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Teacher Experiences with Multiple One-to-One Technology Integration Models: A Phenomenography

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Teacher Experiences with Multiple One-to-One Technology Integration Models:

A Phenomenography

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Dedication

To Mark Post and Linda Calandro
Who have supported my quest for education over the last two decades.

To my sons, Michael, Maddox, and Ace
For sharing Mommy with the education world for your whole lives.

ABSTRACT

The purpose of this qualitative case study was to examine the beliefs and perceptions of teachers who have experience with both the BYOT and school-issued 1:1 technology integration models. The eight informants in this study all had middle and/or high school experience teaching with both models. The data came from semi-structured interviews with each informant and five documents related to 1:1 technology integration from four districts. Analysis results showed a preference for the 1:1 school-issued model due to concerns with technical support, equity, student behavior, technology monitoring, and pedagogical change. COVID reinforced teacher preference. Neither model was conclusively preferred in the areas of student engagement and professional development. Recommendations for future research included a comparative study of the impact of each model on student outcomes and comparative study of the models' applications in specific content areas.

Keywords: 1:1, one-to-one, 1-to-1, BYOT, BYOD, technology, computing, middle grades, secondary school, high school, COVID

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CHAPTER 1: INTRODUCTION

A mid-career teacher feels confident walking into her new school. After 12 years, she had decided she was good enough to branch out into a better school-district than the one in which she had begun her career. She looked forward to leaving behind the socioeconomic challenges of a school where 60% of its population qualified as economically disadvantaged, a district where a small city system embedded within its county borders siphoned off the wealthiest, most athletic, and most academically-prepared students. She was excited to move from a district that, although it issued a laptop to each 3-12 grade student, only had two instructional technology specialists to train and encourage teachers on how to infuse rich technology experiences into the classroom to one that had a positive, even award-winning reputation for its technology-infused curriculum. This new school was replete with an instructional technology specialist responsible for just three schools who would be providing bimonthly training plus co-teaching opportunities! Freshly certified in instructional technology, she knew that she would be elevating her practice with a technology-rich and supportive environment. Very quickly, she realized how wrong she had been.

Her new classroom had three desktops and a printer for student use. Her department of 15 teachers shared two computer labs. An additional lab, 30 desktops in the library, and two laptop carts could be reserved; these resources were shared among an additional 100 faculty. In a school of more than 1800 students, less than 600 computers were available for student use at any given time, including Career Tech and Computer Science laboratories. The rest of the infusion came from using students' personal devices to access applications on a dedicated network. While mobile devices have been rapidly-evolving, she discovered the level of glitches and tech support in which she needed to engage was far more than she was prepared for. She

was used to knowing how to use the school-issued device each of her students carried at her previous school. "This is not at all what I expected," she thought. "Is it just me? Am I the only one who feels this way about managing student devices?"

Background

The United States of America 2017 National Technology Plan issued the following recommendation regarding devices in schools: "Ensure that every student and educator has at least one internet access device and appropriate software and resources for research, communication, multimedia content creation, and collaboration for use in and out of school" (U.S. Department of Education, 2017, p. 83). In other words, the United States Department of Education recommends one device for each child, sometimes called one-to-one or known by the ratio 1:1. One-to-one technology initiatives come in a variety of models. Some schools issue take-home devices, such as laptops or iPads; others allow or require students to bring personal devices to school for daily use. Regardless of the model, the implementation of 1:1 device usage, as with any curricular decision, is undertaken with the intention to benefit student learning.

Statement of the Problem

The decision to choose any ubiquitous curriculum design or technology innovation, including deciding to employ student devices or deploy school-owned devices is often made at levels of leadership above teachers, either school-level or district-level, sometimes with teacher input, but often with a top-down adoption requirement (Chiu, 2017; Farrell, 2000; Larke, 2019). When teachers are mandated to incorporate an innovation, such as a 1:1 computing, without the opportunity to provide feedback during the adoption process, they often become disengaged at the least to openly resentful or defiant of the mandate at the worst (Nadelson & Seifort, 2016). In other words, teacher professional engagement is paramount for acceptance of educational

innovations (Larke, 2019; Nadelson & Seifort, 2016). According to Rogers's (2010) Diffusion of Innovations Theory, educators must not only see the need for innovation, they must understand its relative advantage, find it to be compatible with their "values, past experiences, and needs" (p. 224), must find its complexity palatable, and must have the opportunity have to test it before adopting the innovation fully. Much research on teacher experience with 1:1 computing referenced teacher readiness and concerns, in other words their understanding of the complexity of the innovation, and exclusively considered either school-issued devices or BYOT, but not both (Adhikari et al., 2017; Crompton & Keane, 2012; Crook et al., 2016; Cristol & Gimbert, 2013; Donovan, et al., 2007; Inserra & Short, 2012; Ozerbas & Erdogan, 2016; Thieman & Cevallos, 2017). This research ignored whether teachers had the opportunity to test 1:1 computing before fully adopting it, which is the last of Rogers's (2010) theoretical requirements for successful innovation diffusion. The concerns in some of the research also suggested some teacher still do not see the need for 1:1 computing, its advantages, or its compatibility with their educational philosophies (Adhikari, et al., 2017; Crompton & Keane, 2012). The number of districts employing a 1:1 technology model continues to increase in the United States (Consortium for School Networking [CoSN], 2019; Wainwright, 2013); yet, there is a dearth of comparative data for the various models, especially as related to teachers who have experienced them both is a gap in the study of 1:1 computing models.

Purpose and Significance of the Study

My phenomenographic study intended to give voice to teachers and compared the distinct phenomena they have experienced by teaching in both BYOT and school-issued 1:1 technology integration models. It described, studied and analyzed teachers' different experiences with these models of 1:1 technology integration. This knowledge provides insight into their perception of

the more effective model and shed light on the necessary components of integration of a particular model.

The significance of understanding teachers' experiences with BYOT and school-issued 1:1 models can be explained with the concept of return-on-investment (ROI). Increasing the technology access in a district requires a capital outlay regardless of the model. For BYOT districts, the capital outlay is used to create and reinforce infrastructure that can support student-owned devices while maintaining security of school-owned technology (Ackerman, 2012). In school-issued 1:1 districts, the capital is also used to build and reinforce the infrastructure to support the bandwidth necessary to the initiative; in addition, there is the cost of purchasing, maintaining, and refreshing the school-issued devices. As a result, BYOT may be considered less expensive because of a lower upfront capital outlay (Ackerman, 2012). Indeed, this cost analysis of technology purchasing versus using privately-owned devices is documented in corporate technology purchases in developing nations, which researchers then liken to the underfunded institution of public K-12 education (Kabanda & Brown, 2014). Budget considerations are cited as a reason for the BYOT model selection by school systems (Stavert, 2013). Despite a lower upfront capital cost, the potential ROI should also be developed with consideration to the additional man-hours of support necessary to help students gain and maintain access to the infrastructure, the potential for low teacher-adoption, and the potential increased cost for security risks with privately-owned devices (Ackerman, 2012; McClean, 2016). Studying teacher experiences gives significant data to district leaders and other stakeholders about the potential ROI of a 1:1 initiative based on the potential utilization by the teachers and the amount of time and effort the teachers and other faculty spend supporting students in each 1:1 model.

Research Question

The central question for this study was: *What are teachers' experiences with BYOT and school-issued 1:1 technology initiatives in Northern Georgia?*

Areas of interest under consideration were:

- Perceived impacts on student outcomes
- Key factors for positive and effective implementation
- Role of professional development on teachers' experience with each model
- Perceptions when comparing the models for effectiveness
- Impact of their current models of 1:1 technology integration, BYOT or school-issued, on them and their students during COVID-19's virtual and hybrid learning experiences.

Organization of the Study

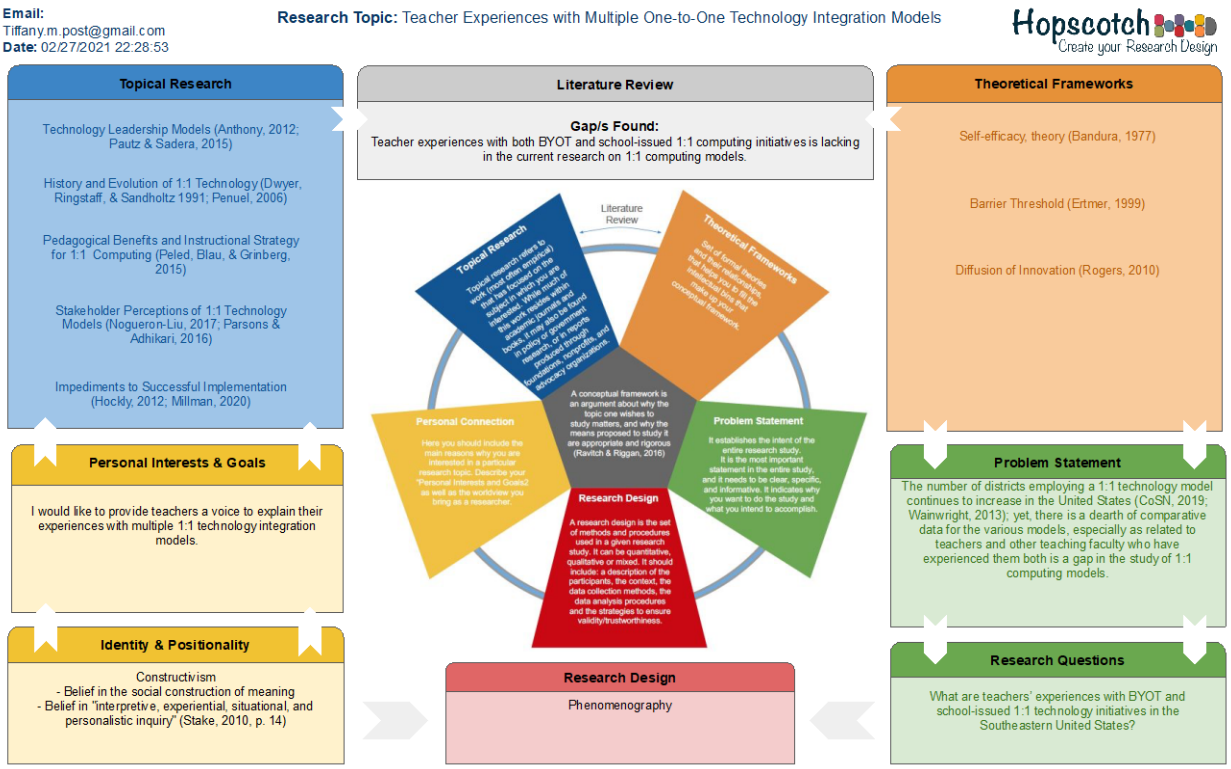
In the study, I employed an interpretive/qualitative approach. I looked at teachers' experiences with school-issued and BYOT 1:1 computing initiatives. My data came from interviews and my interpretation sought to understand teacher experiences within the phenomena in which they occurred. The rest of this chapter provides insight into the limitations of the proposed study and the definitions of the terms relevant to it.

Chapter 2 elucidates the conceptual framework which helps the researcher justify the relevance of the topic under study, as well as the need to conduct the study she is proposing. Ravitch and Riggan (2017) frame the argument of a conceptual framework as an "integrative and evolving" collection of empirical work conducted and theory. This collection supports the resultant proposition for additional research by showing how the research questions developed from the prior empirical work and theory. Figure *1,* built within the Hopscotch framework

(Jorrín-Abellán, 2016, 2019), is a proposal of components to complement Ravitch and Riggan's model to building a conceptual framework. Figure 1 shows my personal connection with my research topic, identifies my identity and paradigmatic positionality as a researcher, displays how the review of the literature is divided into theoretical frameworks and topical research, elucidates my problem statement and my research questions, and provides my research design. Chapter 2's literature review comprised of theoretical frameworks and topical research thoroughly expounds upon the concepts that guided this research study and illustrated in Figure 1.

Figure 1

Conceptual framework built within Hopscotch (Jorrín-Abellán, 2016, 2019)



Chapter 3 elucidates and defends the methodology of the study conceptualized in Figure 1. It first discusses in depth the phenomenographic tradition and how it describes the Informants

experiences with a particular set of phenomena. It also provides the beginning contextualization of the research by describing the Southeastern United States' districts' demographics and the participant selection criteria. The chapter includes the data collection and data analysis processes employed.

Chapter 4 presents an in depth explanation of findings and the tools used to reveal them. It is organized first by the approach to determining an outcome space before discussing the findings for each subarea under consideration.

Chapter 5 explores the research in totality, interpreting the findings and discussing the implications for the implementation and use of 1:1 technology models in schools and for further research.

Limitations of the Study

This study's limitations are three-fold. The study is limited geographically to Northern Georgia. A variety of demographics are available in this region's districts; however, attitudes toward and experiences with the subject of this study may differ across the state, in other states, and internationally. Limitations exist related to school level. Some elementary schools issue devices to some elementary-aged students and BYOT initiatives may also exist at the elementary level, but these considerations were outside of the parameters set for this study, but this study was specifically concerned with teachers at the middle and high school levels. Another limitation related to this study's methodology was the lack of opportunity to include observation of the Informants in more than one 1:1 computing environment since multiple modes of data collection strengthens the reliability of the data. As a solo researcher, the interviews and data analysis were completed by myself alone and even with an awareness of and focus on bracketing my preconceived notions and experience, the potential for researcher bias exists. Another limitation

of this study is the limited pool of Informants. For several years, reductions in force limited teacher mobility due to the economic crisis in the early 2000s. Thus, the number of teachers who have experienced both models is less extensive than the general teacher pool itself.

Definitions of Relevant Terms

- Bring-Your-Own-Technology (BYOT)
    - In education, it is an initiative where students are encouraged to bring an internet-enabled, personally-owned device to access educational technology platforms in class. BYOT initiatives are known by other acronyms, including BYOD for Bring-Your-Own-Device and BYLD for Bring-Your-Learning Device
- 1:1
    - A ratio that references how many devices a school has for use per student. 1:1 computing initiatives are also referred to as one-to-one or the acronym OLPC which stands for One Laptop Per Child.
- School-issued
    - Devices purchased by a school or a school system and provided to a student in that district for use at school and at home for the duration of that student's enrollment in the school.

CHAPTER 2: REVIEW OF LITERATURE

Technology permeates nearly every aspect of our life: it is in our homes, our businesses, our cars, our classrooms, and, frequently, our hands. How our students access it comes from a combination of a diverse set of initiatives and associated pedagogies, each replete with myriad opinions and potential impediments. This chapter examines each of these considerations and frame them within theories that drive this study.

Theoretical Frameworks

Ravitch & Riggan (2017) define a theoretical framework as the way in which a researcher engages with, integrates, and argues from existing theories within and across relevant fields. This theoretical framework contains set of three formal theories, Rogers (2010) Diffusion of Innovations, Ertmer's (1999, 2012) concepts of "barrier thresholds," and Bandura's (1977) Self-efficacy. The theoretical framework, in alignment with Ravitch and Riggan (2017), explores their relationships with one another. Then, in conjunction with topical research, helps formulate the conceptual framework for this study.

Diffusion of Innovations Theory (Rogers, 2010) is the primary theory upon which this study is predicated. Students having a device available to them at a ratio of 1:1, regardless of ownership, is an innovation that is still relatively new to the classroom, with earliest desktop initiatives funded by corporations beginning 35 years ago and state/system initiatives appearing just 20 years ago (Dwyer et al., 1991; Penuel, 2006). The diffusion of technology in schools absolutely adheres to the premises Rogers elucidates in his book, now in its fifth edition. Supporting concepts and theories include self-efficacy theory (Bandura, 1977) and the Ertmer's conceptual framework surround barriers to technology adoption (Ertmer 1999; Ertmer et al.,

2001; Ertmer et al., 2012); they further inform this study as a part of the innovation diffusion process and teacher experiences with technology models in their career.

Diffusion of Innovations

In *Diffusion of Innovations,* Rogers explains that diffusion has four main elements: the innovation, which he says he uses as a "synonym" (p. 12) for technology much of the time, communication channels, time, and the social system. Within the technology element, a subdivision exists between hardware, "the tool that embodies the technology as material or physical object" (p.12) and software, "the information base for the tool" (p.12). 1:1 technology models are a classic representation of this concept of innovation since there is literal hardware and software of multiple sorts under consideration. Furthermore, as Rogers explains, the diffusion of technological innovations rest on uncertainties that must be reduced in order for adoption or rejection of an innovation to occur. Communication channels are particularly important to the subarea of professional development. Professional development and professional learning communities, both formal and informal, are where the information-exchange regarding an innovation takes place. In this area, one might consider that Rogers explains that diffusion of innovations occurs differently when an organization implements the innovation rather than an individual. The five steps in organizational innovation diffusion include agenda setting, matching, redefining/restructuring, clarifying, and routinizing. These steps will also be considered relative to the teachers' experiences with the different 1:1 technology integration models, but, in studying the teachers' perceptions and considering the autonomy that teachers are sometimes afforded in the management of their classrooms, the focus will remain on the individual experiences with the models. The social systems described in *Diffusion of Innovations* are the "set of interrelated units that are engaged in joint problem-

solving to accomplish a common goal" (p.23). The social structure of the school systems in which the teachers experienced the 1:1 technology integration models will also be under consideration because the individuals (teachers), informal groups, organizations, and/or sub-systems at play impact the teacher experiences with integration. As Rogers notes "the norms of a system tell an individual what behavior is expected" (p. 26) and the innovation-decisions take place within the constraints created by the system.

Another key term from *Diffusion of Innovations* is the concept of the technology cluster, where multiple "distinguishable elements of technology […] are perceived as being closely interrelated" (p. 14) may be pushed by change agencies as a package to promote more rapid adoption. The research question and subareas under study are particularly relevant to the concept of the technology cluster because BYOT and school-issued devices are generally mutually-exclusive systems that may be clustered with other distinguishable innovations. There are also characteristics of innovations, such as relative advantage, compatibility, complexity, trialability, and observability that lend themselves to the topics under study because these characteristics are comparable in the models and may explain the diffusion of the innovations by the teachers who have experienced both.

Barriers for technology implementation

Rogers (2010) Diffusion of Innovations relates to the barrier thresholds described initially by Ertmer in 1999. The barriers that Ertmer (1999) describes that teachers must overcome to implement technology relate to the perceptions of complexity and relative advantage required for diffusion of an innovation. Furthermore, these barriers can exist as uncertainties in the diffusion of innovation process.

Ertmer describes these barriers as first-order barriers which are "extrinsic to teachers and

include lack of access to computers and software, insufficient time to plan instruction, and inadequate technical and administrative support" and second-order barriers which are "intrinsic to teachers and include beliefs about teaching, beliefs about computers, established classroom practices, and unwillingness to change" (p. 48). Pushing past these barriers is moving beyond what Ertmer et al., (2012) calls a "barrier threshold" (433). Ertmer et al. (2001) explains that teachers who espoused technology integration often integrate technology in a manner that was still teacher-centered. Technology integration requires a paradigm shift for teachers (Ertmer, 1999); thus, even when technology becomes more ubiquitous, somewhat reducing first-order barriers, second-order barriers persist (Ertmer et al., 2012). This framework relates to the use of BYOT and school-issued 1:1 technology models since teachers' perceptions and beliefs about device usage may reveal first-order barriers persist in some systems and elucidate second-order barriers that persist for some teachers.

Self-efficacy theory

A strong relationship exists between Ertmer's examination of types of barriers to technology integration and Bandura's (1977) self-efficacy theory. In any new situation, self-efficacy theory suggests that how strongly people are convinced of their own effectiveness or lack thereof is likely to affect whether they will even try to adapt to new situations and contexts (Bandura, 1977). Bandura posits self-efficacy is built through four sources: mastery experiences, vicarious experiences, emotional and physiological states, and imaginal experiences. Failing to build technological self-efficacy and the social cognition of said failure results in some of the strongest barriers for innovation implementation (Heath, 2017). Furthermore, self-efficacy has a direct correlation with the concept of complexity in *Diffusion of Innovations.* The less self-efficacy a teacher has with an innovation, the more likely they are to find that innovation to be

too complex for adoption. This assertion is supported by research such as that of Cardoza and Tunks (2014) who found that teachers had self-concerns related to implementing a BYOT innovation successfully. Heath (2017) furthered this concept in a teacher-lead school-issued 1:1 technology model where teachers used self-efficacy to overcome barrier thresholds in not just implementing but initiating the innovation.

Topical Research

To complement the theoretical framework and help complete the conceptual framework of a study, Ravitch and Riggan (2017) suggest engaging in topical research. To identify the gaps in the area under study, one must identify, analyze, and organize works and studies conducted in that area. These studies justify the relevance of the topic under consideration. In this study, that topic is the implementation and use of 1:1 technology models from the teachers' perspectives.

One-to-one initiatives have garnered much attention over the last 30 years, when computers first became affordable enough to be accessible by students in the educational system and inspired the potential for reform (Heath, 2017). The research studies surrounding this reform most often centered on the financial costs and benefits in the forms of improved test scores (Bebell & O'Dywer 2010; Bebell & Padulla, 2015; Brown, 2016; Crook et al., 2015; Genlott & Grönlund, 2016; Hohlfeld et al., 2017; Jesson, et al., 2018; Kennedy et al., 2016; Sung et al., 2016; Thieman & Cevallos, 2017; Topper & Lancaster, 2013). Some studies consider other qualitative measurables, such as structural changes in curriculum and instruction, professional culture changes related to collaboration and pedagogy, and changes in student attitudes, motivation, and behavior (Adhikari et al., 2017; Bebell & Kay, 2010). This review of literature will consider the history and evolution of 1:1 technology initiative models, technology leadership models, bring your own technology policies, the relationship between professional development

and technology, teacher innovation adoption, and teacher beliefs and innovation experience. Furthermore, it will consider how the theoretical frameworks inform these topics.

History and Evolution of 1:1 Technology Models

The history of 1:1 computing initiatives began in the mid-1980s with programs like "Apple Classrooms of Tomorrow" and "Microsoft Anytime Anywhere" citing education reform, including teacher behavior as its goal (Dwyer et al., 1991; Penuel, 2006). Kozma (1991) posited that increasing student access to technology for the purpose of education would improve educational outcomes and higher-level usage of technology especially for students with lower socio-economic status who may have lesser access to technology in the home. These ideas inspired home desktop programs with Microsoft that refurbished and supplied desktops to lower-income students, programs that continue through charitable organizations today (Penuel, 2006). The "Anytime Anywhere Learning Program" by Microsoft and Toshiba began school-issued laptop initiatives in 1996 (Penuel, 2006). This initial program had varied funding models where the school and the parent had limited financial responsibility for leasing a laptop and, in some programs, the family had the option to buy the laptop at the end of the lease (Penuel, 2006). These first decades of initiatives in this field relied upon desktops for home use, followed by laptops with a variety of software but little to no internet connectivity (Penuel, 2006). While these programs were innovative for their time, by the late 1990s computers without connectivity served little function in innovation.

In 2001, the "Maine Learning and Technology Initiative" launched a statewide 1:1 laptop initiative. In 2002, Texas followed with a 1:1 pilot program to be evaluated over four years (Weston and Baine, 2010). Other states and districts soon followed suit (Zucker & Hug, 2007). All of these initiatives were adopted at the district or state level and began the one laptop per

child trend, eventually called 1:1. Into the early 2000s, 1:1 computing initiatives were defined by the school facilitation of getting laptops into student hands, but as personal technology became more ubiquitous, a new model emerged (Penuel, 2006).

The movement toward increased school-ownership and uses of technology resulted in a rapid increase in broadband connectivity to schools (NETP, 2010). An entire infrastructure was built to support on-campus use of technology. Local area networks gave way to wireless connectivity as laptops become more common (NETP, 2017). Simultaneous to the growth in device diversity, personal possession of such devices grew. In the early 2010s, this combination of Wi-Fi and personal device ownership opened a new model of 1:1 computing where school systems previously unsure of how to achieve 1:1 computing while lacking in school-owned devices began to see the potential in dedicating a network to which students could connect their personal devices for academic use. This model of 1:1 computing goes by many acronyms, but, for clarity, will be called Bring-your-own-technology (BYOT) in this study. BYOT initiatives encourage students to bring smartphones, laptops, iPads, Chromebooks, or other internet-enabled devices to connect to a wireless network provided by the school system, though they rely heavily on student-owned smartphones (Hohlfeld et al., 2017). Like 1:1 computing, acceptable use policies governing the initiative usually exist, but it typically refers to when and how students are allowed to use their devices while connected to the school network (Hockly, 2012; Yeop et al., 2018).

While the first National Educational Technology Plan (NETP), issued in 1996 by the US Department of Education, mentions the presence of devices in schools and student homes, the 2000 edition displayed a burgeoning awareness of the new devices coming on the market and into students' and teachers' personal possession. In 2002, Maine became the first state to give

two entire grades of students, seventh and eighth, laptops for in-school and home use (NETP, 2010). Just two years later, the release of the 2004 NETP contained survey commentary suggesting that students should each have laptops for schoolwork. By 2017, the NETP extended the discussion of 1:1 computing with the following recommendation regarding devices in schools: "Ensure that every student and educator has at least one internet access device and appropriate software and resources for research, communication, multimedia content creation, and collaboration for use in and out of school" (p. 83). As technology has evolved, the types of devices that schools issued diversified from PC or MacIntosh/Apple laptops to include iPads, Chromebooks, smartphones, e-readers such as Kindle, and other touch-screen tablets. In these modern school-issued 1:1 computing initiatives, the students are provided a device and allowed to take it home. Having a school-issued device typically requires some sort of user agreement and parental permission (Nogueron-Liu, 2017).

The COVID-19 pandemic structurally changed education and resulted in a pivot from focusing on classroom technology integration to using available technology to facilitate unprecedented distance learning. As this dissertation is written in the Spring of 2021, less than 14 months since the United States closed schools for months on end, research on the impact of technology and 1:1 integration model is currently underway and just beginning to reach publication. Several journals have addressed the emergency remote teaching during the pandemic. Studies related to 1:1 technology in the COVID-19 era have focused on the inequity of access and participation (Catalano, Torff, & Anderson, 2021) and case studies of districts that leveraged their 1:1 technology to attempt to continue learning in the face of a shutdown (Peterson, Scharber, Thuesen, & Baskin, 2020). In one special issue's introductory article, Sharkey, Shonfield, Prestridge and Cervera (2021), noted "Digital inequities were identified in

most of the articles in this special issue and were correlated with rural–urban divides (for example, Bokayev et al., 2021; Scully et al., 2021), socio-economic context of households (for example, Greenhow et al., 2020; Scully et al., 2021), and the cultural context such as restrictions on girls' access to the Internet (Khlaif et al., 2020)" (p. 3) while also considering that that level of technology available – a first-order barrier (Ertmer et al., 2012) – impacted the pedagogy by which the students learned.

