DU Human Research Protections Program by emailing IRBAdmin@du.edu or calling (303) 871-2121 to speak to someone other than the researchers.

Options for Participation
Please initial your choice for the options below:
___ The researcher may observe a lesson/class period in my classroom.

___ The researcher may NOT observe a lesson/class period in my classroom.

___ The researcher may audio record me during this study.
___ The researcher may NOT audio record me during this study.

Please take all the time you need to read through this document and decide whether you would like to participate in this research study.

If you agree to participate in this research study, please sign below. You will be given a copy of this form for your records.

Participant Signature ___________________________ Date ____________
Appendix G

TDOP Data Collection Sheet

Directions: Circle codes for each behavior observed during every two-minute interval. Take detailed notes about aspects of the class that is of particular interest for your application (e.g., content discussed, nature of student dialogue). Note: this template is for illustrative purposes only and includes the 3 Basic Dimensions and 2 Optional Dimensions (i.e. student engagement is not shown).

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Appendix H

TDOP Code Bank

TEACHING METHODS
Teacher focused instruction:
L – Lecturing
LW – Lecture while writing
LVIS – Lecture with pre-made visuals
LDEM – Lecture/demo of phenomena
SOC-L – Socratic lecture
WP – Working out problems
IND – Individual instruction
MM – Multimedia
A – Assessment
AT – Administrative task

Student focused instruction:
SGW – Small group work/discussion
DW – Desk work
SP – Student presentation

INSTRUCTIONAL TECHNOLOGY
CB – Chalkboard/whiteboard, smart board
OP – Overhead projector/transparencies
PP – PowerPoint or other digital slides
CL – Clicker response systems
D – Demonstration equipment
DT – Digital tablet
M – Movie/video
SI – Simulation
WEB – Website

PEDAGOGICAL STRATEGIES
HUM – Humor
ANEX – Anecdote/example
ORG – Organization/transitions/ connecting previous learning
EMP – Emphasis/states something important

POTENTIAL STUDENT COGNITIVE ENGAGEMENT
CNL – Connections to own life/specific cases
PS – Students asked to problem solve
CR – Creating/open-ended idea or product

STUDENT ENGAGEMENT
VHI – Very high 75%+
HI – High 50-75%
MED – Medium 25-50%
LO – Low, less than 25%
Appendix I

Approval to use P21.org Framework Graphic

Apr 29, 2013

Dear Lori,
Thank you so much for your inquiry.

Please feel free to use the Framework for 21st Century Learning - our materials and educator resources are free for educational purposes. Thank you for citing Partnership for 21st Century Skills and linking to our website - www.P21.org. We would also love to receive the completed copy of your dissertation if possible, so we can see how our work is being implemented.

Let me know if I can be of further assistance!

All the best,
Tatyana

Tatyana Warrick
Communications Manager
Partnership for 21st Century Skills
1 Massachusetts Avenue, NW, Suite 700
Washington, DC 20001
Tel: (202) 312-6430
Please note my new email: tatyana@p21.org
Twitter: @P21CentSkills

www.P21.org

On Sun, Apr 28, 2013 at 10:50 PM, Lori Kohl <coloradolori@yahoo.com> wrote:

Greetings,
I am requesting permission to use the rainbow framework graphic as a visual for my dissertation. My topic is the systemic impact the flipped classroom has on a school district. I appreciate your help.

Kind Regards,
Lori Kohl
Appendix J

Approval to use Christensen Research Graphic

Christensen Institute <info@christenseninstitute.org>
To      Lori Kohl Tues, Sept 22, 2015 at 10:46 AM
Dear Lori,
Thank you for your interest in using materials produced by the Clayton Christensen Institute for Disruptive Innovation. We authorize use as long as you cite the materials, provide a link back to the original material when possible, and are not selling the publication you are producing.

Best of luck with your dissertation. Please feel free to keep in touch.

Best,
Judith

--
Judith Emily Levine Malnick
Office Manager for San Mateo
Clayton Christensen Institute for Disruptive Innovation
650.887.0788 x0
www.christenseninstitute.org

On Mon, Sep 21, 2015 at 9:07 PM, Lori Kohl <coloradolori@yahoo.com> wrote:
Greetings,
I am in the process of writing a dissertation on a unique Hybrid day instructional model. I am wondering if I could include your blended learning graphic “Blended Learning Definitions | Christensen Institute” in my work. Thank you!

image

Blended Learning Definitions | Christensen Institute
The definition of blended learning is a formal education program in which a student learns:
View on www.christenseninstitute.org
Preview by Yahoo