Pedagogical Benefits and Instructional Strategy for 1:1 computing models

Benefits of 1:1 computing can be reaped when teachers are trained to leverage computer use within strong pedagogy (Keane & Keane, 2017; Rosen & Beck-Hill, 2012). These benefits include a shift in instructional practice ranging from slight behavioral changes incorporating technology into existing pedagogy to the more transformational "paradigmatic change in the triad: student-teacher-content" (Peled et al., 2015, p. 258). Teachers who find effective instructional strategies in 1:1 classrooms view 21st century learners utilizing technology as social, inquiry-based, and self-directed (Anytime Anywhere Learning Foundation, 2015). The effective teacher in 1:1 computing environment "acts as content experts, facilitators, and consultant" (Peled, et al., 2015, p. 264) rather than as the provider of knowledge. Several frameworks and sets of standards have been introduced to guide educators to effectively incorporate technology into their instruction, including ISTE's (2020) standards for students, educators, education leaders, and coaches, TPACK (Mishra & Koheler, 2006) and SAMR (Puentadura, 2006). At the root, however, technology integration reaps the most pedagogical benefits when teachers understand the technology first and can apply "flexible models in which the processes of teaching and learning with technology are central and dynamic" (Hamilton, et al., 2016, p.11). While the presence of 1:1 computing initiatives did not change the pedagogy of

the teachers in isolation, professional development that improved teacher efficacy with the technology resulted in shifts in pedagogy to more personalized, project-based, and student-centered learning, and increased differentiation (Keane & Keane, 2016; Mouza et al., 2008). An effective 1:1 computing activity system, regardless of the model, has been found to accelerate learning and close achievement gaps (Bebell & Padulla, 2015; Genlott & Gronlund, 2016; Hohlfeld et al., 2017).

Technology and Innovation Leadership

Technology leadership occurs at a variety of levels. The macro – state and district – level decisions get passed principals, assistant administrators, technology specialists, media specialists, and teachers as mandates and policies more often than not (Farrell, 2000). Since the effective integration of technology requires much change on the part of all stake-holders, this top-down approach to decision making could be seen as "an imposition on individual teachers by administrators" (Farrell, 2000). This imposition must be mitigated by principals who may find themselves ill-prepared to lead the technology initiative due to a lack of technological knowledge and technology specialists who have no authority to require technology usage by teachers (Anthony & Petranavich, 2012). In their review of leadership models, Pautz and Sadera (2017) found that principals must engage in transformational leadership where the leader inspires change through communicating vision and motivation, fostering a school culture conducive to change, focusing on curriculum and instruction practices, distributing leadership (i.e. sharing leadership responsibilities among the staff), modelling and guiding technology use, intellectually stimulating and providing professional development, monitoring and attending to individual teacher's needs, and effectively planning for infrastructure, funding, and partnerships related to technology. In this scenario, principals see themselves as change agents, shouldering the

responsibility of promoting the change while also monitoring the speed and manner in which the change is taking place (Pautz & Sadera, 2017). Furthermore, the leaders in the above scenarios saw themselves as agents that could overcome some of what Ertmer (1999) describes as barriers, both first- and second-order.

Within the search parameters used for this study – which included the search terms leadership, teacher leadership, 1:1, one-to-one, 1-to-1, education, school, BYOT, BYOD, technology, and computing – in only one published instance have teachers begun a 1:1 initiative (Heath, 2017). Instead of becoming transformative leaders, however, the teachers created a 1:1 school-issued device program that served a relatively small group of magnet students in a district. Indeed, when the district began a separate 1:1 initiative two years after theirs, these teachers found that the approach taken by district leadership actually made their initiative more difficult to sustain (Heath, 2017). The description of the experience of these teachers, and the lack of communication from and consultation by their district leaders, illustrated a breakdown in an established activity system when the subjects and the division of labor resulted in discord.

Stakeholder Perceptions of 1:1 Technology Models

Parents, students, teachers, administrators and leadership of all levels, local business and industry, and taxpayers as well as the rest of the community at large all have stakes in the success of school programming, including 1:1 initiatives. Each group has a distinct point of view and set of concerns and considerations for the implementation of either BYOT policies or school-issued device programs.

Parents. Parent expectations and points of view related to 1:1 initiatives, whether school-issued or BYOT, reflect a dichotomy of positivity and negativity (Nogueron-Liu, 2017; Parsons & Adhikari, 2016). Among stakeholders, parents express the most reservations relative in a

BYOT school (Parsons &Adhikari, 2016). The reservations for both models of 1:1 computing integration are concerned with the ability of parents to financially maintain a device and connectivity, family values related to school-life balance and parental involvement in education, or the mental and physical health concerns related to increased screen-time (Nogueron-Liu, 2017; Parsons & Adhikari, 2016). Some of the parent concerns with participating in their students' education can be considered in the light of self-efficacy theory, when parents explained their lack of confidence with technology (Bandura, 1977; Nogueron-Liu, 2017). Furthermore, parents hinted at first-order barriers with their concerns to maintain the device and connectivity (Ertmer, 1999; Nogueron-Liu, 2017). While parents often recognized the likelihood that technology would be an integral part of their children's educational and life experience, they were less sure of the ability of 1:1 computing initiatives to positively impact their children's success in school (Keane & Keane, 2018). Academically, some concerns exist about the retention of material in a heavily electronic environment, and parents remained unconvinced of increased engagement or organization in learning for 1:1 technology (Parsons & Adhikari, 2016; Keane & Keane, 2018). Yet, parents support students being allowed to bring personally-owned technology to school, especially mobile devices, so that they can reach their students, even if the devices are not an explicit part of the learning experience (Tabarra, 2017).

Students. Similarly, student experiences with 1:1 technology reflect multiple perspectives. With BYOT, they expressed reservations about affording devices or having infrastructure, bothered by having a mix of devices in the classroom, concerned with having technology take over all teaching and learning, worried about a loss of skills that technology could not replace, and frustrated by physical difficulties with technology; alternately, they felt more productive and observant of their own and others' off-task behaviors, enjoyed easier

communication with teachers and fellow students, appreciated the increased peer collaboration – even with student absences – and more immediate teacher feedback, and believed they had better learning outcomes and resource access (Parsons & Adhikari, 2016; Thomas & Munoz, 2016). With regards to policy, students felt enforcement of BYOT policies is sometimes perceived as unfair or inconsistent and believed that to be frustrating (Tabarra, 2017). Initiatives involving school-issued devices had students reporting positive attitudes, again enjoying more collaboration and agency and a better opinion of their own performance in school (Retalis et al., 2018; Rosen & Beck-Hill, 2012). Sometimes, however, they reported general aversions to technology in schoolwork and frustration with infrastructure failures (Stone, 2016; Spanos & Sofos, 2003). The reports of infrastructure failures represent some first-order barriers while the general aversions and the concerns related to behaviors expressed in the studies related to BYOT reflect more second-order barriers according to Ertmer's framework.

District Leadership and School Administration. Administrators' perceptions of 1:1 initiatives reflect fewer reservations than other stakeholders, though multiple researchers have stated that educational leaders are an under-researched population (Milman, 2020; Cole & Sauers, 2018). As discussed in the technology and innovation leadership model section above, Pautz & Sadera (2017) found that principals felt they must engage in transformational leadership and be change agents within the activity system that 1:1 computing. School-level leaders perceived 1:1 school-issued computing as an opportunity for teachers to reconceptualize their teaching which defined the leaders' roles in 1:1 computing initiatives as being supportive of teachers (Milman, 2020). Vu, Frederickson, and Gaskill (2019) found principals believed having 1:1 computing supplements resources beyond what the school could provide otherwise. Building administrators also noted the need to monitor and discipline off-task behavior in a school-issued

1:1 model (Milman, 2020). School leaders also perceive BYOT as a potential transformative learning tool, but building leaders also perceive a necessity to closely control BYOT to avoid negative behaviors, including inappropriate communication such as bullying or sexting (Tabarra, 2017).

The decision makers at the district level have their own considerations related to 1:1 computing initiatives. In choosing school-issued devices, superintendents and boards must justify the cost and ensure successful implementation (Cole & Sauers, 2018). Based on Cole & Sauers' (2018) work, it seems that superintendents believe school-issued 1:1 computing requires a shared vision developed with multiple stakeholders, a focus on the infrastructure and on personnel and a strategic approach to avoid financial waste. They further believed that school-issued devices with community infrastructure support addressed inequity (Cole & Sauers, 2018). Technology directors participating in another study perceived evaluation of the impact of school-issued devices as necessary to determine the success of the program (Vu et al., 2019). In essence, leaders perceive 1:1 computing initiatives as an innovation to be managed and evaluated above all else.

Teachers. Teacher perceptions of and attitudes toward technology were in flux depending upon the challenges they faced in the implementation period and the point at which they were in the initiative's implementation (Keane & Keane, 2016; Mouza et al., 2008; Sung et al., 2016; Thieman & Cevallos, 2017). Teachers reported feeling that they had to engage in excessive explicit instruction and direction with devices in BYOT districts, worried about buy-in of all colleagues, technology skill gaps with themselves and loss of interaction in the classroom and noted challenges in keeping students on task (Hockly, 2012; Parsons & Adhikari, 2016). These concerns can be informed by multiple frameworks. Some concerns reflect Self-Efficacy

Theory, where teachers are unsure of their skills. The worry about buy-in shows that teacher attitudes toward 1:1 exist as a barrier to successful adoption. Teachers also revealed some concerns, worries that could become second-order barriers, about BYOT allowing students to record staff members, edit recordings, and post the recordings to depict the staff members in a negative light (Tabarra, 2017). Perspectives vary slightly in school-issued 1:1 districts, but are still generally positive (Luo & Murray, 2017). Some teachers expressed concerns about students always being connected and the implications for the role of the teacher and for student social skills, but they found their delivery of curriculum changed and improved with 1:1 school issued devices (Luo & Murray, 2017). Teachers implementing 1:1 computing believed the initiatives promoted easier differentiation and more collaboration (Gherardi, 2019). These positive beliefs suggest barriers in 1:1 school-issued systems may have been circumvented and teachers may have improved self-efficacy related to available technology. For both models, there were concerns about content retention while simultaneously allowing students more independent learning opportunities (Luo & Murray, 2017; Parsons & Adhikari, 2016).

Impediments to Successful Implementation of 1:1 Initiatives

As with any innovation, 1:1 computing faces challenges in implementation. These impediments include stakeholder behaviors, financial, and structural issues. The financial and structural issues would be classified primarily as first-order barriers to successful implementation (Ertmer, 1999, 2012). Structural impediments to successful BYOT implementation include the variety of devices and the social and technical issues that arise from such variation, access to a reliable wireless network and enough bandwidth on that network, concerns with the security of connecting personal devices to a school network, and difficulty for teachers to manage the classroom environment when the devices are personally owned (Hockly, 2012; Milman, 2020).

Infrastructure failure is also reported as a key impediment to continuous and successful school-issued 1:1 computing (Mouza et al., 2008). Financial impediments include the cost of devices, infrastructure, and maintenance. The cost to implement and maintain school-issued devices was and is a key impediment to the ubiquitous adoption of the school-issued model of 1:1 computing (Richardson et al., 2013). Maintenance of the initiative and devices, including refresh, was a key issue because districts often approached school-issued 1:1 initiatives as a one-time purchase rather than an ongoing budgetary item (Richardson et al., 2013).

Stakeholder behavior concerns revolve around teacher adoption, classroom management and student responsibility. These behaviors typically result from perceptions that become barriers. The concerns were present in school issued 1:1 computing environments were similar to BYOT, but the legal ramifications of confiscating or searching a device were not present as with BYOT (Keane & Keane, 2016; Mouza et al., 2008; Storz & Hoffman, 2013). With respect to teachers, Vu et al., (2018) note' "the success or failure of any of the schools' one-to-one initiatives rely on teachers embracing the initiatives" (p. 66).

The infrastructure solutions come at the beginning of a 1:1 initiative, by planning and building a "robust" (Cole & Sauers, 2013) network or series of networks for consistent connectivity. Financial concerns of school-issued 1:1 implementation can be addressed through planning as well (Cole & Sauers, 2013). Legal considerations in BYOT can be addressed through strict BYOT and discipline policies (Yeop et al., 2018). Many stakeholder behaviors can be addressed through professional development, especially that which includes hands-on and teacher-led components (Grant et al., 2015). In fact, professional development and the resulting teacher efficacy were most positively correlated to the initial success of a 1:1

computing initiative (Keane & Keane, 2016; Mouza et al., 2008; Sung et al., 2016; Thieman & Cevallos, 2017).

Impact of Professional Development in Adopting 1:1 Initiatives

Innovation adoption, and success, can rely upon the preparedness of those implementing the adoption (Rogers, 2010). Professional development is an integral component of the 1:1 computing activity systems. Both 1:1 computing models are recent enough ins that most teachers are "not formally trained or prepared to teach in one-to-one instructional settings during their teacher programs" (Vu et al., 2019, p.66). Thus, ongoing professional development is necessary for all teachers before and during the implementation of 1:1 computing initiatives. As Vu, Fredrickson, and Gaskill (2019) note, "it [is] extremely unrealistic to provide devices for the teachers and their students without any training" (p.66). Research suggests that a lack of professional development can negatively impact the success of either 1:1 technology model because of teachers' lack of self-efficacy with incorporating technology as well as an overall lack of technology knowledge (Keane & Keane, 2017; Rosen & Beck-Hill, 2012). This lack of self-efficacy creates a second-degree barrier (Ertmer, 1999) to effective 1:1 computing initiative success. Lack of training altogether is a first-order barrier (Ertmer, 1999; Grant et al., 2015).

Teacher professional development should be aligned with specific curricular content and focus on pedagogy (Penuel, et al., 2007). In addition, professional development should be sustained over time (Garet et al., 2001). Good professional development for integrating technology comes in formal and informal contexts, but a combination of the two shows increased effectiveness (Thoma et al., 2017). Informal professional development can involve a professional learning community, but that community is improved by a technology integration facilitator (Thoma et al., 2017). Furthermore, formal training opportunities provide a foundation for

learning, but informal use of tutorials and webinars help teachers develop individually (Grant et al., 2015).

Gaps and Implications for this Study

The review of the literature above showed an increasing amount of teacher perspectives related to 1:1 computing being researched and reviewed since Fullan (2000) found that their voice was all but silenced in educational innovation adoption and research. What is still missing, however, is teacher experiences with both BYOT and school-issued 1:1 computing initiatives. As more schools move toward a 1:1 ratio for students, consideration should be given to the unique perspectives these teachers bring to the conversation. Since COVID has spurred some districts to more rapidly engage in developing and implementing 1:1 initiatives, an understanding of teachers experiences in these environments is pivotal to effective implementation. This study is situated at the intersection of BYOT and school-issued 1:1 models and teacher experience both before and during the COVID-19 pandemic.

CHAPTER 3: METHODOLOGY

Chapter three discusses the approach to research employed in this study. The question posed in chapter one suggests itself to qualitative inquiry, which Creswell (2013) says is suited to "exploring and understanding the meaning individuals or groups ascribe to a social or human problem" (p. 4). This chapter explains what it means to employ qualitative research, particularly phenomenography, to the lived experiences of teachers who have taught in 1:1 environments utilizing both the BYOT and school-issued device models.

Role of the Researcher

Perhaps it is no surprise that the eager teacher illustrated in the vignette in Chapter 1 is me. In general, I am a proponent of instructional technology. I began to develop an interest in access to technology in schools during the 2006-2007 school year, my first year of teaching as I finished a Master's degree. As I have become immersed in instructional technology over the last five years, I have come to believe that, when implemented with transformative pedagogy – pedagogy that gives students the power to critically consider their beliefs, values, and knowledge and teach them to become reflective of that knowledge and appreciate multiple perspectives (Ukpokodu, 2009) – instructional technology has the potential to make learning more authentic and creative, reversing the trend toward regurgitation and standardization in education.

When I first became a teacher, all of the cool technology tools and Web 2.0 applications that college promoted were out of reach with the amount of technology available at the high school where I taught. One lab of 30 desktops was available to a school of 1600 students. Our technology quickly increased with an addition to the building housing two more computer labs and an investment in several laptop carts, but it failed to keep up with the new demands of subscriptions to electronic test preparation materials. Simultaneously, a middle school in our

district piloted district-owned 1:1 laptops and a dream of every student taking home a laptop in our primarily economically disadvantaged system was born, and, six years later, realized. Intensive training on learning management systems and the ever-increasing array of educational websites and applications resulted in an environment where technology was a foundation.

After two years in the 1:1 environment, I moved to a new district, one with a higher socioeconomic foundation and stronger academic performance. The district was even an award winner for its instructional technology use, but it was not 1:1. It had a 2-year-old learning management system and a *Bring Your Own Technology* (BYOT) policy with established infrastructure. Student use of their own devices was different than what I had experienced in the 1:1 environment. As a result, I monopolized the computer labs and only spent a year in that school.

My next system and school had an even more robust instructional technology department and a worse state of accessibility. At any given time, less than 1/3 of our students could work on school devices, and 2/3 of the devices in use were out of warranty (i.e. more than four years old). In a different role this time, I facilitated more than ever the use of student-owned devices for technology-based activities. If the first change in systems spawned my interest in how the types of devices students use impacted the teachers' experience with technology, the second change spurred me on. Having taught in districts employing divergent 1:1 technology models – school-issued versus BYOT – I found that I had preference for and more positive experiences with the school-issued 1:1 device model over BYOT. Since I believed that the school-issued 1:1 model is better suited for improved student achievement, motivation, and behavior as well as for teacher pedagogy and consistent professional development, I began to wonder how teachers who have

experienced both school-issued 1:1 and student-owned device models felt about their respective experiences.

And, now, in the Spring of 2021, we have endured over a year of COVID-19 pandemic lockdowns and restrictions. We have hundreds of thousands of students across the state opting to or having to learn virtually. I wonder how these teachers' perspectives might be influenced by this experience. Troubleshooting the various types of student-owned devices from afar presents an entirely new quandary and adds an additional layer to the disparity that might exist between schools that issue devices to each student and schools that do not. Teachers are the ones in the trenches, implementing technology day-in and day-out. Shouldn't we listen to what they have to say?

Research Question

The central question for this study is *What are teachers' experiences with BYOT and school-issued 1:1 technology initiatives in Northern Georgia?* Uncovering experience is the entire goal of the phenomenographic research tradition. Thus, using interviews and the strict analysis procedures outlined in the following paragraphs make phenomenography the appropriate tradition to explore this research question. Within this phenomenon of teacher experience, the areas of interest under investigation include:

- Perceived impacts on student outcomes
- Key factors for positive and effective implementation
- Role of professional development on teachers' experience with each model
- Perceptions when comparing the models for effectiveness
- Impact of their current models on them during COVID

Research Approach and Tradition

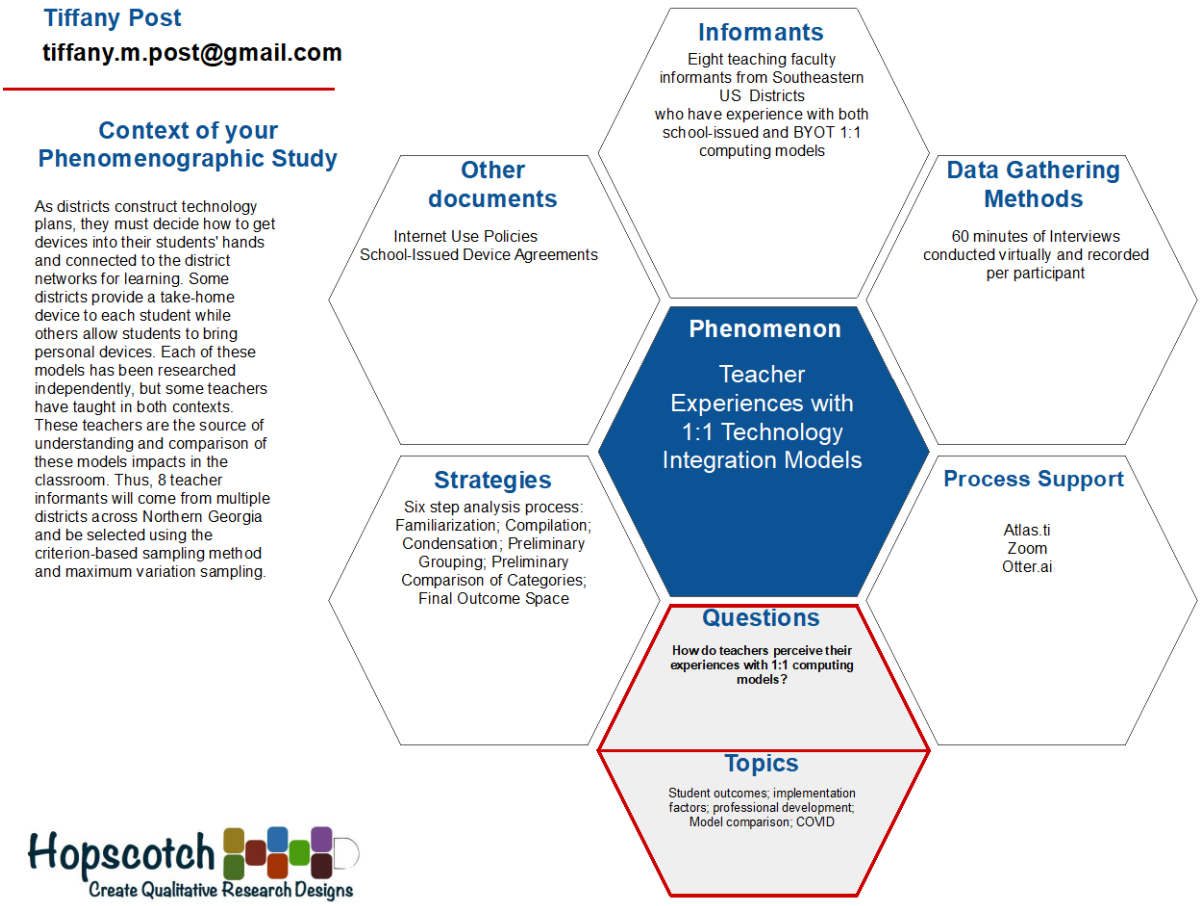
The broad research methodology for my study was qualitative. Stake (2010) describes qualitative research as interpretive, experiential, situational, and personalistic. This research study had each of the four qualities: I *personally* acted as the "main research instrument" (Stake, 2010, p. 15) as I interviewed the teachers about their *experiences* with multiple models of 1:1 computing, examined and synthesized these *experience*s in order to *interpret* their significance within the defined *situations* that exist distinctly in the two models, BYOT and school issued devices.

The research tradition I employed, phenomenography, attempts to identify, describe, and examine the various ways a group of people experience and understand a phenomenon (Marton, 1981). Marton (1981) developed phenomenography to "deal with both the conceptual and the experiential, as well with what is thought of as that which is lived" (p. 181). Stakeholders engaged in any activity provide the best description of the phenomena surrounding said activity. Furthermore, these beliefs are socially constructed based upon the experiences of the stakeholders. Thus, as the experiences change, so will the description of the phenomena. The conventional phenomenography data collection approach uses in depth semi-structured interviews and a well-structured sample of informants who have experience with the particular phenomenon under study (Marton & Booth, 1997). When informed by theories that frame teacher behaviors – Diffusion of Innovations, The Barrier Threshold, and Self-efficacy theory – this phenomenography described the ways teachers experienced and understood the phenomenon of 1:1 technology initiatives. The key elements of the phenomenographic study that I conducted, are represented in Figure 2.

Phenomenography was the tradition of choice because stakeholders' opinions of the presence and use of technology is defined by their position within the educational system in which expectations of technology use has become endemic. Rather than attempting to capture the "essence" (Alsop & Thompsett, 2016) of 1:1 computing, as would be the case with phenomenology, phenomenography is concerned with "experiential description" (Marton, 1981, p. 185). Teachers, like all stakeholders, have experienced technology initiative adoption based upon the environments and systems in which they existed. In order to gain deep insight into stakeholders' experiences, Storz and Hoffman (2013) used phenomenology when they examined the impact of one-to-one technology on students and teachers. But they wanted the essence of the impact, whereas this phenomenography described the ways teachers experience and understand the phenomenon of experiencing multiple 1:1 technology initiatives when informed by theories that frame teacher behaviors. The phenomenographic description of their experiences provides much needed insight into an underrepresented and nuanced voice as districts continue to add 1:1 technology programs across the nation (CoSN, 2019). Because these teachers have had these experiences in different environments, with some never having crossed paths, and the relationships among the others traversing tangled to tangential, a case study would have been too narrow of a consideration.

Figure *2*

Visual representation of the key components of the phenomenography developed using Hopscotch (Jorrín-Abellán, 2016, 2019)



Context & Informants

The location of this study involved informants with current experience in one of two school districts, one with a BYOT policy, Metro School District, and one with school-issued devices, Foothill School District. The eight informants had experience in at least one other distinct districts described in the next few paragraphs, so each had experience in with both BYOT policies and school-issued devices. These districts are located in Georgia. I chose to

require informants with work experience in distinct districts rather than different schools within a district because the districts in the geographic region had established BYOT or 1:1 policies published publicly to increase the trustworthiness of the study.

The various districts in which the teachers have work history are representative of several of the various types of districts found throughout the state and country, ranging from suburban to rural, from among the largest in the country to much smaller, and diverse in a number of demographic measures, including racial and political makeup and economic affluence. Districts with district-wide school-issued devices in these counties included Foothill School District and Appalachian School District. Students in these districts may take school-issued devices home. Systems that employ a district-wide version of BYOT include Lakeside School District, although some schools in Lakeside had school-issued devices at the school-level, and Metro School District. One district, Mountain School District moved from BYOT to school-issued devices in response to the COVID-19 pandemic. Riverside School District had school-issued devices at some schools, including the ones in which the informants for this study had taught.

In addition to personal connection and accessibility to the field, these districts have been chosen based on participant experience and maximum variation sampling which "allows the largest population of readers to connect with what they are reading" (Seidman 2019, p. 58). These districts have wide disparity in size: Metro School District is among the largest districts in the country. Alternatively, City, Appalachian and Mountain districts' enrollments are a fraction of that of Metro. Income disparity also exists across and within the district with some systems having system-wide Title I status and others having just some Title I schools. Furthermore, the districts also have diverse racial make-ups. Metro and Riverside are majority-minority districts. Border, Rocky, and Lakeside have 31%-45% minority populations. Appalachia, Mountain and

Foothill districts have 30% or less minority populations. The political climates of the systems are also varied, with Metro and Riverside's county representation flipping between Democratic and Republican domination while the other districts are situated in more firmly conservative areas. See Table 1 for district 1:1 technology model history.

Table 1

School district 1:1 history

District Pseudonym	BYOT or School-Issued	Implementation Years Informants Present School-Issued	Total Years of implementation for School-Issued
Appalachian	SI	1	2
Border	SI	Unknown	Unknown
City	BYOT	N/A	N/A
Foothill	SI	1-3, 6-7	7
Lakeside	BYOT	N/A	N/A
Metro	BYOT	N/A	N/A
Mountain	SI	1	2
Riverside	SI	1-3	7
Rocky	SI	2	5 (Discontinued)

I purposefully selected eight informants who self-reported teaching experience with both some form of a BYOT 1:1 model and some form of a school-issued device model. Marton (1981) claims phenomenography participant samples are ideally between six and ten informants; thus, I chose the median number of informants. Purposeful selection meant finding the informants that could provide the best understanding of my research questions (Creswell & Creswell, 2018). Thus, I used criterion-based sampling method (Creswell, 2007). The primary criterion was the informants' experience with both BYOT and school-issued devices as employees of a district because of their ability to compare the experiences and evaluate their perceptions of them in response to the third research question. Establishing the criterion requiring experience with more than 1:1 model resulted in comparisons between the models under study.

A second criterion was that the teachers' work experience was in middle and high schools because these two school levels tend to have the most pervasive use of BYOT. While elementary schools also incorporate various 1:1 models, the frequency of possession of devices by middle and high school students made their teachers more likely to meet the dual BYOT/1:1 experience criterion for sampling (Rideout & Robb, 2019).

I reached out to potential informants using social media, direct messaging, and emailing to request participation in my study. I provided them with the potential risks for the study and obtained consent for interviews. I have written record of consent, but identities were concealed by keeping pseudonyms separate from the consent documents. A sample consent form is located in Appendix A.

The informants taught in a variety of combinations of the school-issued 1:1 and BYOT districts. Each participant had experience in a minimum of two districts, with at least one of the districts participating in BYOT and another with school-issued 1:1 devices. Several informants were teaching during the implementation phase of 1:1 technology in their districts. All informants had been teachers within a year of data collection. One was acting as an academic coach to teachers during the data collection period. All informants were current employees of Metro and Foothill School Districts, which granted my requests for research, but each had experience in one or more of the aforementioned additional school districts. See Table 2 for details. Once I received district approval, I sought and received principal approval and submitted to the IRB at the University. Upon approval from the University, I began scheduling interviews with the participants.

Table 2

Informant descriptions

Pseudonym	Sex	School level/Subjects Taught	Districts	Years Experience
Amanda	F	HS ELA Teacher MS ELA Teacher HS Video Production	Mountain SD Rocky SD Foothill SD City SD	5-10
Bailey	M	HS PE Teacher, HS Science Teacher	Foothill SD Appalachian SD Lakeside SD	>20
Cara	F	MS ELA	Lakeside SD Foothill SD	<5
Danielle	F	MS ELA Teacher HS ELA Teacher	Foothill SD Mountain SD	<5
Emily	F	MS Math Teacher MS Science Teacher	Metro SD Foothill SD South SDs**	11-20
Faith	F	MS Academic Coach MS ELA	Metro SD Border SD	11-20
Georgina	F	MS ELA HS ELA	Riverside SD Metro SD	11-20
Heather	F	HS ELA MS ELA	Metro SD Riverside SD Lakeside SD	>20

*South SDs had no 1:1 initiative and were outside of the scope of this study.

Data collection

The primary data collection method was individual interviews with informants. Six informants requested that the 60 minutes' worth of interviewing be combined into a single interview with the option for follow-up questions by email or text. Two chose to participate in two interviews. The protocol focused on using Seidmen's (2019) specific purposes – a focused history for context, a reconstruction of the informants' experience in the topic under study, and a reflection on the meaning behind their experience – despite informants' requests for interviews to be conducted in a single-sitting.

The interviews were semi-structured, and an interview protocol was generated from questions used in a pilot interview as part of a class project (see Appendix B). The semi-

structured format allowed me to be open to the potential that questions may be added to or replaced (Glesne, 2016). The semi-structured interview made it more likely than an unstructured interview for responses to attend to the intent of this study while allowing for the interviews to unfold organically with follow-up probes as I deemed necessary to fully answer the research questions. Follow-up questions asked for examples, clarification, or comparisons of experiences.

All interviews we conducted via Zoom and recorded while I took field notes. Recording of interviews ensured that I was free to actively listen while maintaining the accuracy of and detail present in each interview (Glesne, 2016). The interviews were transcribed using Otter.ai.

Documents published relevant to BYOT and/or school-issued devices were obtained from Metro, Mountain, Foothill, and Lakeside school districts for analysis as well. These documents are available publicly on the various districts' websites for use by district employees, parents, and students in accessing each district's technology program.

Data Analysis

Gonzalez (2010) advocated a six step process data analysis process. Sjöström and Dahlgren (2002) proposed a similar process with an added a step just before the elaboration of the outcome space:

(i). *Familiarization step*: the transcripts were read several times in order to become familiar with their contents.

- (ii) *Compilation step*: The second step required a more focused reading in order to deduce similarities and differences from the transcripts. The primary aim of this step was compiling teachers' answers to certain questions that have been asked during interviews. Through this process, the researcher identified the most valued elements in answers.

- (iii). *Condensation step*: This process selected extracts that seemed to be relevant and meaningful for this study. The main aim of this step was to sift through and omit the irrelevant, redundant or unnecessary components within the transcripts and consequently deciphered the central elements of the informants' answers.
- (iv). *Preliminary grouping step:* the fourth step focused on locating and classifying similar answers into the preliminary groups. This preliminary group was reviewed again to check whether any other groups showed the same meaning under different headings. Thus, the analysis presented an initial list of categories of descriptions.
- (v). *Preliminary comparison of categories:* this step involved the revisions of the initial list of categories to bring forth a comparison among the preliminary listed categories. The main aim of this step was to set up boundaries among the categories. Before going through to the next step, the transcripts were read again to check whether the preliminary established categories represent the accurate experience of the informants.
- (vi). *Naming the categories:* After confirming the categories, the next step was to name the categories to emphasize their essence based on the groups' internal attributes and distinguish features between them.
- (vii). *Final outcome space:* In the last step, the researcher hoped to discover the final outcome space based on their internal relationships and qualitatively different ways of understanding the particular phenomena.

As Khan (2014) noted, Gonzalez (2010) and Sjöström & Dahlgren (2002) were mostly in agreement. This research study followed Sjöström & Dahlgren's (2002) method as described above and included naming the categories as a step.

The data analysis of the interview transcripts and documents took place in Atlas.ti 9 Mac (2020) using Sjöström & Dahlgren's (2002) aforementioned process. After the *familiarization* step of the phenomenographic analysis, I loaded all of the transcripts and policy documents into the Atlas.ti software. Using Atlas.ti, I completed the *compilation* step by coding teacher responses based upon the topics under consideration and the *condensation* step where I generated codes within Atlas.ti. For the *preliminary grouping* step, I used the grouping function of Atlas.ti. I continued using Atlas.ti during the *preliminary comparison of categories* and *naming the categories* (Sjöström & Dahlgren, 2002). A list of codes, categories, themes, their frequency of occurrence and associated quotes were exported and used to illustrate *final outcomes* as well.

Strategies to ensure trustworthiness

Guba (1981) defined four strategies to ensure the pursuit of trustworthiness in naturalistic – i.e. qualitative – research. He aligned these strategies with the strategies previously ascribed to what he deemed rationalistic research. Rather than questions of validity, generalizability, reliability and objectivity, Guba (1981) proposed the credibility, transferability, dependability, and confirmability as the four aspects of trustworthiness in qualitative research. Shenton (2004) further refined these four strategies and how they can be practiced in the course of qualitative research.

Credibility is one of the necessary components of trustworthiness in qualitative research and hopes to produce findings that are "plausible" (Guba, 1981, p. 83). In my phenomenographic study of secondary teachers' experiences with different 1:1 technology initiative models, I interviewed and then conducted member checks to ensure findings accurately represented informants experiences. To further establish credibility, document analysis was an additional data collection method to examine if teacher descriptions of policies and experiences reflected

official policy. A phenomenographic approach's credibility lay in its identification and interrogation of the different ways in which multiple people perceive or experience specific a phenomenon. As a researcher, for transparency, I have experience with both school-issued devices and BYOT and had to bracket my experiences in order to reduce researcher bias. Paying particular attention to my own biases and tracking how they may be influencing my interpretation of the data resolved what Alsop and Thompsett (2016) suggest is a weakness of phenomenography.

Closely linked with credibility, the issue of dependability, which Guba (1981) suggested produces stable results was addressed through the detailed description of the processes within the study. The use of Hopscotch helped provide an in-depth methodological description of the study, which helps ensure the dependability of the study. This description created a "prototype model" (Shenton, 2004) which will allow other researchers to replicate the process. Furthermore, since this phenomenography used multiple interview informants the results will be dependable and not unique to a specific individual.

Transferability allowed the findings of one study to be applied to other situations and allows them to be "context-relevant" (Guba, 1981, p. 83). Within the context of technology, this study could bring to light opinions of a key stakeholder in the K-12 system: teachers. The opinions and perceptions of teachers influenced the extent to and the fidelity with which instructional technology initiatives, including 1:1 computing regardless of the model, are implemented in the classroom. Beyond 1:1 technology, this study may be transferable to the concept of educational initiatives as a whole. Decision-making stakeholders might see a more complete picture of the dynamics in the classroom and make fundamental choices that improve the dynamics.

Confirmability means ensuring the findings of the phenomenography were indeed reflective of the experiences of the informants (Shenton, 2004) and produced results that were "investigator-free" (Guba, 1981, p. 83). Triangulation, member checks, and bracketing reduced the effect of researcher bias. Admitting personal beliefs and weaknesses while reflecting at the completion of the study supported the confirmability of the study. In addition, Atlas.ti generated diagrams demonstrated an "audit trail" that other researchers can follow to ensure the confirmability of the study (Shenton, 2004).

Ethics

This study examined the experiences of eight secondary teachers regarding their experiences with 1:1 technology integration in their classrooms. Risks to the Informants related primarily to confidentiality and privacy. If teachers were critical of an initiative and their confidentiality is breached, it could have negative repercussions on their reputations and/or career trajectory. To address this risk, once the interview was transcribed, informants were assigned a pseudonym and all identifying information was removed. Precautions were taken throughout the study to protect the identities of the Informants. All IRB protocols and procedures were followed to ensure the confidentiality of each individual participant who has volunteered to participate in this study. Ethically, the researcher committed to being honest and providing full disclosure of information to Informants, protecting privacy and maintaining confidentiality, and being aware of researcher bias.

Methodological limitations

One limitation of this study's methodology was the lack of opportunity to include observation of the informants. Having multiple modes of data collection strengthens the reliability of the data. In addition, the interviews and data analysis were completed by myself as

a solo researcher. Even with an awareness and focus on bracketing on preconceived notions an experience, the potential for researcher bias existed. Another limitation of this study was the limited pool of informants. An additional limitation arose from the virtual conferencing imposed by COVID restrictions. The new environment limited reading body language during video conferencing and facial expressions with masks. Finally, the self-identification of Informants resulted in an over-representation of females and ELA teachers.

CHAPTER 4: FINDINGS

This phenomenographic study sought to examine the experiences of teachers who have worked with both BYOT and school-issued 1:1 technology and explore how these experiences have shaped teachers' perceptions about the impacts of the model on student outcomes, positive and effective implementation, effectiveness, and COVID-19 virtual and hybrid learning experiences. Their perceptions of professional development's impact on their experiences was another area of consideration. Sjöström and Dahlgren 's (2002) seven-step process for in phenomenographic data analysis ensured the researcher compares and combines categories to address these topics under consideration and the primary question: *What are teachers' experiences with BYOT and school-issued 1:1 technology initiatives in Northern Georgia?* In this chapter, research findings will be described in thick detail (Sin, 2010). The chapter begins with a portrayal of the participants, followed by a discussion of the data analysis process, and a report of the results organized based on the categorical descriptions related to the areas under study listed above.

Portrayal of Informants

The informants in the study had all been teachers in districts and schools that employed both BYOT and school-issued 1:1 technology models. See Table 2, Chapter 3, pp. 42 for more details. Four informants were currently employed at the high school level and the other four were employed at the middle school level. Four informants had taught both middle and high school levels while one had taught exclusively high school and three had taught exclusively middle school. Six of the eight informants were ELA teachers, one of whom also had CTAE experience. The two additional informants both had science experience, with one moving into Physical Education and another to Math.

Seven participants were female, and one was male. Their ages ranged from mid-20s to mid-50s and their years' experience ranged from 3 to more than 20. All informants were Caucasian, and one informant identified with Hispanic/Latino ethnicity. The informants' names are pseudonyms. The next eight paragraphs are short narratives of each participant to contextualize their experiences.

Amanda is teacher in her early 50s. A non-traditional entrant to education, she has about a decade of teaching experience. Entering the profession at the height of the early-2010s recession, Amanda experienced a good bit of job instability. She trained and student-taught in English but was placed in a Video-Broadcast position due to earlier career experience. She bounced around several long-term sub positions and single-year positions, racking up experience in seven schools in four districts since the 2010-2011 school year. Of these positions, half were in schools with 1:1 school-issued devices and the other half were in BYOT districts. Amanda had the unique experience of working through two separate 1:1 school-issued initiative implementations. At the same time, prior to COVID-19, she did not consider herself an avid user of instructional technology.

Bailey had the most experience, more than 20 years, and highest degree level, a doctorate, of all participants. In his mid-40s, he was also the only male. Having spent most of his career teaching various science courses and coaching, Bailey finally moved into teaching PE during the 2020-2021 school year. He has experience in three districts, two with 1:1 programs and one with a BYOT initiative.

Cara, another non-traditional entrant to education, had 3 years of teaching experience. In her early 30s, Cara began in a BYOT district before moving to a school-issued district in the

midst of the COVID-19 shutdown. She considered herself to be a millennial to whom technology was a native activity coming from a family of early adopters.

Danielle was the youngest informant in the study at under 30 years old and in her 3rd year of teaching. Pregnant with her first child, Cara participated in interviews from her home while quarantining from a positive COVID-19 diagnosis. Danielle student-taught in Foothill SD, a school-issued district, before spending a year teaching in a BYOT district. The last two years, she returned to teach in Foothill. Cara is completing a Master's degree in a non-education field and intends to leave the profession at the end of her fourth year, 2021-2022.

Emily is a mid-career teacher in her mid-30s. Her first several years in the early 2000s were spent in two districts that did not have any 1:1 technology initiative in place. When she moved to Foothill district, she was part of the implementation of 1:1 school issued devices and taught Science. She then moved to Metro, a BYOT district, where she teaches Math. Emily has a degree and certification in Instructional Technology. In addition, she acts as an instructional leader in her current school year.

Faith began her career about 15 years ago in a small city district that had vast technology resources and was an early issuer of 1:1 technology. She then moved to teach in Metro where there is a district-wide BYOT initiative. That initiative, however, had been discouraged at her particular school prior to COVID-19. In the 2020-2021 school year, Faith moved from the classroom to academic coach, where she has gained some experience with the concept of the diffusion of innovations and professional development from a different perspective.

Georgina began her career in Metro SD before it had a BYOT policy or infrastructure. She moved to a Project-Based Learning (PBL) charter school in Riverside SD. At the PBL school, all students were issued devices, but only sixth grade and up were allowed to transport

them home. She returned to Metro SD where she has experience facilitating BYOT in a lower-income high school. In her thirties, Georgina reports being an early adopter of many technologies and an avid user of lifestyle technology.

Heather is a late-career teacher with experience in two school-issued device settings and one BYOT setting. Having begun her career in Metro SD prior to 1:1 initiatives becoming popular, she moved to Riverside SD where she helped implement 1:1 iPads and ran a paperless classroom. She then moved to Lakeside SD where a school-issued 1:1 initiative as in place at the school-level. She ultimately returned to experience the BYOT model in Metro.

Data Collection and Analysis

This study had two primary data sources: interviews and four districts 1:1 technology documents. Interviews took place in February 2020 via Zoom conferencing. The examination of these data sources deigns to extrapolate the experiences and understandings of the informants with the phenomenon under study (Marton, 1981). The recordings of the interviews were uploaded into and transcribed by Otter.ai. The resulting transcripts were uploaded into Atlas.ti 9 for Mac. The transcripts were read and steps 1-2 of Sjöström and Dahlgren's (2002) phenomenographic qualitative data analysis process, as described in depth in Chapter 3, were completed prior to uploading the transcripts into Atlas.ti. The researcher then completed steps three through six of Sjöström and Dahlgren's process in Atlas.ti. The phenomenographic analysis process can be related to the open, axial, and selective coding processes that are the hallmark of qualitative research. This relationship is outlined in Table 3.

Table 3

Relationship between coding process and phenomenographic analysis

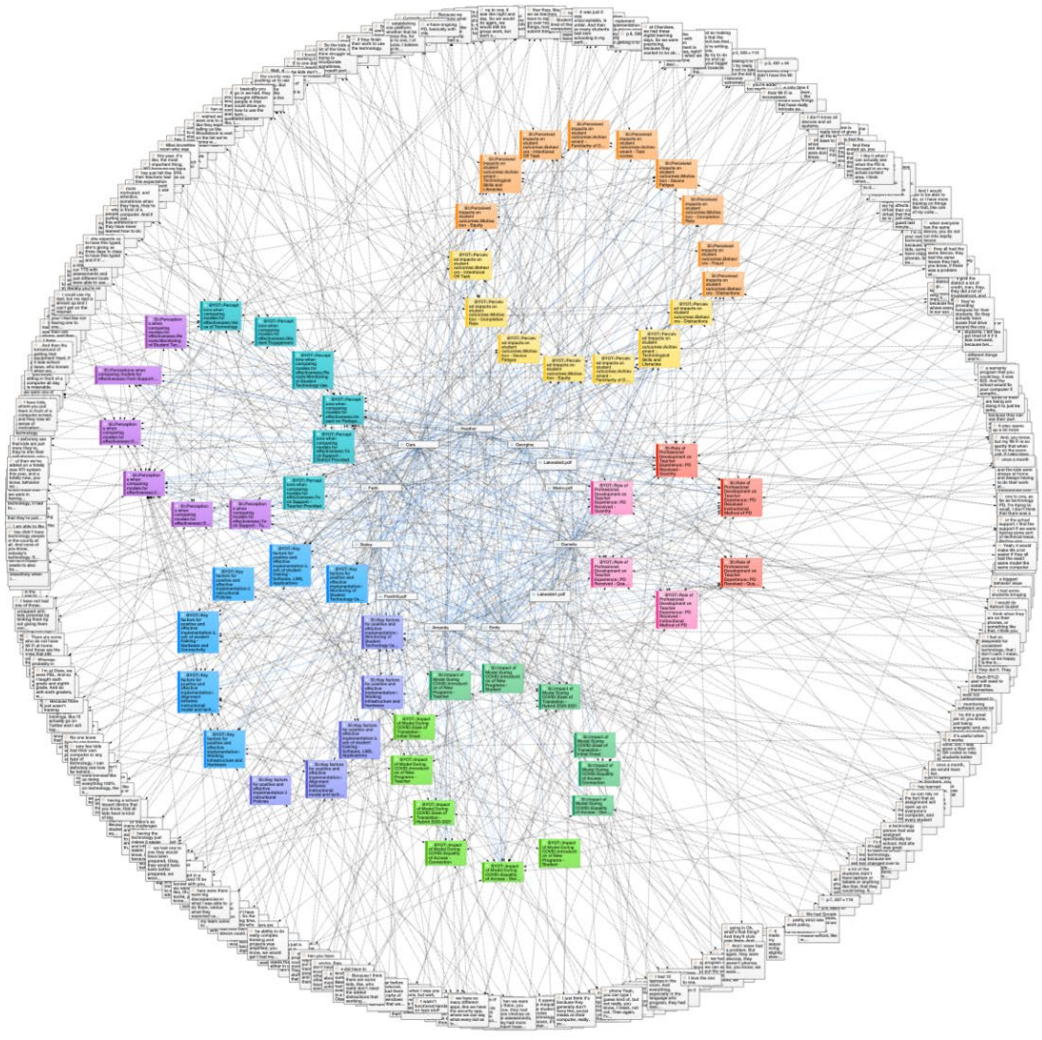
Coding Process	*Phenomenographic Analysis Process*
Familiarization Compilation Condensation	Open Coding
Preliminary Grouping	Axial Coding
Preliminary Comparison of Categories Naming of Categories	Selective Coding
Outcome Space	

During the first round of open coding, the researcher generated thirty codes that were then duplicated to distinguish between the codes' occurrences relative to informants' discussions of a BYOT or School-Issued (SI) 1:1 technology model. Ultimately, 57 open codes were assigned to 262 quotations from the eight interview transcripts and five technology documents. Figure 3 graphically represents the codes, quotations, and sources as a networked and triangulated macro view. In this figure, the participants are located in the inner circle. The five code groups associated with the subareas under consideration appear in color: the light and dark green group is related to COVID; the orange and yellow are the student outcomes codes; the teal and purple group are codes related to perceptions when comparing models; the light and dark blue group are the key factors for implementation codes; and the pink and red group are professional development. Each group has two colors to indicate if the code is related to the

school-issued or BYOT 1:1 model. The exterior circle are the more than 200 quotations associated with codes.

Figure 3

Atlas.ti generated network of the total data set

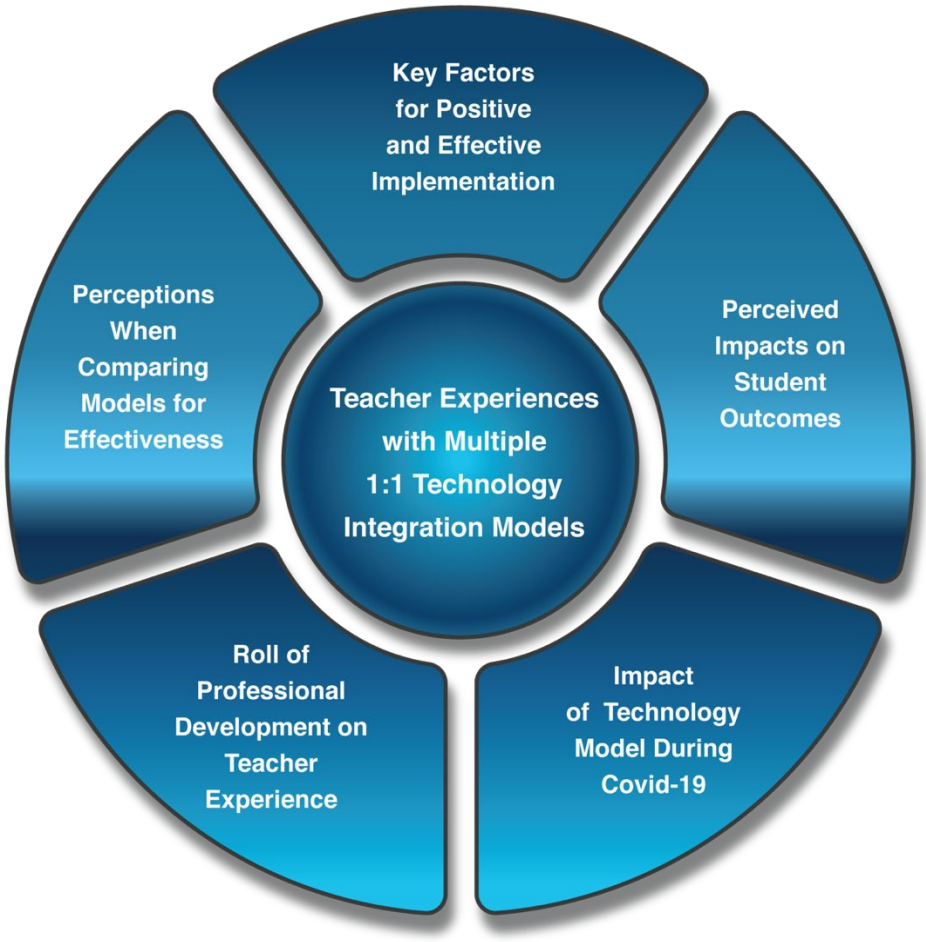


During the preliminary grouping process, or axial coding, the open codes were grouped in a manner that reflected the topics under consideration. These categories were then compared,

defined, and named to establish boundaries between them (Sjöström and Dahlgren, 2002). The emergent categories are illustrated in Figure 4.

Figure 4

Emergent and named categories



Definition of Categories

The first category identifies the key factors for positive and effective implementation of a 1:1 technology model. The codes in this category include the following: the alignment between the instructional model and the technology model – in other words, how the instructional

expectations and the choice of BYOT or school-issued devices do or do not align with one another for effective practice; instructional policies – the grading and student-work expectations; lack of student training – hardware; lack of student training – software; monitoring of student technology usage; and working infrastructure and hardware.

The second category examines perceived impacts on student outcomes. These outcomes have three subsets: achievement, behaviors, and motivation. The achievement subset codes are familiarity of devices and technological skills and literacies. The behaviors subset have the codes fraud, distractions, and intentional off-task behavior. The motivation subset includes completion rate, device fatigue, and equity.

The third category considers perceptions when comparing models for effectiveness. The codes within this category include impact on pedagogy, student engagement, remote monitoring of student technology, value of technology, and tech support, both district- and teacher-provided.

The fourth category explores how the instructional model, quality, and quantity of professional development plays a role in teacher experience.

The fifth considers the impact of the model during COVID with codes considering the ease of transition during the initial onset of the pandemic and during hybrid learning in the 2020-2021 school year, equality of access for both connection and devices, and the introduction of new programs to teachers and students during the pandemic period. A full listing of codes is listed in Appendix C.

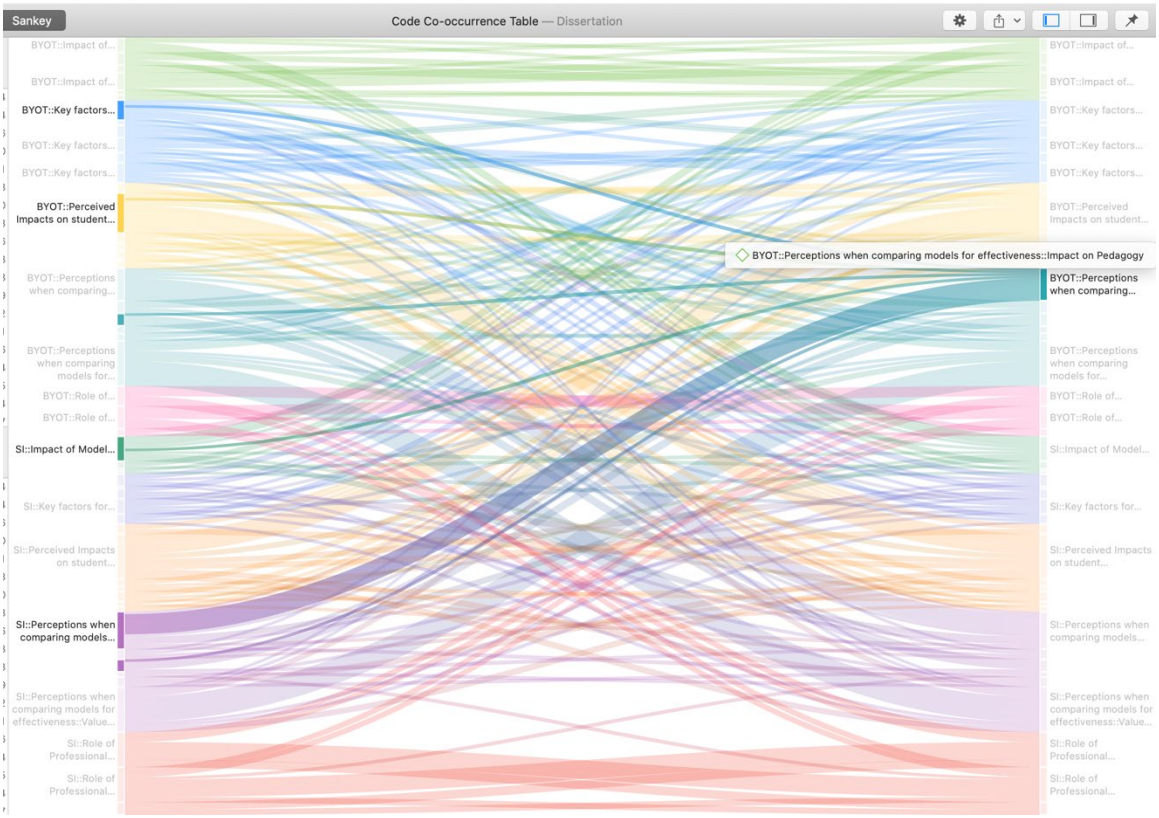
Outcome Space

Once the codes and categories were established and duplicated so that BYOT and school-issued code occurrences could be compared, various functions within Atlas.ti were utilized to determine the outcome space. For instance, the co-occurrence Sankey diagram that helps

visualize the co-occurrence table in Atlas.ti was examined to determine how frequently the same codes occurred with one another for BYOT and school-issued models. The variety of co-occurring codes between the BYOT and school-issued models suggests that teachers experience the 1:1 integration models in relationship to one another. In other words, the frequency with which a code that existed in both the BYOT and school-issued discussion shows that teachers who have experienced both models often compare them organically. Figure 5 portrays the co-occurrence Sankey diagram with the relationship between the impact of pedagogy codes in teal and purple. It also illustrates how the impact of pedagogy code for BYOT is also associated with several other BYOT codes and some school issued codes.