Lori Kohl

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Appendix K

Approval to use Next Generation Learning Vision Framework

From: CEI -Website@coloradoedinitiative.org [mailto:info@coloradoedinitiative.org]
Sent: Wednesday, May 04, 2019 8:13 PM
To: Colorado Education Initiative Info <info@coloradoedinitiative.org>
Subject: New submission from Contact Us

Dear Team CEI,

You received a new message with the following details:

Your Name
Lori Kohl

Email
coloradodrl@yahoo.com

Subject
Next Gen Learning Vision

Your Message

Hi,

I am a PhD student at DU doing dissertation work on innovative learning environments. I would like to use your Next Gen Learning Vision Framework (http://www.coloradoedinitiative.org/our-work/next-generation-learning-vision/) and would cite it appropriately. Please let me know if you would grant permission for me to do so. Thank you so much!

Lori

Casey Macaulay
<cmacaulay@coloradoedinitiative.org>
To: Colorado Education Initiative Info, coloradodrl@yahoo.com
CC: Tara Jahn, Paul Beck

Hi Lori,

I don't think that should be a problem! Do you think you'd be able to share your thesis with us once it's finished? It sounds very interesting!

Best,

-CM

Lori Kohl <coloradodrl@yahoo.com>
To: Casey Macaulay, Colorado Education Initiative Info
CC: Tara Jahn, Paul Beck

Yes! I'd be happy to share once it's done! Thank you

Lori
Appendix L

Definitions of Key Terminology

Definitions of Key Terminology

The following defined terms assist the reader in accessing the context and content of the study.

21st century skills. Critical thinking and problem solving, communication, collaboration, and creativity and innovation as defined by the Partnership for 21st Century Skills (P21, 2015).

Blog. A web-based publication of periodic journal entries or posts, with the most recent entry listed first (Pitler et al., 2007).

Bring Your Own Device (BYOD). The practice of allowing students to bring and use their own lightweight, handheld devices such as computers, smartphones, or tablets for schoolwork purposes (Looi et al., 2009).

Cloud Computing. A specialized distributed computing paradigm that offers a variety of services, such as managed computing power, storage, and platforms, to external customers via the Internet (Foster et al., 2009).

Computationalism. Concerned with information processing, how finite, coded, unambiguous, information about the world is inscribed, sorted, stored, collated, retrieved, and generally managed by a computational device (Bruner, 1996).

Culturalism. Reality is represented by a symbolism shared by members of a cultural community in which a technical-social way of life is both organized and construed in terms of that symbolism (Bruner, 1996).
**Differentiated Instruction or Differentiation.** A type of learning where instruction is tailored to meet the learning needs, preferences and goals of individual students (Bayse, 2014).

**Digital Immigrant.** A person born who was not born into the digital world, but who later adopted the use of digital technology (Prensky, 2001).

**Digital Natives.** A person born or brought up during the age of digital technology and therefore can “speak” the language of computers, video games, and the Internet (Prensky, 2001).

**Distance Learning.** See Online Learning.

**Educational Technology.** Any kind of technology that is used support digital learning (ISTE, 2008).

**Flipped Classroom.** A blended learning model which is typically structured by having students watch lecture material via online videos at home, then provides them opportunities to practice their learnings in classroom laboratories or other hands-on activities (Gannod, 2007).

**Innovation.** An idea, practice, or object that is perceived as new by an individual or other unit of adoption.

**Instructional Technology.** The process that involves planning, implementing, evaluating and managing the use of technology to enhance teaching and learning (Garza Mitchell, 2011).

**Inverted Learning.** See Flipped Classroom.
**Millennial.** A person born in the 1980s and 1990s; also known as Generation Y (Diaz et al., 2009).

**Online Learning.** Includes a variety of offerings delivered over the Web ranging from content such as lectures, textbook-like information, Internet-based collaborative role-playing in social simulations, and interactive multiplayer strategy games. (U.S Department of Education, 2010).

**Podcast.** Combining Apple’s iPod and the word broadcast to describe a digital audio file that can be downloaded from the Internet (Yang, Peck, Mozdzierz & Waugh-Fleishmann, 2010).

**STEM.** An acronym that stands for the fields of science, technology, engineering, and mathematics (Gerlach, 2012).

**Vodcast.** A podcast with video content (Yang et al., 2010).

**Web 2.0.** Social software that includes social networks, media sharing, collaborative knowledge development and blogs, such as Facebook, YouTube, Wikipedia, and Twitter (Greenhow et al., 2009).

**Web 3.0.** Provides those seeking information on the Internet to search and receive information in a meaningful way by drawing from a multitude and variety of sources (Chisega-Negrila, 2014).