Figure 5

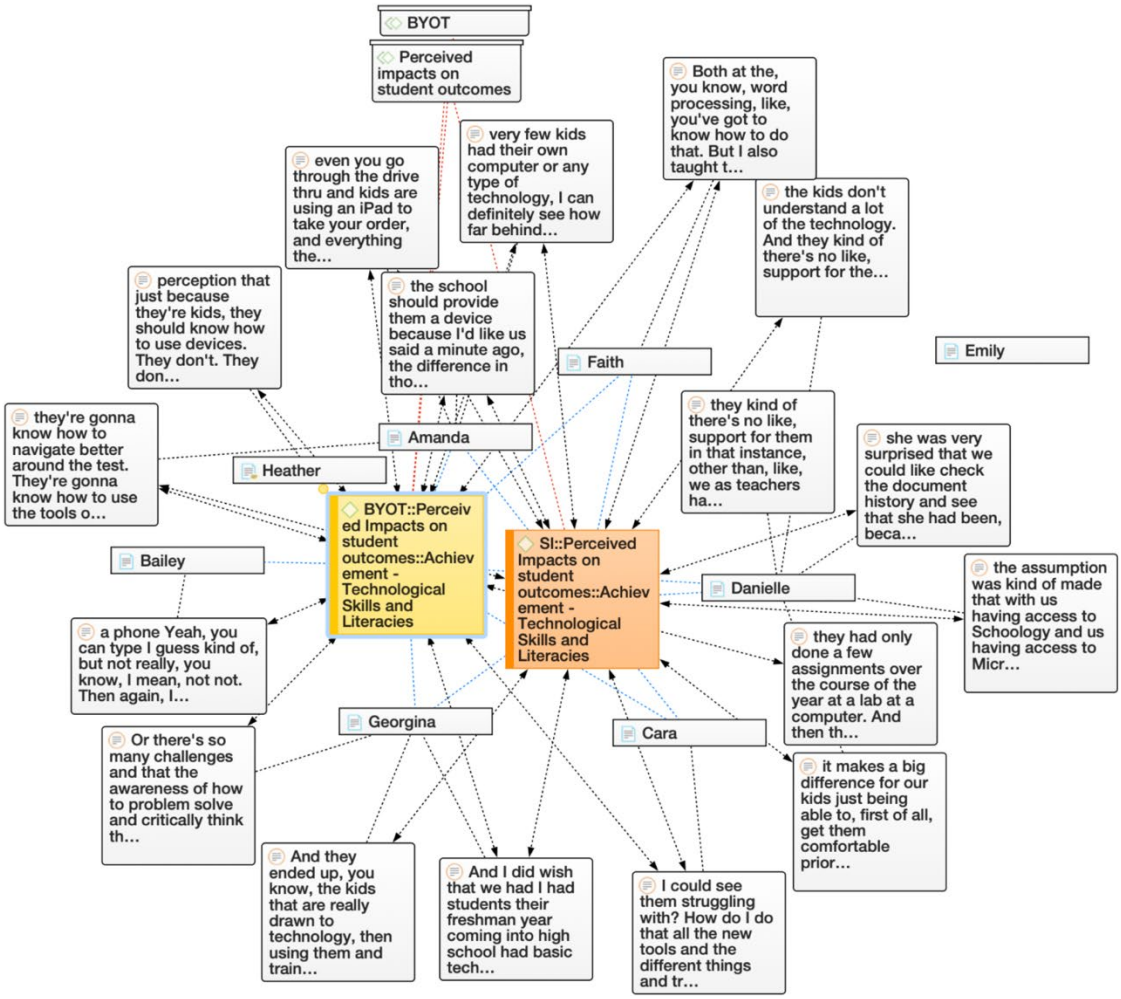
Atlas.ti co-occurrence Sankey diagram with highlighted Impact on Pedagogy



Additionally, the researcher used network views in Atlas.ti to find commonality and dissimilarity among the informants relative to particular codes and themes. These network views assisted the researcher in determining the different ways in which the informants experience the phenomenon under study.

Figure 6

A sample network of code, code group, category, associated informants and quotations



In his 2020 dissertation, Osman Khan drew upon the work of Hans and Ellis (2019) to describe the outcome space as a collection "emergent themes described as categories, code families and descriptions, and major representative statements […] organized by research

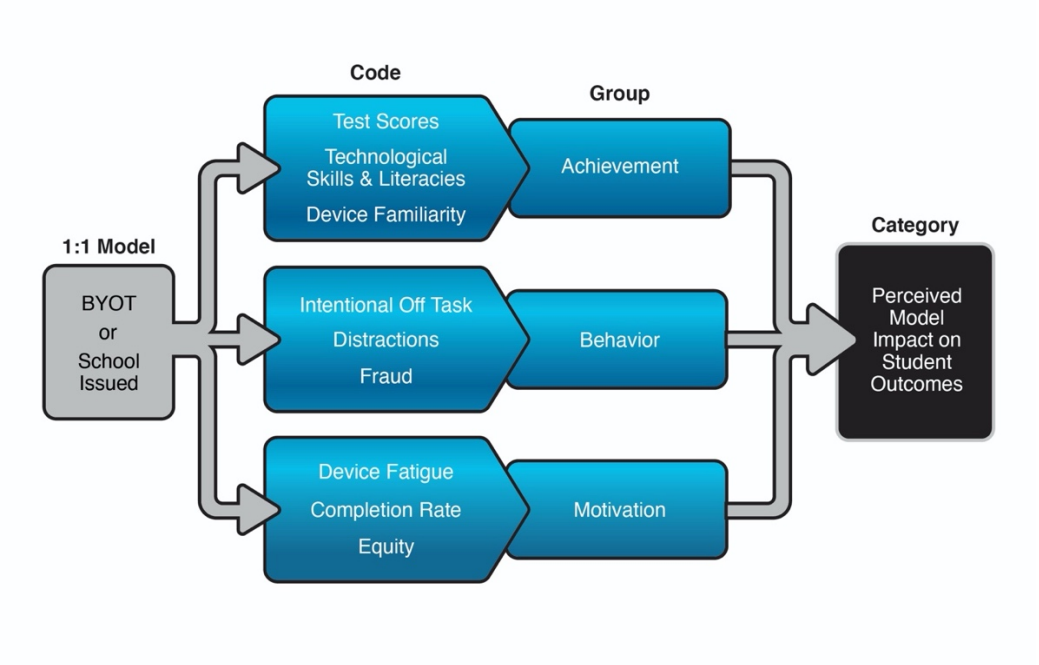
question" (p. 95). This dissertation emulates Khan's, and previously Hans and Ellis's, organization of data into an outcome space table (see Appendix D). The outcome space, and its table, structures the representative quotations, codes and categories into a hierarchical format that shows the collective experience gleaned through phenomenographic analysis. The following sections are a narrative of the outcome space organized by the subtopics under consideration relative to the overall question: *What are teachers' experiences with BYOT and school-issued 1:1 technology initiatives in Northern Georgia?*

Perceived impacts on student outcomes

When an initiative is implemented, as Rogers (2010) notes, the adopters must see its relative advantage. In the case of a 1:1 technology initiative, that relative advantage may be perceived through the lens of student outcomes. Figure 7 illustrates the qualitative coding process for the perceived impact of the 1:1 technology model.

Figure 7

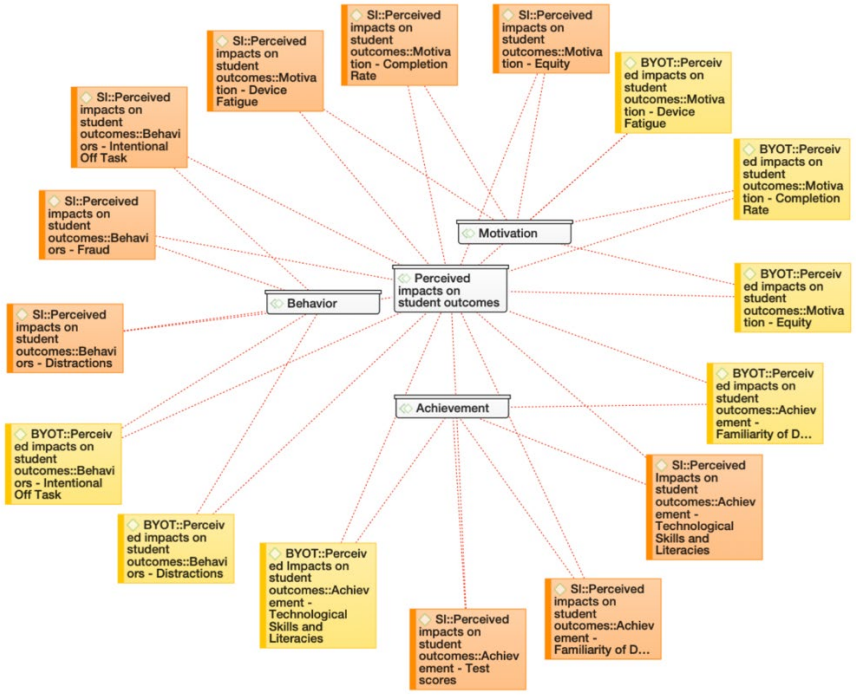
The coding process for perceived impacts on student outcomes



The outcome space for this subarea of consideration found that teachers experienced student outcomes in the code families of achievement, motivation, and behavior. These categories are also illustrated as an Atlas.ti network in Figure 8 to show the interrelatedness of the school-issued and BYOT models. As Figure 8 illustrates, the codes are mostly repeated, with school-issued in orange and BYOT in yellow. The sections that follow elucidate this category within the outcome space.

Figure 8

Network view of codes related to perceived impacts on student outcomes



Achievement

Achievement for both BYOT and school-issued devices was communicated in the areas of technological skills and literacies and familiarity of devices as related to testing where 12 quotations directly referenced these areas. When discussing BYOT and these two achievement

areas, teachers raised concerns about their students' preparedness for a variety of circumstances if they only had access to their phones and/or in-school computer labs. Heather expressed this concern succinctly by saying "there's this perception that just because they're kids, they should know how to use devices. They don't." In more detail, Cara and Georgina discussed watching students "struggling" and lacking the ability to "problem solve" with the technology.

Amanda noted that the technology skill gap increases when students don't have access to personal devices in some BYOT districts, saying "very few kids had their own computer or any type of technology, I can definitely see how far behind they are in comparison to other schools where they had technology." Having worked in the same districts, Danielle reinforced Amanda's description of a technology gap describing this experience:

> *They [Students] had only done a few assignments over the course of the year at a lab at a computer. And then they had to go take their end of course tests and they didn't, they weren't super comfortable with sitting in front of a computer for that long, and it was physically uncomfortable for them. But then it was also just kind of, they didn't know what to do, like if the monitor randomly turned off, or, you know if any of these sort of issues happened, whereas they didn't get a lot of typing practice in.*

The school-issued model had much more frequent positive commentary. Informants balanced their perceptions between device familiarity and increased expectations due to device access. Amanda explained that she believes

> *They're [students are] gonna know how to navigate better around the test. They're gonna know how to use the tools on there, you know, they've got highlighting tools and all these little tools, you can use own actual tests, and they just are going to be more familiar with technology in general. And hopefully now that they have their own devices, their typing skills will be better, and they can move faster and get those, you know, the free response things done a lot quicker just because they're familiar with it.*

Meanwhile, Georgina specifically referenced a positive relationship between her experience with school-issued devices and test scores, she said:

> *When you have resources and you put in, you know, training the people to do PBL and supporting them **and then devices** that these kids who, you know, were behind grade level*

> *and probably never passed Milestones tests, were able to raise, were able to do much better testing... and that was the trade off with having that technology was, you know, and being a charter school, you have to prove yourself. That was the expectation that, hey, you're given all this, you have this great opportunity, you have technology, you have everything that you need to educate this whole child. Now, you've got to perform. And they did; they did work hard, and they did rise to the occasion.*

Thus, more informants perceived 1:1 school-issued devices as having a positive impact on student technology skills and potentially test scores due to access that resulted in familiarity of devices. BYOT was perceived as a detriment to student outcomes, especially in districts where students might not have access to personal technology, or, at most, had smart phones.

Behavior

Also within the perceived impact on student outcomes category was a code group of student behaviors relative to the 1:1 technology model employed. The informants discussed distractions and intentional off-task behaviors for both BYOT and school-issued models. Of the eight informants, ten quotations from seven informants noted classroom and technology management concerns during a BYOT model. Six quotations specifically noted distractions while four quotations cited students intentionally being off-task. Thus, most of the informants involved had experience with the BYOT model inciting off-task activity.

Five informants also discussed experiences with student off-task behavior with school-issued devices, some comparing the school-issued model with BYOT. Two of the informants, Cara and Danielle whom both work at the same middle school in a school-issued 1:1 district seemed most concerned with students being intentionally off-task, including behaviors such as "playing porno noises" (Cara) and "playing games instead of working" (Danielle). Alternately, Amanda and Bailey expressed the perception that school-issued devices made it less likely that a student would be distracted or off task:

> *I think that's definitely more the thing for them because they can use their own minutes their own data, and be able to look at what that whatever they want to, and then go on their Snapchat and then go on their, their Facebook and whatever so easily, where on their school issued device, that's going to be a more of a hassle. – Amanda*

> *I just think it's because they generally don't have like, social media on their computer, really, you know, so I'm sure there's way but, you know, it's just not common. So, I would say that would be the only the only thing you know, you know, with a phone versus, or their individual, you know, iPad or whatever, versus what school-issued. – Bailey*

Figure 9 shows a networked view of how distractions, intentional off-task behaviors, and fraud have been experienced by the informants and the similarity in rate for both 1:1 models, BYOT in yellow and school-issued in orange.

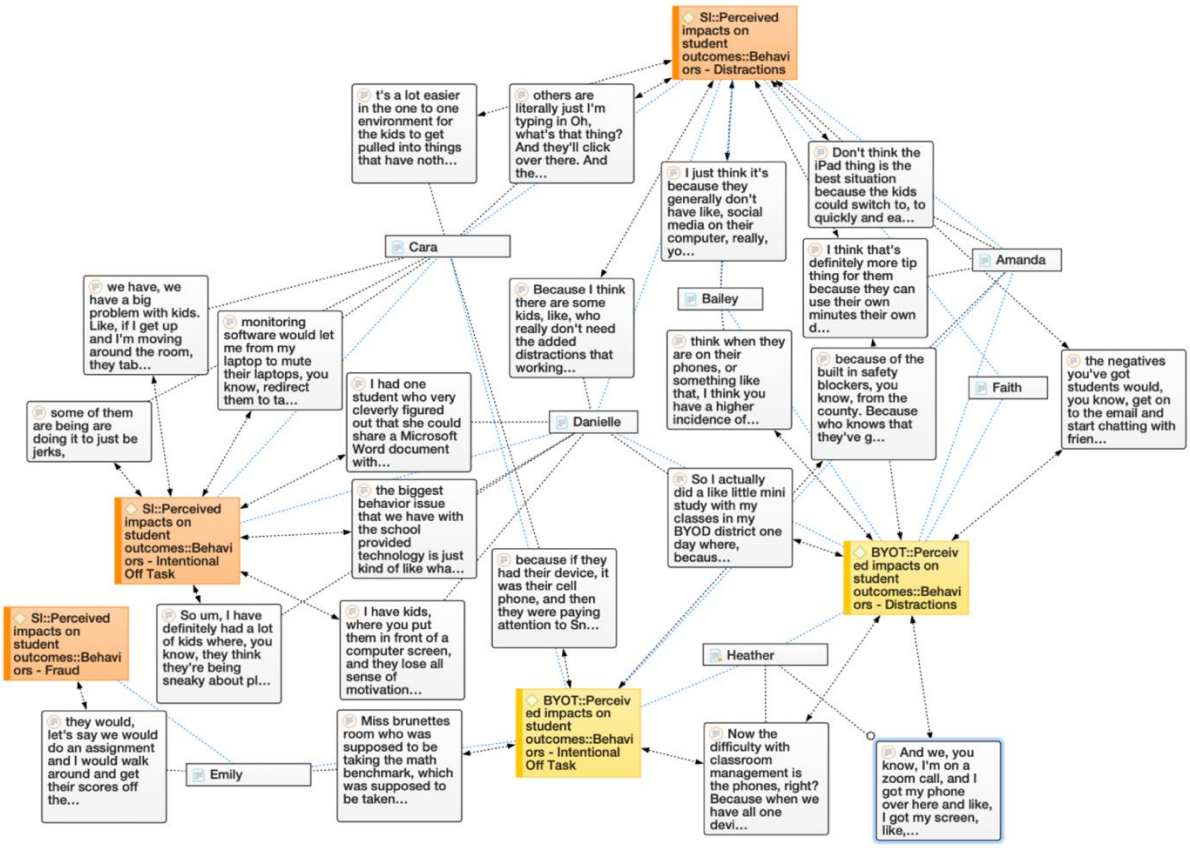
An additional behavior that did not fit within the distraction or intentional off-task codes was described by Emily. It garnered its own code: Fraud. While no other informant reported grade-changing behaviors, Emily's experience is particularly significant as a negative behavior that occurred in a 1:1 school-issued environment. She describes:

> *They would, let's say we would do an assignment and I would walk around and get their scores off the screen; they would highlight the scores, right click, and then change the text on the screen and type in a different score. Did you ever see that? Oh, oh, gosh, yes. I forget what it's called. But you can actually highlight something, go into the HTML, basically change what the screen says, and they would all be putting in 100 for their assignment. So, I had to make it to where we couldn't just simply go by what was on the screen, I had to go by – use – programs that would actually record in a gradebook instead of something that was visual on the screen.*

This situation occurred in the same school that Cara and Danielle described the most intentional off-task behaviors, five years prior to their tenure there. Thus, half a decade apart with different devices and different administrations, Emily, Cara and Danielle each experienced some of the negative aspects of a 1:1 school-issued device model, perceiving a necessity for monitoring software that will be discussed in another category where codes frequently co-occurred: key factors for positive and effective implementation.

Figure 9

Network of distractions, intentional, and off-task behaviors



Motivation

Motivation as a code group arose from the grouping of codes related to device fatigue, equity, and work completion. All eight participants provided comments on aspects of motivation for either BYOT or 1:1 school-issued devices and the concept of equity was found within a district document related to its school-issued 1:1 initiative.

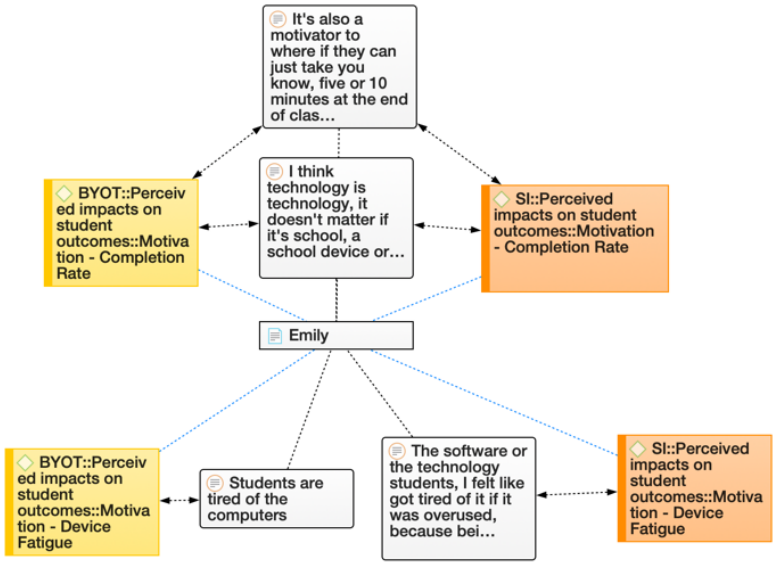
Within the outcome spaces related to device fatigue and work completion, informant perceptions revealed some direct conflict even within individual teachers' experiences. This conflict is illustrated in these quotations from Emily:

- *Students are tired of the computers.*
- *The software or the technology students, I felt like got tired of it if it was overused, because being one to one and having it with you all the time. That meant every single class they had each day, always had access to technology. And it would get overused I feel like as well. So, if each content didn't really focus in and say, Hey, we're going to be doing this all day in my class with the computer, and then they get to my class and we're using the computers, again, all class period, they **would just get tired** of sitting and staring at the screens.*
- *It's also a motivator to where if they can just take you know, five or 10 minutes at the end of class or if they finish their work to use the technology.*
- *I think technology is technology, it doesn't matter if it's school, a school device or their own device, if they are told that they have to put something away, not gonna be happy about it, if they're told that they can use it as a reward they're going to be happy*

Emily's description of students getting tired of using technology primarily referred to the 1:1 school-issued devices while her description of technology as a motivator for work completion referred to both BYOT and school-issued devices. Figure 10 illustrates Emily's point of view.

Figure 10

Network of codes and quotations for Emily's perception of motivation.



Amanda also expressed conflict with 1:1 technology usage regardless of model, believing students are "more motivated" and engaged with in-class use of 1:1 technology. Alternately, she explains that independent and constant use of technology "leaves a lot of room for questions" and students who are "less engaged." Danielle also revealed conflict but responded in a manner that focused on student characteristics. She said, "I have some kids who are super self-motivated and are able to just sit down on a computer and get their work done. And then I have kids, where you put them in front of a computer screen, and they lose all sense of motivation." Bailey had a similar take on student motivation, but he espoused school-issued technology as a way to boost work completion for intrinsically motivated students.

Without discussing the motivation to complete work, three additional participants noticed there was significant device fatigue include Faith's assessment that "sitting in front of a computer all day is miserable." While Faith made no distinction between the models with her claim, Heather and Cara focus more on this concept in the school-issued environment. Heather said, "it was in those classrooms where they just opened up their devices, and they were on their devices for the entire period that that's where I saw, some of my students told me, they just couldn't take that on behaviorally." Similarly, Cara noted that the end of the day exacerbated device fatigue: "When it comes to the end of the day, if you're like, Okay, we're gonna do this, get out your laptops, they're like, Oh, my God." These three participants were specifically referencing their experiences with the school-issued model when the device fatigue code appeared. On the other side of it, Georgina, like Emily, finds that the BYOT use of personal phones was a motivator, saying "I think the turn-in rate seems to be higher than not."

A potential confounding factor in perceptions of motivation related to the code equity. Five informants had a total of seven quotations coded for equity related to BYOT and five

quotations for equity and school issued devices. Three informants, Cara, Bailey, and Amanda described situations where student-owned devices resulted in a lack of motivation or ability to use them during BYOT lessons. One particularly poignant example comes from Amanda:

> *So, the perfect example is I was on the yearbook, too. And so, I had a kid that I was trying to send a picture, I couldn't even send a picture to his phone, he had a phone, but he said he didn't have a phone number. So, I couldn't even send the picture of what I wanted him to do for yearbook to him, because he didn't have that. So, I think there's even with bring your own device, there's just who knows what the kid has? And what the level of technology that they have is?*

Alternately, school-issued devices were considered by Cara, Amanda, Bailey, and Faith to be more equitable. In addition to informant data, a Foothill document declared one of the purposes for implementing a 1:1 school-issued devices is to "provide equal access to technology for all students." This purpose confirms informants' experiences with equity in a 1:1 environment: that school-issued devices improve equity while BYOT highlights inequity.

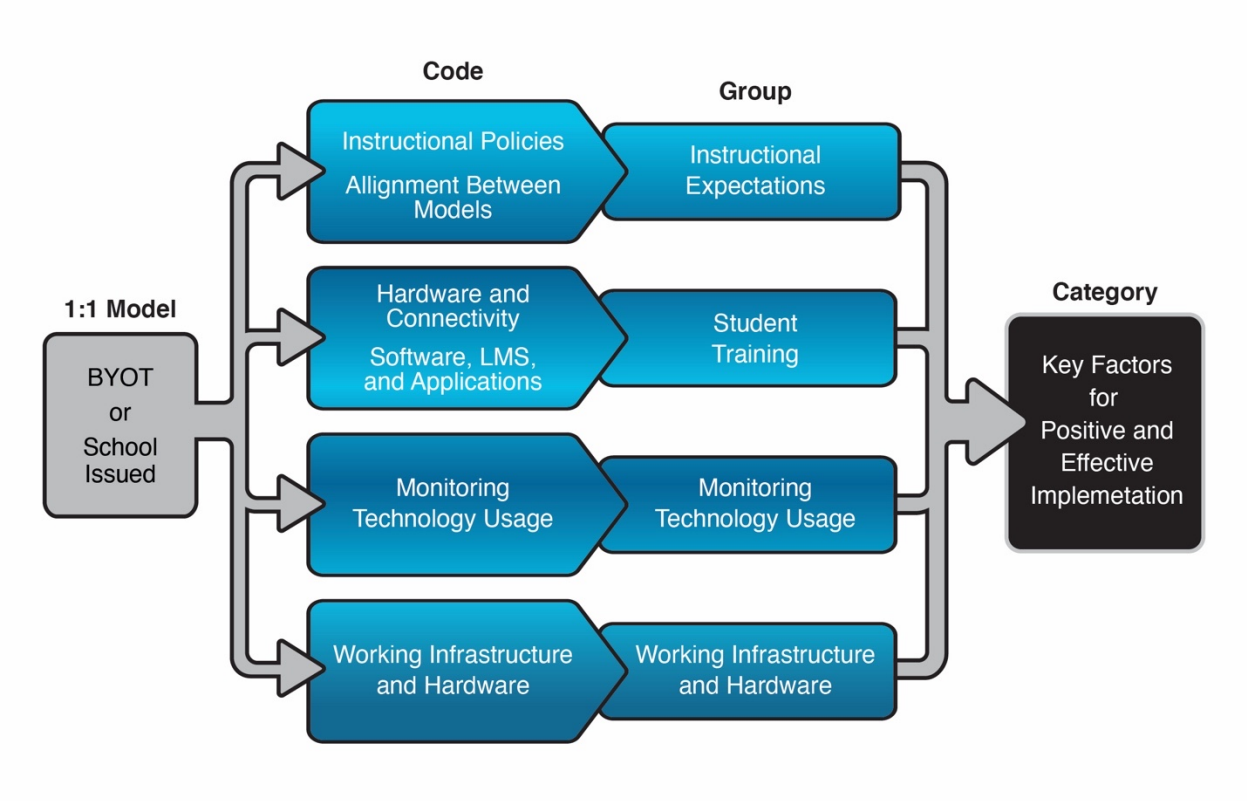
Key factors for positive and effective implementation

Having experienced both BYOT and school-issued 1:1 models, the informants in this study were uniquely positioned to provide insight into what would make the implementation experience better for each and both of the models. There were initially six codes each for BYOT and school-issued devices: alignment between instructional model and technology model; instructional policies; hardware and connectivity training; software, LMS, and application training; monitoring of student technology usage; working infrastructure and hardware. The alignment between instructional model and technology model make up the instructional expectation code group. Hardware and connectivity training and software, LMS, and application training became the lack of student training code group. Working infrastructure and hardware and monitoring student usage are each stand-alone codes. Sixty-one quotations collectively make

up the category called key factors for positive and effective implementation. Figure 11 illustrates the coding process for this category.

Figure 11

Coding flow chart for key factors for positive and effective implementation



Instructional Expectations

The instructional expectations for the districts in which the informants had worked or were currently working varied as much as models of technology integration the districts employed. Two codes summed up the teachers experiences with instructional expectations in BYOT and school-issued 1:1 models: alignment between instructional model and technology model and instructional policies. To further define the two codes, instructional policies referred to grading and late work expectations rather than modes and methods of instructional planning

and delivery while instructional model referred more to the modes and methods of instructional planning and delivery.

In this code group, indeed in the whole category, alignment between instructional model and technology model for BYOT was the most frequently occurring code. It was of particular importance to Cara, who described her experience in the BYOT district like this:

> *I had 10 laptops in the room. And everything, especially in the language arts program, they had designed a new curriculum for us. And all of the we were the only middle school that wasn't one to one. So, it was all very much get on this website, research this thing, create a PowerPoint do that, like it was all web based. And I had 10 laptops, and the kids could bring devices, but if they brought devices, it was their cell phone that couldn't do that thing, or that they didn't want to sit and type a whole essay on, or just or they were too embarrassed to bring it out, because it was not as cool as everyone else's brand new iPhones or whatever. So yeah, there were there were big discrepancies in what I was able to do there, versus what they expected us to be able to do. And we were constantly told to stop making so much copies, because that will show them that we're using paper. So, I don't know how to not make copies when I can't have them all on a laptop. Because I do not have enough laptops. They're never gonna give us funding for one to one if we're, we're making all those copies. That's not how this works. But that was the that was the message from the top. So yeah, it was stressful.*

Cara's experience is reflected in the BYOT documents from Lakeside SD where she was working at the time. Their guidance for staff responds to the question "How do I handle a student who does not bring a personal learning device?" with the answer, "Whenever possible the school will provide a District owned device for use during the class period as needed for instruction purposes and at the discretion of the teacher. Advance planning is recommended. Cara's experience with the advance planning is described here:

> *Only having 10. I couldn't, I couldn't plan for whole class, anything with the technology, it had to either be small groups, or I had to like wheedle. 10 from this classroom and 10 from that classroom, so I had a total of 32 to use with my students.*

While Cara's experience with a lack of alignment between a BYOT initiative and the instructional model expected by her Lakeside SD is the most detailed, it is not unique. Amanda and Danielle both worked in Mountain SD during a BYOT era. Of her experience, Amanda said:

> *The county was pushing us to use technology. But that was the problem. We didn't have the available technology to use, they wanted us to use USA test prep, they wanted us to do the SRI Lexile testing, they wanted us to do some stuff on Google Classroom. They wanted us to - I don't know if you're familiar with Revision Assistant - they want us to do revision assistant. And so, it's like they had all these technology things that they wanted us to do. And we couldn't get the labs to do that with our kids.*

Danielle concurred, explaining that, as far as implementing student-owned devices went,

> *a lot of the students didn't have laptops or tablets or anything like that, that they could bring. So, for the most part, the only technology my students had that they could bring were their phones. And so, we were still operating primarily out of desktop computer labs, which had 25 computers for a class of 30 or 32 students.*

Thus, the three informants that referenced BYOT and the instructional model's alignment with the technology model each spoke to a lack of alignment. Alternately, the three informants who discussed technology alignment with instructional model spoke positively of technology acting as a tool to facilitate instructional expectations. Cara, who was so stressed by the incongruency in Lakeside SD found that Foothill SD's 1:1 school-issued technology has relieved all of that stress, simply saying, "I am able to like actually do things that are technology based." Bailey and Georgina also reflect the ease of technology integration with their instructional models in their 1:1 school-issued environments:

> [In Riverside SD] *we were PBL. And so, I taught sixth grade and eighth grade. And so, with sixth graders, we have the laptops, we use a lot of research based or creative. And also, with group work, creating slides, Google Slides in them to do some research and work on presentations together. So that was used a lot. I'm trying to remember; it's been a few years. So that's what I think at the sixth grade level, we used a lot of that. It was independent, students had to be independent learners. So, they had to be able to Okay, come in, log in, let's look at our lesson. And I was the facilitator. So, I think the laptops and that access to technology was building a lot more of an independent skill base, being a learner being responsible for their learning. – Georgina*

> *They could do stuff. I feel like that was more organized like that. We had an online prep platform that we put out notes with and things like that, that we built the curriculum on. And so, in our PLC, you know, we would kind of just really kind of build our class. And then that class the kids would have access to they could access the work, the notes, the worksheets, and all that stuff. So, the more that they had the ability to you know. - Bailey*

Instead of the alignment, or misalignment, between the technology model and instructional model, Danielle was more aware of the impact of instructional policies on the effectiveness a technology model had in her classrooms. She found that the late work policies in her districts had more of an impact on student outcomes than the choice of 1:1 model itself.

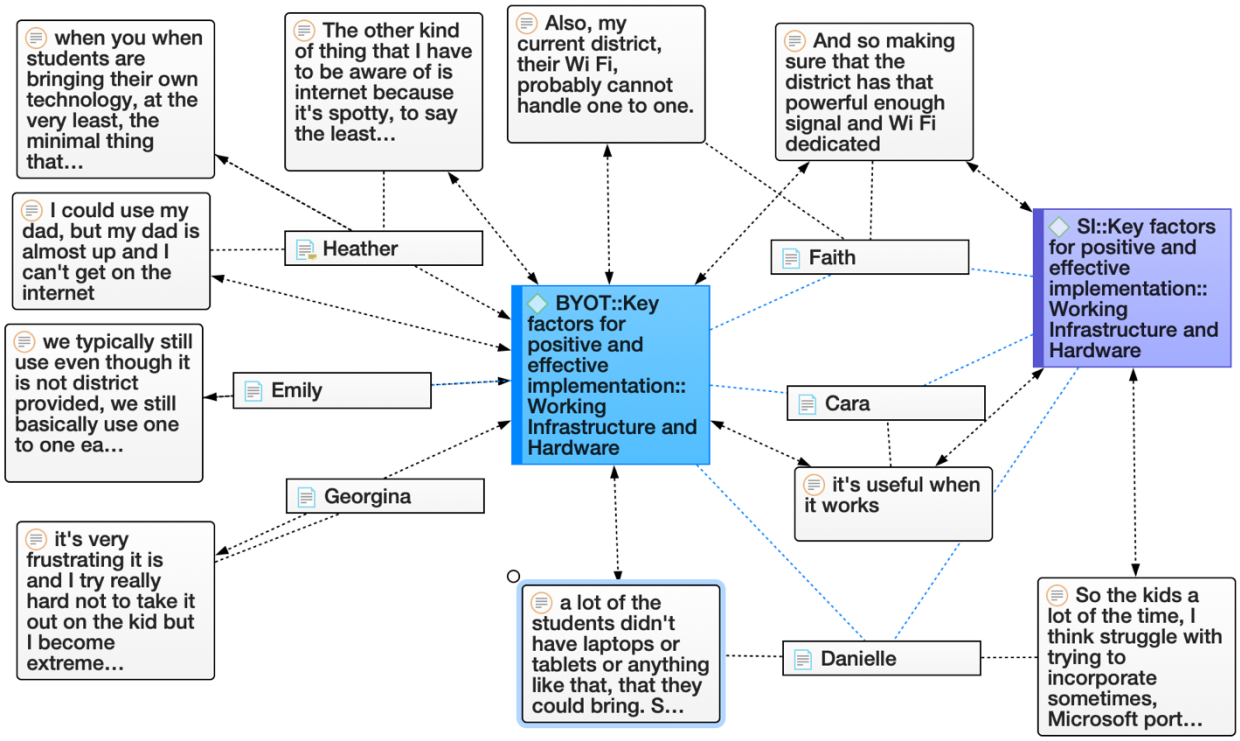
Working Infrastructure and Hardware

A key factor that Heather says should be the "very least" in a BYOT environment appears in eight other quotations about BYOT, two of which appear concurrently with school-issued devices, and only once independently with school-issued devices coding is working infrastructure and hardware. See Figure 12 for the network of quotations and informants for this code. Working infrastructure according to the six participants who commented heavily focused on robust WIFI, with half of the comments mentioning "powerful signal" (Faith) or "spotty" internet (Heather). Three of the four of the BYOT-employed informants mentioned frustration with the capability of the BYOT infrastructure working effectively. Emily was the outlier, but recognized her situation wan unusual, calling herself "lucky" to have four working desktop computers in her classroom.

Alternately, only two of the four, Cara and Danielle, school-issued district employees mentioned, or hinted at, technology failing to work on occasion. Of their three coded quotations, Danielle references a lack of working hardware in her BYOT experience and some difficulty with technology syncing in her school-issued district. Cara's commentary was less than explicit. She stated that technology is "useful when it works."

Figure 12

Network of informants and quotations for working infrastructure and hardware

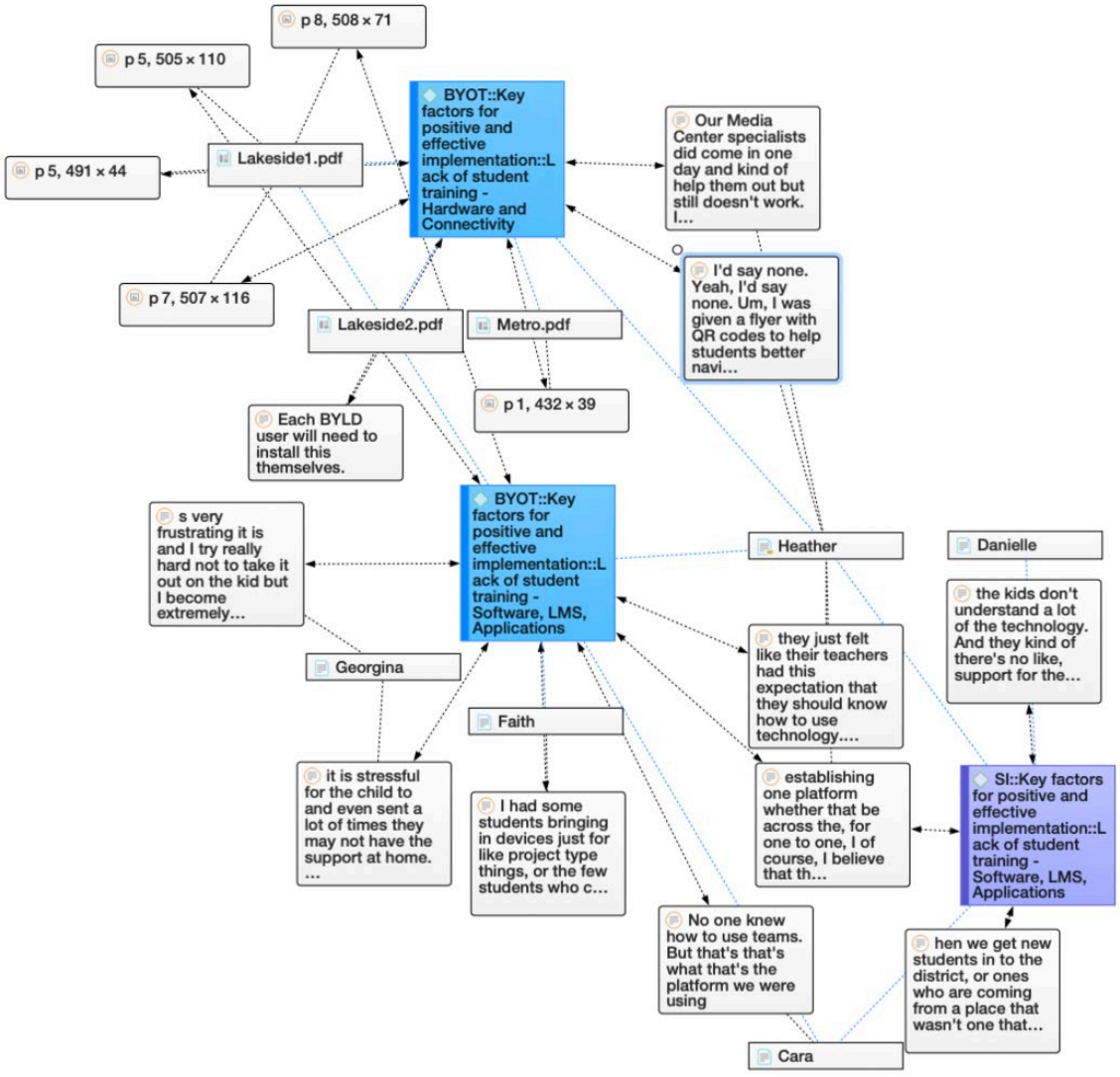


Lack of Student Training

When the infrastructure and hardware does work, the informant commentary suggested that sometimes an issue is user error due to a lack of understanding of how to use the hardware for connectivity, especially with personal devices or how to use the various applications, software, and learning management systems. This code group had three codes: both BYOT and school-issued districts had codes related to software, applications, and learning management systems and BYOT also had a code related to hardware and connectivity. Figure 13 shows how these codes were interrelated and provides insight into how frequently this concept was addressed in district literature.

Figure 13

Network of codes and quotations for student technology training



Only one informant addressed BYOT networking, but her references were supported by documentation from Lakeside SD's guide on its BYOT initiative and Metro SD's training document that provided different pathways for connecting the various types of devices to the BYOT network. When specifically asked about student training with their personal devices, Heather said the quantity was more than lacking for Metro school district:

> *I'd say none. Um, I was given a flyer with QR codes to help students better navigate getting on to the internet, which they still have issues doing. Our Media Center specialists did come in one day and kind of help them out but still doesn't work. It's spotty because of my classroom and where the wireless is so right. Yeah, I'd say no. non-existent*.

Metro school district did provide a QR code on the document coded in this study confirming Heather's description. This document had processes that differed by device type and often device manufacturer and most recent operating system, with different instructions for iPhone, iPad, MacBooks, Android-based phones, Android-based tablets, Kindles, Chromebooks, and Microsoft-based PCs. Each device set up had no fewer than six steps before a student could achieve connection to the BYOT network. In Lakeside's guide to BYOT, a similar varied process to BYOT connection was also provided. Lakeside's guide went further, however, in explaining that students could not expect district- or teacher-support should they find connecting their personal devices difficult. Levels of technology support will be discussed in a later section of this chapter.

Faith, Georgina, Heather, and Cara all addressed the difficulty with the variation in devices on a BYOT network combine with a lack of training on how to use the various software, applications, and learning management systems that are suggested, and often mandated, for use by BYOT systems. Faith elucidates the issue with cross-platform functionality that exists in a BYOT district:

> *I had some students bringing in devices just for like project type things, or the few students who chose not to use the school's Chromebook and brought in their own that the training on how to access things takes so much more time because everybody's device shows something different. And some students are getting on a cell phone and some on an iPad and some on a, you know, Kindle Fire and some on a laptop, and some on a Chromebook and some on a MacBook. And it is none, nothing looks the same on any of those devices. And some things aren't even accessible on some of those devices. And so it drastically would change. Probably even my desire to use technology beyond. Here's how you get to the [Metro SD's] Digital Library.*

Georgina addressed the same issue, expressing the level of stress it creates for teachers and students:

> *It's very frustrating it is and I try really hard not to take it out on the kid but I become extremely frustrated because there's, there's only so many times I can take . . . how to, how to make a copy of a Google Doc like that, in itself, simple skills, how to do that? Kids, some kids can open certain documents, or sometimes they're sending me things, and I can't open it. And then in the classroom, I can't, I can't really plan or I'm always having to plan paper copies or alternatives. Because I don't know exactly who's going to have what when they come in. It is stressful for the child to and even sent a lot of times they may not have the support at home. And then when they are issued something it sometimes it breaks, or it's not working, and they can't log into the zoom, or they can't get into [Metro SD's LMS]*

Cara and Heather expressed more concern with the disconnect between teacher and district expectations of student knowledge and ability, both recognizing in their BYOT and school-issued experience that students are expected to know how to use a particular type of software or an LMS without having direct training on how to do so.

The school-issued model only garnered two quotations independent of the BYOT model in the consideration of student training and both were in the area of software, applications and learning management systems. Danielle specifically explained:

> *The kids don't understand a lot of the technology. And they kind of there's no like, support for them in that instance, other than, like, we as teachers have to repeatedly go over how to do things, how to submit things, how to attach things, and they're not learning those computer skills at any point before they get to us. So, I mean, I've had kids who have been with me since August, and are still like, how do I attach something, just submit it on Schoology I still have kids sending me things in Schoology messages and I'm like, "No, no, that's not where that goes."*

Cara suggested explicit training in the platforms used by their school-issued district, especially for new students:

> *When we get new students into the district, or ones who are coming from a place that wasn't one that weren't what they're not a one-to-one school, or they didn't use the same learning platform that we use, they have no clue what they're doing. And it can be a huge learning curve, to sit like to sit there with them and walk them through all the steps that are kids who have been there since kindergarten kind of grew up, like grew up knowing*

> *as they grew. It would be nice for those incoming students are just like, sixth grade, you've entered Middle School, here are the things we're gonna hear the technology tools we're going to use, like, not even necessarily connections class that's like we have a focus block built in was if there was a focus period once a week that focused on, like tech training for the kids. Like I have a student I have to walk him through how to save a file to find it to upload it to Schoology every single time we do that.*

For both the BYOT and school-issued models, teacher experiences suggested that students receive little to no training on how to access and use the tools of the model unless it is provided repeatedly by the teacher.

Monitoring Student Usage

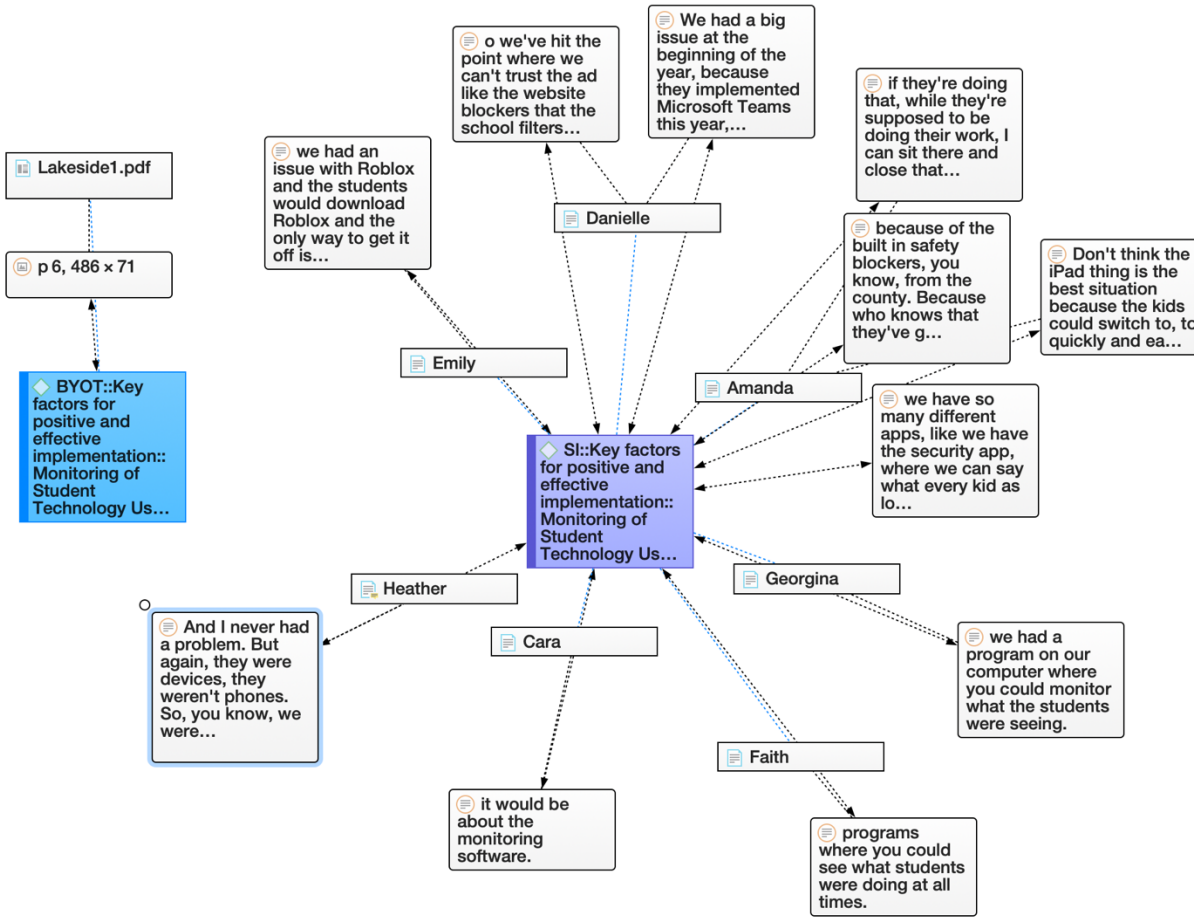
The concept of monitoring student usage came up here, in the "key factors for positive and effective implementation," and in the next section, "perceptions when comparing the models for effectiveness." In this section, monitoring had more to do with the overall experience of the teacher with monitoring what the student was doing with physical or virtual access to the devices the students were on, and what they believe is best for monitoring student technology use in schools. In the next subarea, the consideration is more about what each model does or does not offer regarding remote monitoring of student activity.

As far as monitoring as a key component for implementation, seven of the eight informants provided insight into how they perceive its difficulty and/or necessity. The informants spoke only about monitoring in the school-issued environment. It was as if monitoring student technology use on their personal devices was not even a consideration. See Figure 14 for how the seven informants discussed student monitoring for school-issued devices while ignoring the concept for BYOT. The only code related to monitoring of student usage was part of Lakeside's BYOT document. It explained that "student filtering is a requirement of all public schools. The Children's Internet Protection Act requires all [Lakeside]-provided network access to be filtered, regardless of the device you used to access it while in a public school."

Lakeside further says that students are expected to use Lakeside's BYOT network that it is a "violation of District Policy for students to access the Internet through any cellular data provider or use a personal hotspot while on campus."

Figure 14

Network of codes and quotations for monitoring student usage



The seven informants' comments can be divided into two general topics: the desire or experience with monitoring students and the inability to trust students, even with filtering, when monitoring applications are not in place. Amanda, Danielle, and Emily's statements co-occurred with difficult behaviors. For example, Amanda explained that even in a school-issued environment: "Don't think the iPad thing is the best situation because the kids could switch to, to quickly and easily between playing a game and whatever they were supposed to do in class."

Danielle also stated that “So we've hit the point where we can't trust the ad like the website blockers that the school filters anymore.” Amanda, Faith, Georgina, and Heather all espoused their positive experiences with monitoring students. They could “control the apps from in house,” (Heather) or “While they're supposed to be doing their work, I can sit there and close that tab” (Amanda). The ability to know what the students were doing and prevent inappropriate behavior seemed paramount. Cara, whose school-issued district does not have monitoring, illustrates the different viewpoints of her fellow informants using monitoring software in this one example:

> *It would be about the monitoring software. Okay, we have, we have a big problem with kids. Like, if I get up and I'm moving around the room, they tab back over, but they're playing, like porno noises when no one's paying attention, or they're, you know, they're just they're playing games. And there's only so much I can do to make them care about learning. But it's my responsibility to make sure they're not keeping other people from learning. And that can happen when they're on their devices, and they're not caring enough about what they're learning. And that monitoring software would let me from my laptop to mute their laptops, you know, redirect them to talk directly to their screen a lot of those things that I can do on the OneDrive assignments. But if the kid isn't even pulling up the OneDrive aside, you know, the ability to be like flipping on or pulling it up for them and being like, there you go, you know, will be a huge help. And Classroom Spy for the entire district in perpetuity is less than $3,000.*

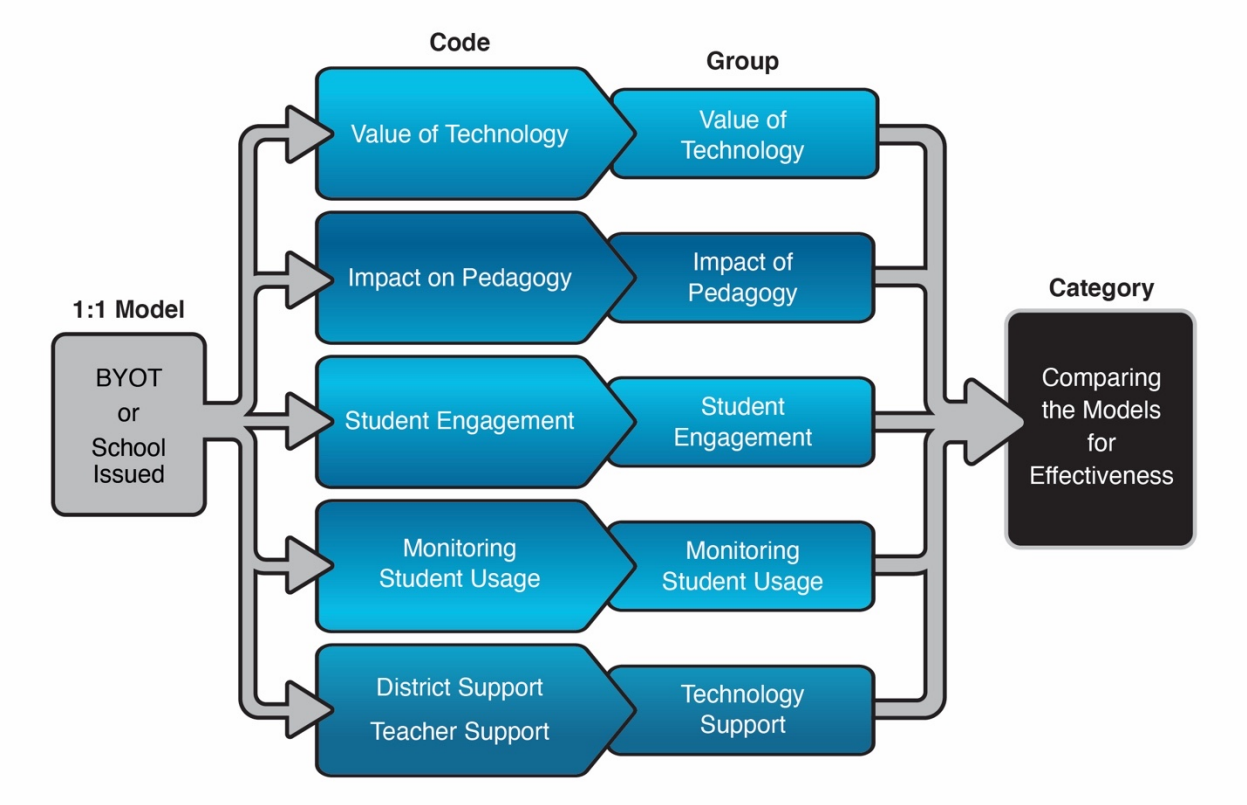
Perceptions when comparing the models for effectiveness

Because the aim of this dissertation is to consider the lived experiences and perceptions of teachers who have taught in both BYOT and school-issued 1:1 districts, part of the outcome space is an opportunity to for those teachers to directly compare the models rather than discuss them in isolation. Four of the six codes in this segment could not be further reduced into code families. Informants’ value of technology, the impact they perceived on their pedagogy, their perceptions of student engagement, and their capability to monitor students during technology usage remained independent of any code group. Only the dichotomy of teacher-provided

technology support and district-provided technology support could be collapsed into the overall technology support code group. In the technology support code group, data from published district documents that outlined policies and/or procedures for the model that district employed was used to increase the confirmability of the study. See Figure 15 for the coding process for this subarea under consideration.

Figure 15

Coding flow chart for perceptions for comparing models for effectiveness



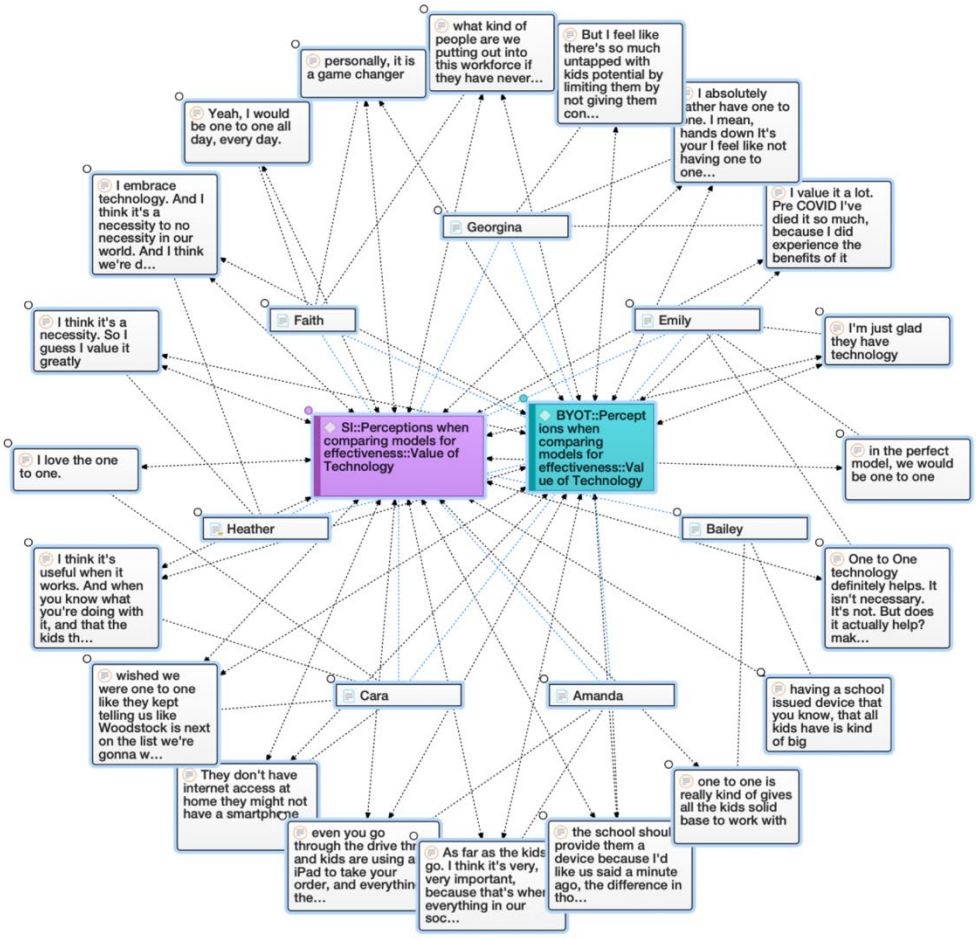
Value of Technology

The value of technology code contains quotations from teachers in two realms: their generally appreciation and use of technology as a tool and an evaluation of which 1:1 model holds more value in their estimation. Seven informants provided the 14 total quotations for the

BYOT model and 19 total quotations for the school-issued model. Nearly all of the quotations overlapped. Only Danielle did not overtly discuss valuing technology generally or in relationship to a specific model. Figure 16 displays the intricacy of co-occurrence between BYOT and school-issued devices in this subarea under consideration.

Figure 16

Network comparison of concurrent value of technology quotations



General value statements regarding using technology in the 1:1 classroom regardless of model called it a "necessity" (Heather) and "a game changer" (Faith). Emily said simply "I'm just glad they have technology." Faith and Amanda recognized the larger implications of technology access when considering the futures of students relative to technology, asking, "what

kind of people are we putting out into the workforce?" (Faith) and observing that "even [when] you go through the drive-thru and kids are using iPads to take your order" (Amanda).

Considering the models relative to one another, six participants all agreed that a school-issued model is preferable. Although in agreement, the intensity of the quotations varied. Emily was the least intense saying "In the perfect model, we would be one-to-one" but also that "It isn't necessary. It's not. But does it actually help? make things easier? If you're wanting to use technology? Yes. So, do I like one to one? I do. It's, it just makes life easier." Bailey's preference is also understated, though more intense than Emily's when he says "having a school issued device that you know, that all kids have is kind of big." Cara, Georgina, and Faith each made simple statements about the school-issued model such as "I love the one to one" (Cara), "I would be one-to-one all day" (Faith), and "I absolutely [would] rather have one to one" (Georgina). Heather skipped over the concept of preferring school-issued; she went so far as to make this suggestion:

> *Establishing one platform whether that be across the, for one to one, I of course, I believe that that's essential. Instead of bringing your own and, and that it's one platform, at least within a cluster, so that students can have a period of time where they're used to the same technology*.

It is interesting to note in this section the frequency with which the informants referred to the school-issued model as 1:1. The implications of the semantics related to this choice will be discussed in the next chapter.

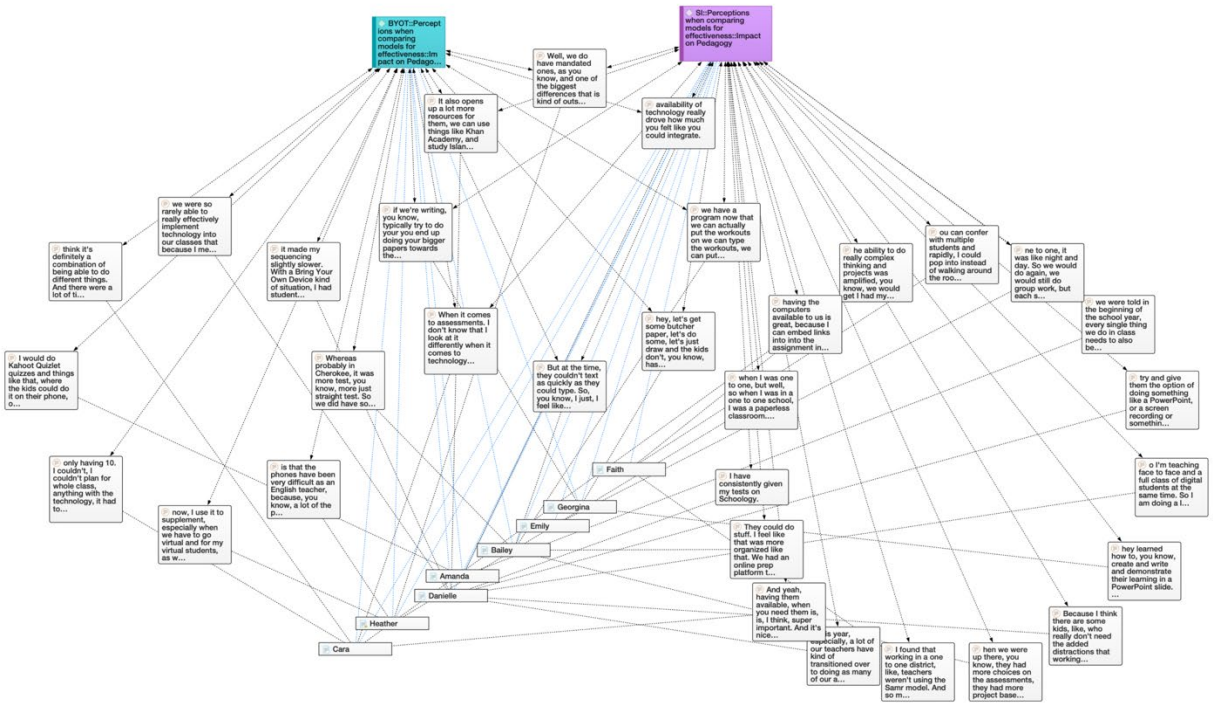
Impact on Pedagogy

The most frequently used code in the study was "impact on pedagogy." All eight informants reference the impact an instructional model had on their pedagogy 24 times with school-issued devices and 16 times with BYOT. Of the 16 and 24 quotations coded for impact on pedagogy, seven quotations co-occurred between the two models. Six informants referenced both

models in their discussion of pedagogy while two, Emily and Faith, only commented on school-issued devices. See Figure 17 for the networked view of the codes. The teal is BYOT and the eight codes in the left circle are associated with BYOT only. The right circle of 16 quotations belongs to the school-issued impact of pedagogy code. In the middle circle are seven quotations related to both codes.

Figure 17

Network of quotations and informants for impact on pedagogy



The quotations for BYOT primarily discussed how pedagogy that was less effective or limited by the BYOT model. Bailey mentioned that the technology integration was limited to test prep while Amanda said she chose technology tools based on her students' capability to use them on their phones. Danielle and Heather, both ELA teachers, mention the cumbersome nature of

using personal devices, especially phones, to write entire essays. Cara reflected back on the stifling of pedagogy in her BYOT district:

> *And there were a lot of times with the prescribed curriculum that I wish we had the one to one because it was set up for one to one. And I felt that we, in my school were at an incredible disadvantage, because we weren't able to do the things that were built into the curriculum to make sense going to the next step and moving forward and everything.*

Instead of describing limitations, the quotations about school-issued 1:1 devices discussed how the technology expanded their pedagogy. From Danielle consistently giving tests online to Faith's descriptions of being able "to do really complex thinking projects" and "confer with multiple students rapidly" to Georgina's complete revolution of her teaching into "a paperless classroom," the approaches pedagogy with school-issued devices reflected trust and reliance on technology. Indeed, four informants mentioned building and housing nearly all, if not all, of their assignments on a learning in a school-issued 1:1 environment and providing students the opportunity to complete work using a technology-based platform.

The quotations coded for both the BYOT and school-issued environment discussed pedagogy with technology with the context focusing on the technology tools used rather than on the model's impact. For example, Georgina describes how technology, both BYOT and school-issued 1:1 models, have changed her assessment procedures:

> *One of the biggest differences that is kind of outside of the technology scope first was that when I was in [Riverside], I actually was the assessment lead up at our school. And so, we worked really hard to create our own benchmarks by, you know, team, what we call STTs, of course. And I just felt like that was really important that those assessments were authentic and collaborative. And, and had some performance aspect to it as well. And, and that was, you know, when everyone had the same technology, that was a little easier to navigate. We used in [Riverside] we used we use Google platforms. So, we use Google Classroom, with our iPads, which proved a little difficult at times. But mainly we use Google Forms. I still use Google Forms on primarily, I don't use the where I put the assessments in [Metro-LMS]. Now that I'm back in [Metro], it just is clunky. For me, Google Forms is so much easier, it's so much more accessible. And I will tell you that what I'm what the use of technology has brought to light for me as a teacher, both in [Riverside] and [Metro]. Well, in my little stint in [Lakeside] as well, is that students*

> *have access to everything at their fingertips. And, and even in the situation where I have a hybrid model where I have students in front of me and I have students at home. I am very aware that they have the internet at their fingertips, they have their notes right there. They can't be babysat. Right. And so, it changed the way back when I was in [Riverside] of thinking about how to assess students. So, you know, not so much. You know, it's sort of like gaming the higher order you know, complexity of questioning, and performance tasks [. . .]* ***And so my assessments have organically become, you know, something where they, they have to use material as opposed to memorizing material.***

Although Georgina's description focused primarily on assessments, the other informants mentioned the various ways in which school-issued devices superseded BYOT for differentiation, task complexity, and technology tools and applications.

Student Engagement

One of the less discussed codes was that of student engagement as it relates when the categories are compared. Foothill SD's reasoning for having a school-issued 1:1 includes "student engagement" as one of the goals. Only four informants mentioned student engagement as part of either a school-issued or BYOT model. Three of the informants, Emily, Georgina, and Bailey all note an excitement for technology use; in Emily and Georgina's BYOT district, that excitement is especially prevalent because, as Georgina says, "kids are just more, they're into the cell phones." Georgina extends this engagement to other technology as well, saying

> *So, I feel like the best way is to just, you know, engage them through what they know. And through technology. So, a lot of them are a lot more motivated. and attentive, sometimes when they have, they're in front of a computer. And it just feels like it's been forever since we were even in a - or everyone had a laptop - or in a computer lab.*

She then adds this contrast for a less-technological environment:

> *A lot of times you resort to like, "Hey, let's get some butcher paper, let's do some, let's just draw" and the kids don't, you know, have to like the arts. You tell them you can do it at home if you want and a lot of them, they'll want to do it at home. But you do I mean, it's things you could do with a computer, you end up doing like, you know, paper or something, it's just less engaging.*

Faith's ideas regarding student engagement include this nuance related to using technology

> *It just became, you know, kids would just sit there at a computer answering questions and be like, Look, I'll engage my students are, but they weren't, they were compliant. And they were just answering worksheets, or, you know, doing a basic search or something. And so wild technology is amazing. And so much can be done with it. If teachers are not trained on it, or at least comfortable with technology. It just becomes a digital worksheet*.

None of the participants actually contrasted the models of 1:1 with one another, instead favoring the idea of technology as a tool for student engagement. Emily elucidates the sentiment best saying, "technology, to me, it doesn't really matter, the actual model, the type of technology [. . .] the students know, let's say, we're going to be playing a Kahoot game, and they majority of them will be excited to play a Kahoot game no matter what the technology type is."

Technology Support

Supporting technology in a 1:1 model was one of the most discussed concepts for informants. The concept was divided into technology support provided by the district and technology support provided by teachers as individuals. Support for students by teachers in the BYOT setting was mentioned by Heather and Faith and appeared in Lakeside's BYOT guidance document. Both mention difficulty with providing support to students because, as Heather simply states: "I don't know all devices and all systems." In the same system, but at a different school, Emily reported a different experience:

> *{My media specialist] ha[s] been absolutely amazing with [her] knowledge, not only of just running the Learning Commons, but I think [she has] the most knowledge of technology out of anyone I've ever met for media specialists, definitely. So. So we do have support with [her, the field technician], and then at the county level, we have our helpdesk tickets, we can always do if something is a bigger problem. And then there is the web, not the Web Help the line to call, I have called that line. But that phone call did take quite a while. It was like an hour plus phone call. And then the issue took over a week to resolve but the people on the end of the phone didn't quite understand what we were needing fixed compared to someone that's in the building.*

Their experiences are in conflict with the expectation in at least one BYOT district. Lakeside SD lets student know not to expect much help from the district or teachers with personal devices. As

mentioned in the key factors section, Lakeside states: “It is not the responsibility of your teachers or other [Lakeside] staff to troubleshoot individual devices.” Despite this type of warning to students in the BYOT environment, Lakeside also states that teachers may “assist if [they] choose.” Thus, informants frequently reported find themselves and other staff members providing assistance to students with personal technology issues. Figure 18 shows the network of quotations related to BYOT technology support, with just four total quotations from informants and two quotations from a district document. In comparison, Figure 19, the network of quotations related to school-issued technology support, has 10 total quotations from seven informants and another two quotations from a school-issued district document.

As Figure 19 illustrates, the informants had much more to say about technology support provided by both teachers and district officials. The overall tenor of the quotations was generally more positive as well. For direct comparison, Heather, who worried about knowing all systems, said:

> *They all had the same device, they had the same issues they had, you know, if there was a problem with one, there was going to be a problem with them all. So that was an issue where I could problem solve a whole lot more effectively than dealing with multiple devices. Because I'm not a technology specialist.*

In addition to Heather, three other informants described easier facilitation of student devices by teachers in a school-issued environment. Cara said she is now “not running around” like in her BYOT district. From her BYOT positions, Emily said, “Yeah, it would make life a lot easier if they all had the exact same model the same computer.” Faith provided more detail: “You can rely on the fact that an assignment will open up on everyone's computer, and every student can log in, and you know how to talk students through things because they're all logging in, through the same way.” The ability of teachers to facilitate was encouraged by Mountain SD, where the

technology support page encourages students to “reach out to [their] teacher” for minor technology issues like a password change.

Figure 18

Network of codes, quotations, and informants for BYOT technology support

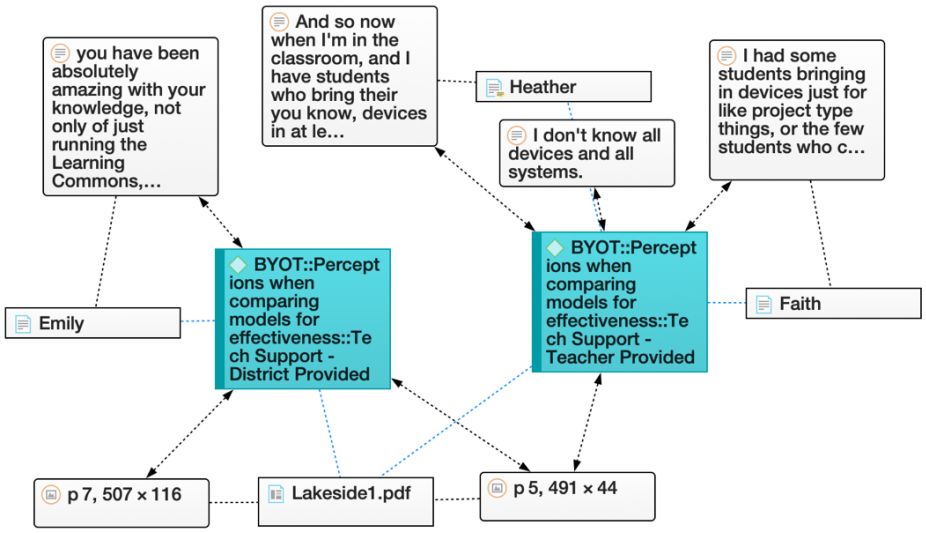
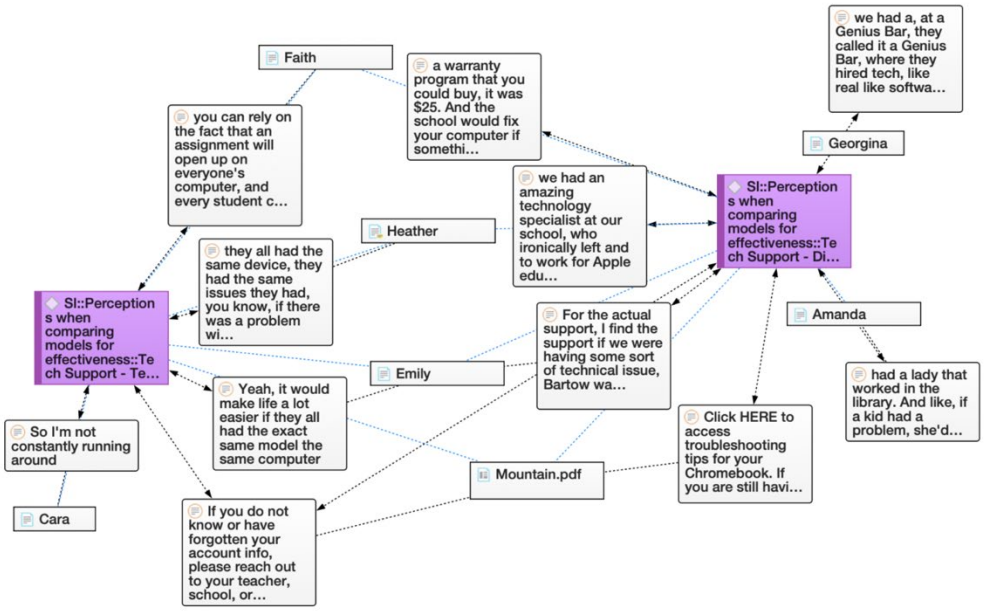


Figure 19

Network of codes, quotations, and informants for school-issued technology support



` District-provided support received an equal amount of attention as teacher-provided support in the school issued model. Four quotations from four informants and one quote from Mountain SD's technology support page suggest that district support for student devices is often readily available. Georgina describes:

> *We had a, not a Genius Bar, they called it a Genius Bar, where they hired tech, like real like software, guys, that you would get who came from corporate world who fixed the laptop, so the kid had an issue with their laptop, we, you know, put in, and we would turn it in, and then he would tell us when to come back and pick it up, they look at it right and fix it, send it off whatever it needs to be that they had dedicated staff members for that building to look after the technology and support us.*

While Georgina's situation exceeds most, Amanda, Faith, and Heather all mention having district personnel who would fix school-issued devices and provide loaners when available. Mountain SD's technology FAQ's included a form for students to fill out to get district support for their devices, confirming teachers' experiences with increased technology support in school-issued district.

Emily, who spoke glowingly of the support in her BYOT district, was an outlier in that she did not have as good of an experience with Foothill SD's initial implementation of school-issued 1:1 devices. Indeed, she said "for the actual support, I find the support, if we were having some sort of technical issue, [Foothill] was not able to facilitate them." Emily was employed by Foothill in the first year of its implementation with MacBook, which were later abandoned in favor of Dell laptops.

Remote Monitoring of Student Usage

The informants repeatedly mentioned how the capability to monitor students was key to effectively implementing school-issued 1:1 technology. The results when comparing the two models reinforce the outcome space from the key perceptions subarea. While fewer overall quotations were coded, half of the informants mentioned remote monitoring as something that

makes a 1:1 environment easier to manage and that it is something only achievable in a school-issued environment. In comparing the two models, current BYOT informant Heather provided this insight:

> *Now the difficulty with classroom management is the phones, right? Because when we have all one device again, and especially when you can control the apps, you know, there's less of that wanting to look at social media. Because they can't, or they couldn't, right when they had even the surface pros. So, but with their phones, sky's the limit. So, there's no amount of classroom management that can negate that.*

Also currently teaching in a BYOT district, Faith concurs:

> *They are much more well behaved on school issued devices. Okay. One because they know the search history is public. And now there are many districts that are one to one do have some type of monitoring system. And it will alert people who are much more important than the teacher.*

Amanda describes how much easier it is when a remote monitoring program is available. She says:

> *We have so many different apps, like we have the security app, where we can say what every kid as long as their own are the Chromebook, what even at home, I can monitor them from home and look at their screen and see what they're looking at and make sure that they're on the right tab, make sure that they're not cheating, and you know, or have something inappropriate on another tab, and I can close their tab right from my computer, even if they're at home. So, I like that. It's just easier to monitor.*

Foothill SD allows for the monitoring, explicitly explaining that it "reserves the right to monitor usage at all times. All information files remain the property of the school system and no user should have an expectation of privacy regarding such materials." Yet, Cara made the statement more than once that remote monitoring was a missing component to her school-issued 1:1 classroom.

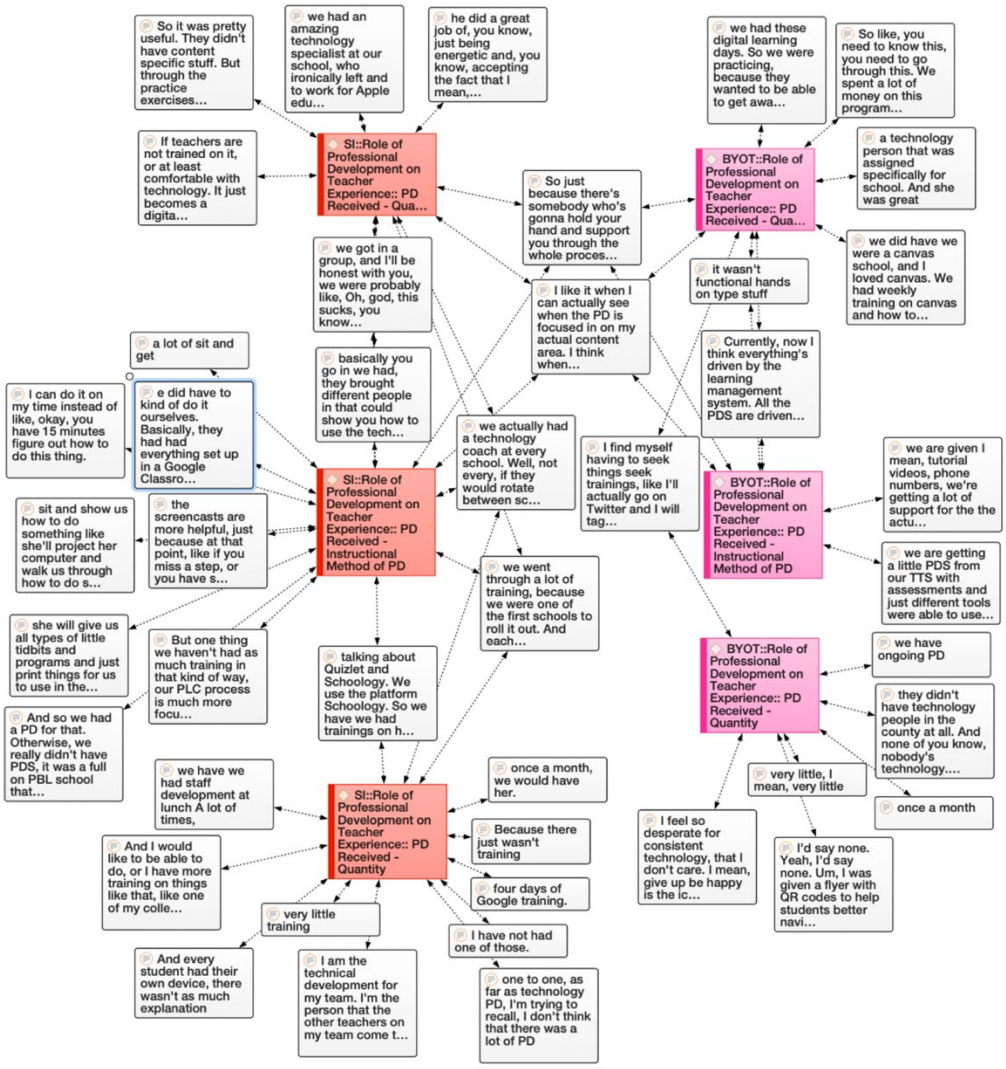
Role of professional development on teachers' experience with each model

The category of professional development had three codes: quantity, quality, and instructional model. Despite the few related codes, all eight informants referenced professional

development a combined 22 times for BYOT and 38 times for school-issued devices. Only two quotations have co-occurrence between the two models. Thus, teachers' experience with professional development differs depending upon the model of 1:1 technology integration the school employs. Figure 20 displays the network of codes associated with professional development and the quotations to which they are assigned.

Figure 20

Network of codes, quotations, and informants for professional development



The divergence in professional development experienced between the two models also mirrors the divergence in experience among the informants. Emily, Georgiana, Faith and Heather work in the same BYOT district. Emily and Georgina describe the current professional development as “ongoing” (Emily) and “centered around using the learning management system” (Georgina). Meanwhile Heather emphatically declares a lack of availability of PD: “I'd say none. Yeah, I'd say none [...] non-existent.” Also employed by Metro SD, Faith paints a more complete picture of her professional development experience, saying

> *I find myself having to seek things seek trainings, like I'll actually go on Twitter and I will tag the actual companies, Pear Deck, you know, Padlet, all these things and ask them questions. I'll private message them and whatnot to get what I need, Flocabulary all the things, but the trainings that are required in my current BYOD district are on a need to know basis.*

Bailey and Cara both experienced BYOT professional development in Lakeside SD. Like the Metro SD informants, Bailey and Cara had different experiences with professional development within the same district. Bailey stated there was “very little” professional development and “it wasn’t functional, hands-on type stuff.” On the other hand, Cara had a much richer experience:

> *We did have – we were a canvas school, and I loved Canvas – We had weekly training on Canvas and how to use it in the different features of it. We had, we had weekly tech training where the door the lady from the county would come and teach us different things like we learned about Nearpod, and all these different kind of web-based things.*

The divergence continues into the school-issued experiences Emily, Heather, and Amanda all worked in different school districts during the initial implementation of the districts’ 1:1 school-issued devices. Emily explained that her experience was a regular professional development “talking about Quizlet and Schoology. We use the platform Schoology. So, we have, we had trainings on how to use that. But really, we were just introduced to it. And there wasn't anything that was a big training that we just more of 30 minutes to 15 minutes for

planning and that was it." Heather and Amanda each described more intensive professional development during implementation. Amanda discussed having "four days of Google training" during pre-planning during the implementation school-year. Heather said

> *We went through a lot of training, because we were one of the first schools to roll it out. And each school was allowed to choose which operating system they wanted to use. So, our school, they administrators chose to use apple and I was there during the rollout. So, there was a lot of, you know, really great sort of hands on basics, that I really appreciated, that I'm not sure that other teachers would have gotten had they not been there in the initial phases*

Heather's supposition might be supported by Danielle's experience. As a third year teacher, Danielle experienced the school-issued model during year four as a student teacher and years six and seven of implementation in Foothill SD. She describes her training experiences:

> *I am the technical development for my team. I'm the person that the other teachers on my team come to when they're like, Schoology is not working, I can't make it do this, or how do I do this with Microsoft? I got some Schoology training, when I was student teaching at woodland, and then that's the extent of the technology development I've gotten in the last three years.*
>
> *We'll have it at like grade level meetings where it will kind of sit and show us how to do something like she'll project her computer and walk us through how to do something, or the new kind of technology person from central office will send us a screencast and be like, here's how you do this. And then we're like, hope at least one person I know actually understood it.*

The disparity in school-issued professional development is particularly apparent with Bailey who worked in multiple school-issued districts. He says he has not had training in his current 1:1 district, Foothill, on year seven of 1:1 implementation. Meanwhile, in Appalachian district which had only a year of implementation prior to his employment, he described this experience:

> *They brought different people in that could show you how to use the technology, different things that were out there to use, there's all kinds of different programs for teachers, and having somebody do that with you, I think really made a big difference. You know, they brought a guy in that that. I mean, we did Goosechase, we did some other things. And it was, I think, really what they tried to do is they said, "Okay, this is it, do it once in your classes week, and see what you think." And I think, by I don't know, forcing it, not really*

> *forcing but having teachers implement it and use it made people more comfortable with it, where it wasn't just like a go by the wayside type thing.*

The two quotations that addressed professional development for both models also diverged. Emily expressed a desire for professional development relevant to her content area: "I like it when I can actually see when the PD is focused in on my actual content area. I think when it's specific to a subject, it makes it more valuable information and it's kind of like oh, I see I can use it like that." Meanwhile, Faith recognizes that teachers generally experience professional development in unique ways, including rejecting it: "So just because there's somebody who's gonna hold your hand and support you through the whole process, doesn't mean people are gonna jump on board."

The outcome space for teacher experience with professional development and impact on 1:1 model implementation suggests that there was a more frequent training with school-issued devices, especially within the first few years of implementation. Participants generally preferred more hands-on activities when they had access to them. Technology professional development in BYOT districts was generally more focused on the software and applications and less on effective implementation of the model.

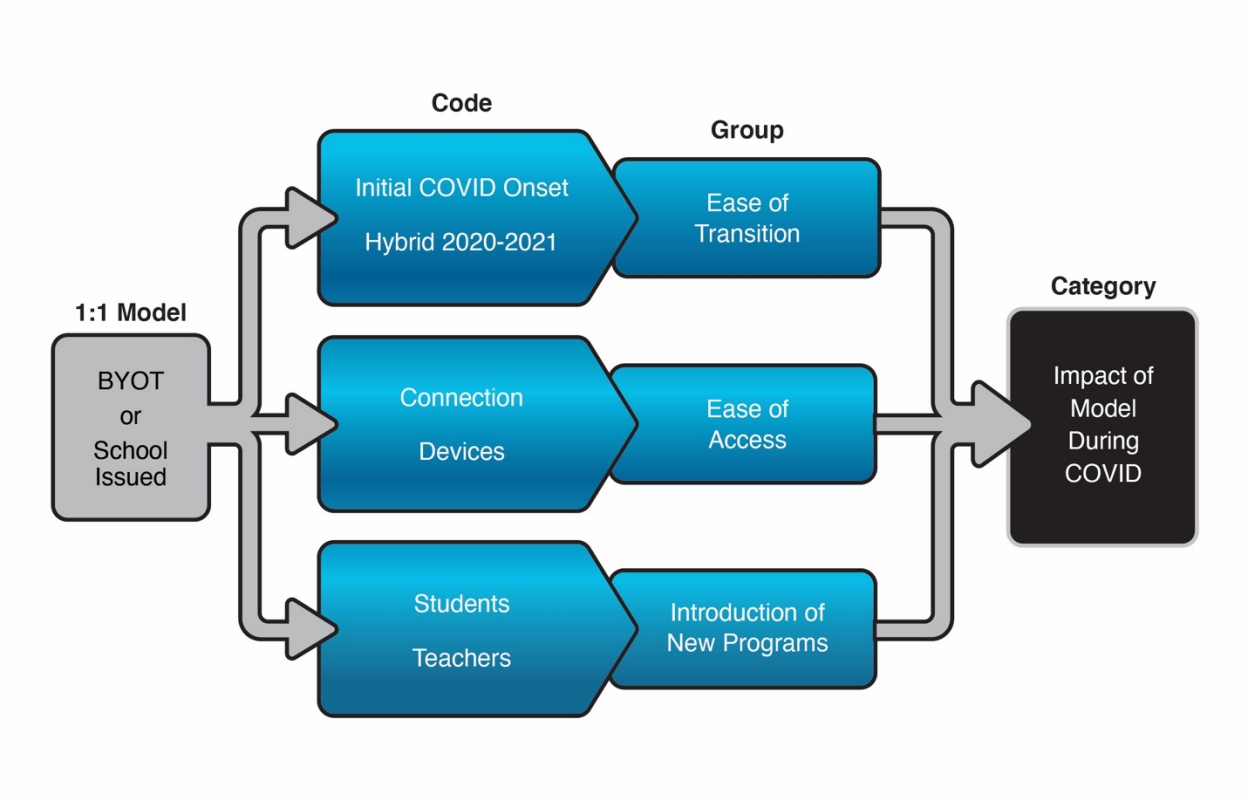
Impact of during COVID-19's virtual and hybrid learning experiences

It might go without writing that the COVID-19 pandemic changed the entire world seemingly overnight, and in the midst of the development of this dissertation. Most teachers went to work in Georgia on March 12, 2020 not realizing that the next day would be their last traditional day of schooling for many months. By March 16, 2020, a transition to learning online began its impact on nearly every teacher and student in the United States and across the world. As of the writing of this dissertation, late in the Spring of 2021, schools are still operating under modified schedules, with virtual and hybrid models of instruction in existence in both of the

districts where informants are currently employed. Both the initial transition and the ongoing school-year have influenced teachers' perceptions of 1:1 technology in education. Their perceptions began with these codes: initial onset, hybrid learning 2020-2021, connection, devices, new student programs, and new teacher programs. These codes were narrowed into these code groups: ease of transition, equity, and introduction of new programs (See Figure 21).

Figure 21

Coding flow chart for perceptions for impact of model during COVID



Ease of Transition

In a state with two fully online public schools and one school offering *a-la-cart* courses to supplement local education, virtual schooling was not something to which the entire system was oblivious. Some districts had begun planning for digital learning days to replace inclement weather days whenever transportation was dangerous, but connection was available. Some

districts did not yet have a fully-functional learning management system. All of these districts faced moving the hundreds of thousands of students in the state fully online in a matter of days. The informants spoke of this transition from the perspective of the district or districts in which they experienced it. Five informants signed contracts for the 2020-2021 school year in the district where they finished the 2019-2020 school year. Three informants changed districts in the midst of the pandemic. All of them worked in environments where teachers and students faced quarantines and often moved fluidly between learning in person and online. The initial transition spurred five quotes from three participants who all worked in Metro, a BYOT district, for the past two school years. Faith, however, was the only one who spoke about the BYOT model during the transition. She was fully critical:

> *It was just it was unacceptable, is unfair. And then so many students had zero schooling in my particular district from March till September, when our school district went back face to face or up to whatever it was at our school district, October, when our school district went back face to face. So, seven months of no schooling, because they didn't have a device. And then when my district finally started issuing devices, it was one device per family. So, if I have a brother or sister in the same gradeband spectrum as me, we can't both be on classes at the same time. So, one of us is missing out on learning. Just, it was absolutely unacceptable.*

Her criticism did not stop with considering the impact on students during the transition, however. She continued to discuss the impact on teachers:

> *COVID brought to light the fact that not having regular technology use and technology accessibility in a school or school district puts students at a deficit and puts teachers at a deficit as well. I saw teachers go into absolute panic mode on top of the already crisis mode that we were in having to completely switch from their -I don't want to use the word antiquated - but their standard style of teaching.*

Rather than being critical of BYOT directly, Georgina and Heather expressed a positive impression of how school-issued devices would have worked out better, or did work out better,

for colleagues in school-issued districts. Heather said of colleagues at her previous location of employment:

> *They've told me that it was so easy for them to switch to all virtual, because they were already with those kids, when COVID first hit; they had had almost an entire year, because they were year-long classes, with these students with their devices, and, and, you know, moving in and out of platforms. So, you know, I know that it was "easier" for them. Because there wasn't like this learning curve of how to use the technology; they had it.*

Georgina said "if we had 1:1 they would have been prepared. Okay, they would have been better prepared, we would have already been over a lot of these challenges." This quote also spoke to the continued transitions through the 2020-2021 described in the next paragraph

Foothill district, where half of the informants worked, began with a hybrid schedule, where students could choose virtual or in person learning based on the COVID status at their schools. Metro SD, where the other half of the informants worked, spent the first quarter of the school year online before transitioning students to a hybrid schedule during the second quarter. With two week quarantines and a spike in cases during the second and third quarters, students in both districts frequently experienced transitions. Amanda also observed the experiences of Mountain SD, which moved to a school-issued model during the 2020-2021 school year. She noted that providing a device eliminated one of the excuses for not doing school-work that was present in a BYOT district: not having a device on which to do it. Bailey's perspective was similar, but focused more on how teachers can help students through the constant transition:

> *I like the idea of being able to reach out and do things. I like the idea of the kids that are quarantined, because we do have kids that are in class that, you know, are really, really super motivated and want to do good things, and they'll, they'll email you to send workouts and things like that, and then they get quarantine or when, when they're quarantine but it's, you know, how do you serve them when they're not here? You know, that's, that's one of the things that makes me excited about that program is you could send them stuff, they could see it.*

Danielle interviewed from home during her own COVID-19 illness. She explained COVID's impact on her own transition: "As I sit at home in my COVID-19 quarantine. I was posting assignments for my classes this morning. And so, you know, it's not one of those things where you have to have kind of an emergency sub folder with 10 days of work ready to go and all the copies made." Like Amanda, Danielle had knowledge of how Mountain SD handled the transition and moved from BYOT to school-issued devices. Her observations highlight the differences in approach that took place in different districts with the same model:

> *I think the fact that [Mountain SD] was not initially, a one to one district, made them take a long, hard look at what sort of school model was going to work for them for this year. Which I think [Foothill SD] did not. We have been put in a position where our digital classes go back and forth so much that they're just kind of letting kids come and go from Digital whenever they want, which makes our grade books a mess. They, [Foothill SD], just kind of went well, we have computers, and the kids signed the paperwork, so teachers figure it out.*

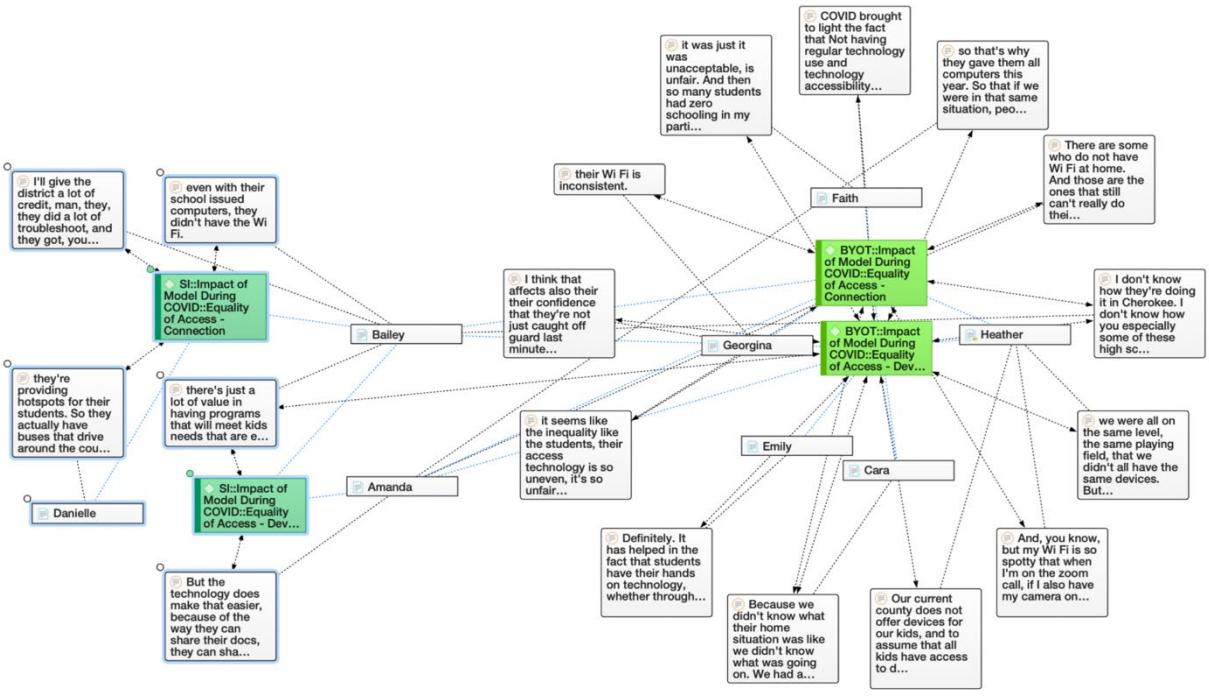
Thus, Danielle moved beyond the position that merely having school-issued devices would solve the transition problem; planning was an essential element for her too.

Equity of Access

Planning, especially for equal access for students, was a topic that frequently co-occurred with the discussion of COVID-associated transitions and with the hybrid model of instruction in general. Perhaps the most telling detail is the sheer number of times the equity of access appeared related to the BYOT model with 16 quotations compared to the school issued model's 5 quotations. Informants were, thus, three times as concerned with students' equity of access in the BYOT districts. Furthermore, within the school-issued commentary, the quotations reflect the districts in a more positive light. See Figure 22 for a networked code map of equity related to COVID.

Figure 22

Network of codes, quotations, and informants for COVID-19 equity



Bailey and Amanda mentioned the benefits of equitable access to devices in a school issued model. Amanda said, “But the technology does make that easier, because of the way they can share their docs, they can share slideshows, and they can work on those, even if they're sitting on the opposite side of the room, or one kid in the group is at home.” Bailey, joined by Danielle, also discussed how COVID highlighted the inequity in Wi-Fi connections. Bailey explains:

> *I'll give the district a lot of credit, man, they, they did a lot of troubleshoot, and they got, you know, hotspots out. And, you know, I don't really know what it was called, but it was a way for them to get on so that they could take something to the house and make that happen. There was I think it was, you know, good for equity for those kids.*

That sentiment is the extent of the perceptions provided by the informants about the equity provided in a school-issued 1:1 district.

Alternately, the experiences expressed related to the BYOT school districts and equity of access during COVID focus more on exposure of inequity. Five informants mentioned concerns about equity of devices and equity of connection related to BYOT districts. In addition to the quotations with co-occurring codes mentioned in the Ease of Transition section above, Heather sums up the concerns and experiences of teachers with a BYOT district during COVID:

> *Our current county does not offer devices for our kids, and to assume that all kids have access to devices is ludicrous. And it angers me to no end because I saw it firsthand, I saw students who would confide in me, you know, I only have my phone, and I am on your zoom call on my phone, but I can't do all this other stuff. While I'm on the zoom call on the phone. I don't know how to do it. I'm, or, I'm, you know, we can't afford to have them, you know, I have a device that I borrowed from the school because our school had a limited amount that they could borrow from our media center. And, you know, but my Wi Fi is so spotty that when I'm on the zoom call, if I also have my camera on, or, you know, all this other stuff it my internet will go out and it constantly will kick me off. Right. So, it's, it's COVID has, I think, really exposed the in equitability of, of technology. And in terms of our student populations across our county.*

The commentary of most of the other informants contain portions of the sentiment expressed by Heather above. Only Emily finds that COVID has had a positive impact on any aspect of BYOT: "It has helped in the fact that students have their hands on technology, whether through the district or from home, parents, allowing them to now bring their bring an actual device to school."

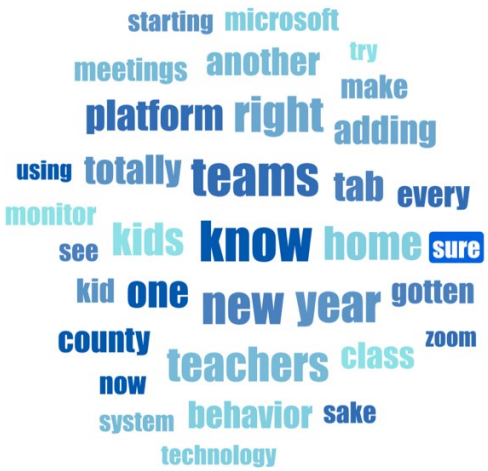
Introduction of New Programs

The final codes in the COVID-19 category were the least frequent, but not necessarily the least important. While teachers were dealing with shifting their modalities and associated pedagogies, some of the school systems decided to add, change, or augment their electronic programs. The sentiment surrounding these changes appeared in the commentary of five of the

informants. The exasperation was apparent and is perhaps best summarized by Danielle's thoughts directed toward her district, which chose to add a new RTI and behavior intervention system: "you're doing too much." This comment and Amanda's comments both reflected learning curves for programs introduced to staff and students in school-issued districts throughout the COVID crisis. Similar sentiment is expressed by Cara and Faith about the BYOT districts which introduced students and staff to new-to-them platforms and applications. Furthermore, these informants hinted at a potential resistance to learning any new technology program due to being overwhelmed. Emily's BYOT decided to build their own learning management system and implement it during the 2020-2021 school year, to great discomfort of the teachers. Of it, Emily says the LMS "is being built as it is, we're building the boat as we are sailing. So basically, we were kind of introduced and it was I feel like we're almost like a beta version the entire time we're in it because it's like, Hey, let's try it out while we're still using it and see what works and what doesn't." Figure 23 is a word cloud showing key terms related to the new applications, management systems, and computer programs introduced during COVID.

Figure 23

Word cloud of key terms for introduction of new program



Quality of Evidence

Qualitative researchers focus on credibility and dependability over validity and reliability due to the nature of their data. This is achieved through multiple data sources which, in the case of this dissertation, included (1) interviews and (2) guidance documents from four districts in the area under study. In an effort to show how the researcher achieved an understanding of the outcome space, this chapter included visual networks of triangulation and transparent approaches to the coding process in which the researcher engaged. Once the thick collective description of the phenomenon being examined was produced (Marton, 1981), the researcher engaged in member- checking after transcription of the interviews to ensure the validity of the study (Merriam, 2009).

Summary

The results in this chapter were reported by the categories into which codes and code group were ultimately sorted. One must understand, however, that these categories and the outcome space have an interconnected nature and that identifying this interconnected nature and the relationships amongst the subareas, the categories, of the phenomenon understudy is the hallmark of phenomenography (Khan, 2014). The goal of this study was to understand teachers' experiences with BYOT and school-issued technology models. During the course of the study, teachers were allowed to also provide suggestions for the key factors that allow for a positive and effective implementation of the 1:1 technology models. This chapter analyzed the variances in the ways that teachers experienced, and want to experience, 1:1 technology in their classrooms. In addition to the key factors they highlighted for implementation, the informants also compared BYOT to school-issued technology, discussed their implications in a COVID world, considered

the impact professional development had on their opinions, and pondered the impacts on their students' outcomes.

More specifically, the study showed an overwhelming preference for school-issued devices, especially for reasons of equity, technical support, and ease and consistency of use. The COVID pandemic amplified the need for technology, especially that which is school-issued. Professional development was more frequent in early days of a school-issued technology initiative and focused more on software, learning management systems, and web applications in both models. Each of these results is connected with the other to create the collective experience of the teachers.

CHAPTER 5: DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

Introduction

Almost three years have passed since the opening vignette of Chapter 1 inspired the researcher to question how other teachers had experienced 1:1 technology models. In the last year, the entire landscape of using technology for K-12 education has changed. This pivotal year has made the research question this qualitative study was guided by relevant in a way that was unanticipated by the teacher illustrated by that vignette. That question was: *What are teachers' experiences with BYOT and school-issued 1:1 technology initiatives in Northern Georgia?* Its focus was refined by the following areas of interest:

- Perceived impacts on student outcomes
- Key factors for positive and effective implementation
- Role of professional development on teachers' experience with each model
- Perceptions when comparing the models for effectiveness
- Impact of their current models of 1:1 technology integration, BYOT or school-issued, on them and their students during COVID-19's virtual and hybrid learning experiences.

To better understand the implications of each model's impact on teacher experience with 1:1, this phenomenography has explored the perceptions of eight teachers with work experience in at least two school systems, one that employed a BYOT 1:1 technology model and one that employed as school-issued 1:1 technology model. The study uncovered factors that influence teacher perceptions of 1:1 technology models including disparate technology support, varied policies and instructional expectations, considerations of equity, concerns with the capability to monitor student technology usage, professional development, and the COVID-19 pandemic.

Additionally, the researcher generated an outcome space that revealed 1:1 model preferences, including informant suggestions for implementing the chosen 1:1 model. The current chapter is the conclusion of this dissertation. This chapter includes a discussion of findings for each subarea and any relationship to previous literature, the implications of findings for educational practice, the limitations of the study, and some recommendations for potential future research.

Discussion and relationship of findings to previous literature

Through the aforementioned data analysis processes, the researcher found the subareas of the phenomenon under consideration that guided the outcome space. Thus, this section of Chapter 5 will be organized by subarea.

Perceived impacts on student outcomes

Some quantitative and qualitative studies have suggested that achievement, behavior, and motivation improve, at least temporarily, when school-issued 1:1 or BYOT initiatives are implemented (Adhikari et al., 2017; Bebell & Kay, 2010; Bebell & Padulla, 2015; Genlott & Gronlund, 2016; Hohlfeld et al., 2017). The informants in this study generally concurred with the literature with regards to motivation but were inconclusive on the potential impacts on achievement and were somewhat at odds with the literature on behavior.

When the teachers discussed the motivating aspect of technology, it was in the context of using it as a reward and with limitations. Most informants who recognized motivating factors were from BYOT districts, suggesting that the novelty of using one's own device could have been more motivating than using technology in general. At the same time, with regards to motivation, equity was a concern in the BYOT environment for the informants. They generally believed, like stakeholders in Cole and Sauers's (2018) study, that equity could be better addressed through a school-issued 1:1 initiative. As the use of technology increased, especially

in school-issued 1:1 environments, informants noticed that device fatigue began to set in. Some informants, like Danielle, Emily, and Cara, noticed that using the 1:1 school-issued devices elicited groans from students at times. This device fatigue and aversion to working with technology agrees with Stone (2016) and Spanos and Sofos (2003).

Due to a number of factors, particularly the lack of standardized testing comparison, the informants generally stated that they could only speculate on how technology impacted achievement related to test scores. As a result, many of the informants declined to comment or just simply said "I don't know." Only Georgina, whose experience with a 1:1 school-issued devices occurred in a charter setting with a project-based learning focus, felt like she could confidently comment on test scores; in her estimation it was a function of resources, including the 1:1 school-issued devices, and the expectation that students would raise their standardized testing scores. The literature showed improvements in test scores (Adhikari et al.,2017; Bebell & Padulla, 2015), but perhaps the qualitative nature of this study and its timing during COVID did not allow for the topic to be addressed cohesively.

One area in which the informants noticed achievement was a function of device familiarity. The common link was that students in school-issued 1:1 environments developed more familiarity and overall comfort levels with devices, particularly when they had access to the same device for several years. The informants suggested this achievement could positively impact test scores if exposure occurred prior to standardized testing. Furthermore, this achievement related to another achievement area – technological literacies and skills. Once again, the positive statements appeared in the school-issued environments and commentary in the BYOT environment most frequently reflected a negative perception of BYOT in comparison to school-issued devices for the sake of progress in students' technological capability. Amanda

mentioned that she believed school-issued devices better prepared students for post-school life. For instance, Amanda noted the use of iPads at even entry-level jobs such as fast-food restaurants. In addition, teachers were concerned with typing ability and technology troubleshooting. As Georgina noted "the awareness of how to problem solve and critically think through that process is a struggle. They just throw their hands in the air." All of the teachers in this study worked in schools with low- to mid- socioeconomic standing. This fact might have informed the beliefs that students do not have access to technology in a way that will prepare them if that technology is not provided by the school. These value statements that fall firmly on the side of school-issued technology interpreted through the lens of Rogers's (2010) Diffusion of Innovations suggest that teachers have found school-issued devices to have more *relative advantage* than BYOT and are more likely to adopt the innovation.

Behavior as a student outcome was perhaps the most varied among and within the informants' experiences. At the same time, the variation was equally diverse for the school-issued and BYOT environments. That students found ways to be distracted, to engage in off-task behaviors, and to even engage in fraudulent behavior is likely more of a function of being a human, especially an adolescent one at that. The concerns with students inappropriately using technology toward teachers that was apparent in Tabarra (2017) did not appear a single time in the interviews with the informants. The comments on the concept of behavior concerns only became truly relevant and dichotomous in the informants' perceptions of the 1:1 technology when discussing using a monitoring software as a key factor for effective implementation.

Key factors for positive and effective implementation

Positive and effective implementation, according to the informants, had four components: instructional expectations, working infrastructure and hardware, student training on how to use the various components of the 1:1 technology, and ability to monitor technology usage.

Instructional expectations spoke to the concept of leadership put forth by Pautz and Sedera (2017) that curriculum and instruction practices as a part of transformational leadership can have an impact on the success of a technology initiative. Striking commentary came from Cara, who experienced a BYOT model of 1:1 technology being expected to support a curriculum that required near daily use of a technology device. She found the incongruency between the model and the instructional policy to be detrimental to her implementation of technology and of the curriculum in her classroom. Alternately, Danielle found that a BYOT model with a reliance on school computer labs and a strict late work policy improved the use of technology for her students because they felt pressured to complete their work in a timely manner; her experience with a lax late work policy in the school-issued environment caused frustration despite having technology at her disposal. The frustration for these two teachers illustrate first order barriers to technology integration, a lack of technology access for Cara and "inadequate . . . administrative support" (Ertmer, 1999, p. 48) for Danielle. These two teachers also made innovation-decisions based upon the constraints of their systems, often abandoning effective use of technology (Rogers, 2010). Danielle and Cara's experiences exemplify the disconnect of the instructional expectations and the technology model with which they are associated.

Working infrastructure and hardware concerns raised by teachers in BYOT districts were in full agreement with Hockly (2012) and Milman's (2020) research on BYOT implementation. The most extreme report of failing infrastructure came from Heather whose room had no BYOT connectivity and, thus, presented a first order barrier to even beginning to implement the BYOT

initiative. Heather described working infrastructure as a basic need. The school-issued informant comments said that they had more difficulty with a failure of the software to engage in appropriate interoperability. In the school-issued district, however, the informants reported that schools were undergoing a refresh in the district, suggesting a focus on the maintenance of the initiative and devices advocated by Richardson et al (2013).

Student training on how to connect to a network was a key component only mentioned in the BYOT districts. Not having connectivity and technical support are first-order barriers to implementation (Ertmer, 1999). The informants who wanted to adopt the BYOT innovation often struggled with the lack of support for students with personal devices, a structural impediment to successful BYOT implementation according to previous research (Hockly, 2012; Millman, 2020). Indeed, in at least one BYOT district document, the students were informed that the BYOT model made them wholly responsible for any and all technical issues.

Unlike concerns with connectivity, student training software, learning management systems, and applications was mentioned across the two models. Two suggestions that stood out combat barriers for students that could then assist teachers in better 1:1 technology implementation: having training for students new to the 1:1 technology model and having training from technology professionals or instructors. One informant highlighted that students are often expected to understand the technology up front, but that expectation is based on the faulty concept of youth being digital natives, when in reality "digital natives are not homogeneously fluent in technology" (Wang, Myers, & Sundaram, 2012, p. 9). Lack of student support co-occurred with other codes about technical support, which are discussed in the "perceptions when comparing models for effectiveness" section later in this chapter.

The need to monitor students' technology use was a recurring theme in the informants' discussions and co-occurred with the various behavior codes. This co-occurrence is logical in that the informants wanted to be able to monitor their students were on-task during technology usage and that monitoring can be difficult if students have good navigation skills. Of particular concern was the ability of students to access inappropriate content on personal devices or even play inappropriate sounds from school-issued devices in an effort to distract the class. The idea that monitoring is a key component to positive and effective implementation reflects Rogers Diffusion of Innovations theory because it will reduce an uncertainty within the innovation: how to control student behaviors. The informants concerns about keeping students on task was reflected in Parsons and Adhikari's (2016) research on the BYOT environment.

Role of professional development on teachers' experiences

Professional development had some impact on teachers' perceptions of 1:1 technology models, but the overall impact was not explicit and had a number of variables that warrant further, more specific study. These variables include professional development targeted to BYOT environments and professional development occurring more than three years after the initial implementation of a 1:1 technology model. For instance, Bailey, Cara, and Danielle could not recall any training in their 1:1 district in the last year, year six of the implementation of school-issued devices while Danielle and Emily remembered having training in the same district during years one through four of implementation.

Similar to the literature, the outcome space saw informants desiring content specific and targeted professional development (Penuel et al., 2007). In addition, the review of literature presented in chapter 2 noted that professional development and the resulting teacher efficacy were most positively correlated to the initial success of a 1:1 computing initiative (Keane &

Keane, 2016; Mouza et al., 2008; Sung et al., 2016; Thieman & Cevallos, 2017). That the informants reported more frequent professional development during the initial periods of school-issued implementation shows that their school-issued innovation elicits a focused effort for success. That the same informants did not comment on the types of professional development targeted directly at creating a successful BYOT environment suggests that despite being considered a good alternative to school-issued 1:1 devices, it is not treated in an equal manner. When the diffusion of innovations theory is applied, the BYOT environments and associated professional development fail to achieve successful communication channels, and, as a result, have less chance of success than a new school-issued initiative. The fall-off in professional development for school-issued environments beyond their third year is also concerning, as the innovation may struggle to find a foothold with individuals new to the 1:1 school-issued initiative, even if the initiative itself is not new. The lack of professional development could raise self-efficacy concerns (Bandura, 1977) or fail to assist teachers in overcoming second-order barriers (Ertmer, 1999, 2012) surrounding implementation.

Perceptions when comparing the models for effectiveness

The most densely coded category compares BYOT to school-issued 1:1 technology models. Concepts such as student monitoring and technology support recurred in this section. Other concepts, the impact on pedagogy, student engagement, and the value of technology are new. This set of codes was designed to specifically identify places where teachers compared the two models using value statements. These comparisons sometimes appear as direct commentary; other times, the researcher had to deductively analyze to find the generalizable opinions.

All of the informants in this study made statements that reflected that they valued technology in education. This cohesive belief in the necessity of technology is unsurprising for at

least half of the informants who self-identified as available to the study. The other half of the participants were either known to the researcher or suggested for their technology experience by a mutual connection. The general consensus that technology is valuable agrees with the Chapter 2's review of literature's findings that various stakeholders, including students (Parsons & Adhikari, 2016; Thomas & Munoz, 2016), parents (Keane & Keane, 2018), and district leadership (Vu, et al., 2019), all believe technology a necessary component to the current modes of education. While the informants all expressed strong opinions that technology is a necessity and must be used to prepare students for the future, Cara made the nuanced observation that "Its value comes from what it can add to the learning experience, just like anything else, I think it's not more important than anything else. But it's a great, greatly useful tool."

The value of technology expressed 35 times in the study shows that as far as an innovation goes into the diffusion process, technology has overcome second-order barriers for them even when first-order barriers still remain, which is opposite of Ertmer et al.'s (2012) findings. This finding could be reflective of the informants themselves, or it could be an overall shift toward a positive evaluation of technology in the near-decade since Ertmer's study. Furthermore, the adoption of technology for the informants in this study is diffuse. Though technology is valued in general, the value statements repeatedly show that the informants value school-issued technology more. As described by the quotes in Chapter 4, seven of the eight participants explicitly stated that they prefer school-issued devices to the point that they call the school-issued model one-to-one and differentiate it completely from BYOT. Only Emily claimed that the model didn't matter. Her tone, however, suggested a desperation for technology that did not allow her to express a preference. For instance, when asked for a preference, she stated, "I'm

just glad they have technology; [I] can't be picky" before conceding that "Yeah, it would make life a lot easier if they all had the exact same model the same computer."

Data coded for the comparison category reinforces the previously discussed concepts of student monitoring and technology support, although in this instance both codes are refined. Specifically, student monitoring is considered from the remote perspective and is only mentioned in conjunction with the 1:1 school-issued model. As a result, the researcher deduced that remote monitoring of personally-owned devices seemed unfeasible to the point that the informants did not even mention it. With the ability to monitor considered a key factor for positive and effective implementation and the ability to remote monitor only being associated with 1:1 school-issued devices, the researcher believes syllogistically that, to an extent, the school-issued model is preferred in this respect because it is the only model capable of completing a task considered to be a key factor.

The discussion of technical support of students in the key factors section provided some insight into how the lack of student support makes teaching and learning more difficult. In this comparison category, the conversation is more robust. Technical support is divided into that which is teacher-provided versus that which is district-provided. In the teacher-provided code for BYOT, the concerns brought forth in the literature review are reflected in the statements of the teachers: managing multiple platforms is beyond their capability and negatively impacts their desire to implement the BYOT model (Hockly, 2012; Parsons & Adhikari, 2016). Heather clearly explains this issue: "I can't do an effective job in teaching as well, when I have multiple devices, because there's more problem solving with the technology itself." This statement speaks to the Diffusion of Innovations concept of complexity. The informants perceive their roles as too complex in the BYOT initiative because they add-on the role of technology specialist.

Alternately, the role of technology specialist as someone other than the teacher appears more frequently in the school-issued subset of the code. Positive commentary on district-provided appears at double the rate for school-issued devices, suggesting the method of technology support in 1:1 school-issued districts was preferable. Thus, deductively, the researcher sees that the informants are leaning toward preferring school-issued devices, as was evident with remote monitoring.

In the literature review in Chapter 2, only parents commented on student engagement in relation to the use of 1:1 technology models and they remained unconvinced (Parsons & Adhikari, 2016; Keane & Keane, 2018). The informants' perceptions in this study disagreed with the parents for the most part, finding that technology seemed engaging to students socially and recreationally, and, thus, should be leveraged educationally. Engagement was even noted as a goal of one of the districts' implementation of school-issued 1:1 technology. Faith provided insight that clouds the informants' perceptions a bit when she said:

> *Kids would just sit there at a computer answering questions and be like, Look, I'll engage my students are, but they weren't, they were compliant. And they were just answering worksheets, or, you know, doing a basic search or something. And so wild technology is amazing. And so much can be done with it. If teachers are not trained on it, or at least comfortable with technology. It just becomes a digital worksheet.*

Faith's observation underscores the idea that what teachers may perceive as student engagement may not be as engaging as it appears to the teachers. This quote from Faith also illustrates that some of the technology integration, even in 1:1 environments, amounts to little more than substitution on the SAMR model.

The most common code in the entire study was the impact each model had on the informants' pedagogy. The literature review in Chapter 2 found that the presence of technology alone did not change teachers' pedagogy. When discussing BYOT, the informants in this study

somewhat agreed, stating that they altered their instruction little because of a lack of reliability with how many devices would be available and to what extent the devices would be functional with the technology applications that they intended to implement, considering the technology to be supplemental at times rather than integral to their instruction. Alternately, in the school-issued environment, teachers reported changing their pedagogy to include projects that required complex thinking and involved increased collaboration between students and between student and teacher. Thus, the pedagogical benefits found in previous studies – collaboration, more personalized, project-based, and student-centered learning – were more reflected in the 1:1 school-issued model than with BYOT in this study (Gherardi, 2019; Keane & Keane, 2016; Mouza et al., 2008).

Reporting more pedagogical impact in the school-issued environment suggests that the diffusion of that innovation and the overcoming of multiple barrier thresholds occurred more thoroughly with that model. Indeed, that teachers who experienced a school-issued environment prior to experiencing a BYOT environment sometimes hinted at a retraction in their acceptance of BYOT as a 1:1 initiative. The most extreme example of this retraction would be Heather, who used a paperless concept in her 1:1 school-issued classroom but now considers technology supplemental since she cannot rely on the internet in her classroom for BYOT. At the same time, Heather displayed the most transformational acceptance of technology, allowing it to impact her pedagogy because she understands that students have resources always available through technology, so she has modified her curriculum. She calls it

> *gaming the higher order, you know, complexity of questioning, and performance tasks became really in trouble so that, you know, notes and, you know, lectures, whatever the information, just simply be becomes a tool to be able to apply that knowledge. And so, my assessments have organically become, you know, something where they, they have to use material as opposed to memorizing material.*

Heather describes transformational "paradigmatic change in the triad: student-teacher-content" (Peled et al., 2015, p. 258) where the "teacher acts as content experts, facilitators, and consultant" (Peled, et al., 2015, p. 264) rather than as the provider of knowledge.

Impact of their current models of 1:1 technology integration during COVID-19

One major impact of COVID-19 was making the teachers aware of their own technology self-efficacy (Bandura 1977), on the barriers they and their students needed to overcome to access an entirely new way of learning (Ertmer, 1999, 2012), and on the rapidity with which they and their colleagues have had to accept an innovation. Six of the eight informants had high self-efficacy and had already overcome many of the second-order barriers, sometimes even before the first-order barriers, to effectively using technology. They could not only understand how to innovate with whatever 1:1 model was available to them, but they could also critique others' abilities relative to effective implementation. COVID for these six created challenges, but not challenges that they felt they were wholly unprepared for. Amanda, however, had much less self-efficacy and found that COVID changed her perspective on technology integration in a way that was unexpected. She felt that she had learned a lot and COVID gave her the stance that school-issued devices, especially in socioeconomically disadvantaged schools, was simply a necessity. Bailey found that COVID impacted him the most in the concept of adopting 1:1 in a physical education environment with colleagues that were resistant to changing anything, pandemic or no pandemic. His experience highlighted that even in the most extreme situations, there will still be resistors to accepting an innovation.

Summary and Conclusions

Of the perceptions in the five subareas under consideration related to teacher experiences with multiple 1:1 technology models, the majority of the perceptions of teachers reflected a

preference for school-issued devices. The teachers reported increased impacts to their pedagogy, easier classroom control and student monitoring, increased equity before and during COVID, higher levels of professional development especially at the beginning of the innovation, and better infrastructure and technical support. While some codes showed no preference for a model, such as student engagement and student support with software, LMS's, and applications, in no area or code was BYOT the preferred model. Table 4 illustrates some of the positives and negative perceptions of the models.

Limitations of findings

The informants in this study predominately had backgrounds in English Language Arts. Although there were two participants from other subject areas, the experiences were often colored through the lens of students needing to develop the capability to use technology for the purpose of composition or multimedia responses to texts. This study did not begin to provide understanding 1:1 technology models from the perspective of all subject areas. This study was also limited to middle and high schools. As the age students have their own devices decreases (Rideout & Robb, 2019), the potential for BYOT implementation in elementary schools likely increases. Another limitation is the lack of official data regarding student growth for comparison between the two 1:1 technology models.

Table 4

Sample quotations showing positive vs. negative statements by model

Model	Positive Statements	Negative Statements
BYOT	I definitely see that kids are just more they're, they're into their cell phones, you can't drive them away from their cell phones. So, I feel like the best way is to just, you know, engage them through what they know. - Georgina	They want us to do certain programs, but getting it to do what we need it to do is too much – Cara I'm still not a technology specialist. You know, I don't know all devices and all systems – Heather And there were a lot of times with the prescribed curriculum that I wish we had the one to one because it was set up for one to one. And I felt that we, in my school were at an incredible disadvantage, because we weren't able to do the things that were built into the curriculum to make sense going to the next step and moving forward and everything. Because of that, those laptop limitations. I also feel like I've, I've had to change my teaching style. – Cara . And then the turnaround of getting that equipment fixed, if it was school issue, who knows when we're gonna get it because we have one person who's covering several schools. - Georgina
School-Issued	We have so many different apps, like we have the security app, where we can say what every kid as long as their own are the Chromebook, what even at home, I can monitor them from home and look at their screen and see what they're looking at and make sure that they're on the right tab, make sure that they're not cheating, and you know, or have something inappropriate on another tab, and I can close their tab right from my computer, even if they're at home. So, I like that. It's just easier to monitor. – Amanda I absolutely rather have one to one. I mean, hands down It's your I feel like not having one to one is teaching like with chalkboards that just feel like it's so ancient is just. And that's not that's not preparing the kids for today at all. And so absolutely one to one. – Georgina We had a, at a Genius Bar, they called it a Genius Bar, where they hired tech, like real like software, guys, that you would get who came from corporate world who fixed the laptop, so the kid had an issue with their laptop, we, you know, put in, and we would turn it in, and then he would tell us when to come back and pick it up, they look at it right and fix it, send it off whatever it needs to be that they had dedicated staff members for that building to look after the technology and support us. - Georgina	

*See Outcome Space Table in Appendix D for additional important quotations

Implications for future practice in local context

Based on this research, district leaders might reconsider the choice of a BYOT initiative, especially in a low- or mixed-socioeconomic environment. The concerns raised about equity are in the forefront of education, particularly as the nation grapples with a continuation or revisioning of a distance learning model that has the potential to become permanent (Bokayev et al., 2021; Greenhow et al., 2020; Scully et al., 2021). In addition, that teachers who have worked in both environments resoundingly prefer an environment where devices are issued by the school should inform district leaders as to the effectiveness of the 1:1 model choice. If a district chooses BYOT despite the overwhelming teacher preference, then robust support of student personal devices should be added to make sure that the technology is usable, and the technical support does not fall to the teachers. In addition, district and building leaders may consider frequent evaluations of the infrastructure so that the technology is available can connect, regardless of ownership. In school-issued environments, district leaders may consider adding monitoring programs to ensure on-task behavior and more complete compliance with the Children's Internet Protection Act (2001). In both environments, leaders should consider best practices in professional development relative to their 1:1 technology model; professional development that is content specific, hands-on, and ongoing. Finally, district and building leaders should be aware of how software, hardware, and application choices should be fully evaluated for interoperability and ask teachers to provide feedback so that choices and adjustments can be made.

Implications for future research

Additional research could focus on broadening the participant pool and exploring quantitative preferences related to BYOT and school-issued 1:1 models to determine if the overwhelming preference for school-issued 1:1 is a statistically significant quantitative trend.

Adding student voice to this area of study is also another avenue to broadening the participant pool. Quantitative studies could also be conducted to determine if achievement occurs at an equivalent rate in both 1:1 technology models when controlled for socio-economic discrepancies. Additional qualitative studies could focus on specific subject areas or lower grade levels to determine if the experiences regarding school-issued and BYOT 1:1 technology models extend beyond this heavily ELA-focused informant group. Finally, a longitudinal study could be conducted in BYOT and/or school-issued districts that commit to long-term model-specific professional development.

REFERENCES

Adhikari, J., Scogings, C., Mathrani, A., & Sofat, I. (2017). Evolving digital divides in information literacy and learning outcomes: A BYOD journey in a secondary school. *International Journal of Information & Learning Technology*, *34*(4), 290-306. doi: 10.1108/IJILT-04-2017-0022

Anthony A.B. & Patravanich S. (2014). The technology principal: To be or not to be? *Journal of Cases in Educational Leadership*, *17*(2), 3-19. doi:10.1177/1555458914528913

Anytime Anywhere Learning Foundation (2015). 1-to-1 pedagogy – An overview and introduction. *Layers of Teaching and Learning.* Retrieved from http://www.aalf.org/comm/docs/files/76.pdf

Alsop, G. & Tompsett, C. (2006) Making sense of 'pure' phenomenography in information and communication technology in education, *ALT-J, 14*(3), 241-259, doi: 10.1080/09687760600837058

Atlas.ti [computer software] (2019). Retrieved from https://atlasti.com/

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215. doi:10.1037/0033-295X.84.2.191

Bebell, D., & Kay, R. (2010). One to one computing: A summary of the quantitative results from the Berkshire Wireless Learning Initiative. *Journal of Technology, Learning, and Assessment*, *9*(2), 5-59. Retrieved 4 March 2019 from http://www.jtla.org.

Bebell, D., & O'Dwyer, L. M. (2010). Educational outcomes and research from 1:1 computing settings. *Journal of Technology, Learning, and Assessment*, *9*(1).

Bebell, D., & Pedulla, J. (2015). A quantitative investigation into the impacts of 1:1 iPads on early learner's ELA and math achievement. *Journal of Information Technology Education: Innovations in Practice*, *14*, 191-215. doi:10.28945/2175

Bokayev, B. , Torebekova, Z. , Davletbayeva, Z. , & Zhakypova, F. (2021). Distance learning in Kazakhstan: Estimating parents' satisfaction of educational quality during the Covid-19 pandemic. *Technology, Pedagogy and Education, 30*(1), 25-37. Doi:10.1080/1475939X.2020.1865192

Brown, H. Q. (2016). Examining the effects of school-provided E-Readers on middle school students' reading ability. *Journal of Educational Technology Systems*, *44*(4), 404–410. doi:10.1177/0047239515623050

Cardoza, Y., & Tunks, J. (2014). The bring your own technology initiative: An examination of teachers' adoption. *Computers in the Schools*, *31*(4), 293–315.

Cole, B.V. & Sauers N. J. (2018). Superintendents' perceptions of 1:1 initiative implementation and sustainability. *Journal of Research on Technology in Education*, 50(3), 200-213, doi: 10.1080/15391523.2018.1442754

"The Children's Internet Protection Act (CIPA)" (2010). American Library Association, Retrieved from http://www.ala.org/advocacy/advleg/federallegislation/cipa on May 20, 2021.

Chiu, T. K. (2016). Introducing electronic textbooks as daily-use technology in schools: A top-down adoption process. *British Journal of Educational Technology*, *48*(2), 524-537. doi:10.1111/bjet.12432

Consortium for School Networking (CoSN). (2019). *CoSN's 2018-2019 Annual Infrastructure Report* [PDFfile]. Retrieved from

https://www.cosn.org/sites/default/files/CoSNs%202018%202019%20Annual%20Infrastructure%20Survey%20Report%20final_0.pdf

Creswell, J. D. & Creswell, J. W. (2018). *Research design: qualitative, quantitative, and mixed methods approaches, 5th ed.* Sage Publications.

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA, US: Sage Publications, Inc.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed methods Approaches, 4th ed.* Sage Publicatiosn.

Cristol, D., & Gimbert, B. (2013). Academic achievement in BYOD classrooms. *QScience Proceedings*, *2013*(3), 15. doi: 10.5339/qproc.2013.mlearn.15

Crompton, H. & Keane, J. (2012). Implementation of a one-to-one iPod Touch program in a middle school. *Journal of Interactive Online Learning*, *11* (1), 1-18.

Crook, S. J., Sharma, M. D., & Wilson, R. (2015). An evaluation of the impact of 1:1 laptops on student attainment in senior high school sciences. *International Journal of Science Education, 37*(2), 272-293. doi:10.1080/09500693.2014.982229

Donovan, L., Hartley, K., & Strudler, N. (2007). Teacher concerns during initial implementation of a one-to-one laptop initiative at the middle school level. *Journal of Research on Technology in Education*, *39*(3), 263-286. doi: 10.1080/15391523.2007.10782483

Dwyer, D. C., Ringstaff, C., & Sandholtz, J. H. (1991). Changes in teachers' beliefs and practices in technology-rich classrooms. *Educational Leadership*, *48*, 45–52.

Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, *47*(4), 47-61. doi: 10.1007/bf02299597

Farrell, T.S.C. (2000). English teacher development: top-down, bottom-up or both? *Teaching and Learning*, 21(1), 27-35. Retrieved December 8, 2019, from https://repository.nie.edu.sg/bitstream/10497/343/1/TL-21-1-27.pdf

Fullan, M. (2007). *The New Meaning of Educational Change.* Fourth Edition. Teachers College Press.

Garet, M.S., Porter, A.C., Desimone, L., Birman, B.F, & Yoon, K.S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*. *38*(4), 915-945. doi:10.3102/00028312038004915

Genlott, A. A., & Grönlund, Å. (2016). Closing the gaps – Improving literacy and mathematics by ICT-enhanced collaboration. *Computers & Education*, *99,* 68-80. doi:10.1016/j.compedu.2016.04.004

Gherardi, S. (2019). Success stories: A case study in administrator and teacher collective sensemaking around 1:1 computer technology. *Leadership and Policy in Schools*, 1-15. https://doi.org/10.1080/15700763.2019.1668020

Glesne, C. (2016). *Becoming qualitative researchers: An introduction* (5th ed). Boston, MA: Pearson.

González, C. (2010) What do university teachers think eLearning is good for in their teaching? *Studies in Higher Education*, *35*(1), pp. 61-78, doi: 10.1080/03075070902874632

Grant, M., Tamim, S., Brown, D., Sweeney, J., Ferguson, F., & Jones, L. (2015). Teaching and learning with mobile computing devices: Case study in K-12 classrooms. *TechTrends: Linking Research & Practice to Improve Learning*, *59*(4),

32–45. doi: /10.1007/s11528-015-0869-3

Greenhow, C. , Lewin, C. , & Staudt Willet, K. B. (2020). The educational response to Covid-19 across two countries: A critical examination of initial digital pedagogy adoption. *Technology, Pedagogy and Education , 30*(1), 5-23. Doi:10.1080/1475939X.2020.1866654

Guba, E. (1981). ERIC/ECTJ Annual Review Paper: Criteria for Assessing the Trustworthiness of Naturalistic Inquiries. *Educational Communication and Technology, 29*(2), 75-91. Retrieved October 12, 2020, from http://www.jstor.org/stable/30219811

Hamilton, E., Rosenberg, J., & Akcaoglu, M. (2016). The Substitution Augmentation Modification Redefinition (SAMR) model: A critical review and suggestions for its use. *TechTrends: Linking Research & Practice to Improve Learning*, *60*(5), 433–441. doi: 10.1007/s11528-016-0091-y.

Han, F., & Ellis, R. A. (2019). Using phenomenography to tackle key challenges in science education. *Frontiers in Psychology*. Doi: https://doi.org/10.3389/fpsyg.2019.01414

Heath, M. K. (2017). Teacher-initiated one-to-one technology initiatives: How teacher self-efficacy and beliefs help overcome barrier thresholds to implementation. *Computers in the Schools*, *34*(1–2), 88–106. doi: 10.1080/07380569.2017.1305879

Hockly, N. (2012). Tech-savvy teaching: BYOD. *Modern English Teacher, 21*(4), 44-45.

Hohlfeld, T. N., Ritzhaupt, A. D., Dawson, K., & Wilson, M. L. (2017). An examination of seven years of technology integration in Florida schools: Through the lens of the levels of digital divide in schools. *Computers & Education*, *113,* 135-161. doi:10.1016/j.compedu.2017.05.017

Inserra, A., & Short, T. (2012). An analysis of high school math, science, social studies, English, and foreign language teachers' implementation of one-to-one computing and their pedaogical practices. *Journal of Educational Technology Systems, 41*(2), 145–169. doi:10.2190/ET.41.2.d

ISTE (2020). ISTE Standards. *International Society for Technology in Education* Retrieved from iste.org/standards.

Jesson, R., McNaughton, S., Rosedale, N., Zhu, T., & Cockle, V. (2018). A mixed-methods study to identify effective practices in the teaching of writing in a digital learning environment in low income schools. *Computers & Education*, *119,* 14-30. doi:10.1016/j.compedu.2017.12.005

Jorrín-Abellán, I. M. (2019). Hopscotch 2.0: an enhanced version of the model for the generation of research designs in social sciences and education." *Georgia Educational Researcher 16*(1) doi: 10.20429/ger.2019.160103

Kabanda, S., & Brown, I. (2014, December). Bring-your-own-device (BYOD) practices in SMES in developing countries: The case of Tanzania. Paper presented at the 25th Australian Conference on Information Systems (Auckland, New Zealand, December 8-10, 2014). Retrieved from http://hdl.handle.net/10292/8153

Kay, R. & Schellenberg, D. (2019). Comparing BYOD and one-to-one laptop programs in secondary school classrooms: A review of the literature. *Proceedings of the Conference: Society for Information Technology and Teacher Education (SITE 2019*)

Keane, T., & Keane, W. (2016). Achievements and challenges: Implementing a 1:1 program in a secondary school. *Education and Information Technologies*, *22*(3), 1025-1041. doi:10.1007/s10639-016-9470-4

Kennedy, C., Rhoads, C., & Leu, D. J. (2016). Online research and learning in science: A one-to-one laptop comparison in two states using performance-based assessments. *Computers & Education*, *100*, 141-161. doi:10.1016/j.compedu.2016.05.003

Khan, O. (2020) "Experiences with and conceptions of school discipline and PBIS implementation: A phenomenography of fifteen students with disabilities in one Title I middle school" *Doctor of Education in Special Education Dissertations*. 8. https://digitalcommons.kennesaw.edu/speceddoc_etd/8

Khan, S. H. (2014). Phenomenography: A qualitative research methodology in Bangladesh. *International Journal on New Trends in Education and Their Implications, 5*(2), p.p. 34-43. Retrieved July 15, 2019 from http://www.ijonte.org/FileUpload/ks63207/File/04.khan.pdf

Kozma, R. B. (1991). Learning with media. *Review of Educational Research*, *61*(2), 179.

Larke, L. (2019). Agentic neglect: Teachers as gatekeepers of England's national computing curriculum. British Journal of Educational Technology, *50*(3), 1137–1150. Doi: 10.1111/bjet.12744

Luo, T., & Murray, A. (2018). Connected education: Teachers' attitudes towards student learning in a 1:1 technology middle school environment. *Journal of Online Learning Research*, *4*(1), 87–116.

Marton, F. (1981). Phenomenography ? Describing conceptions of the world around us. *Instructional Science*, *10*(2), 177-200. https://doi.org/10.1007/bf00132516

Marton, F., & Booth, S. (1997). *Learning and awareness*. Mahwah, NJ: Lawrence Erlbaum Associates.

Maxwell, J. A. (2009). Designing a qualitative study. In Bickman, L., & Rog, D. J. *The SAGE handbook of applied social research methods* (pp. 214-253). SAGE Publications, Inc. doi: 10.4135/9781483348858

Milman, N. B. (2020). School leadership of a one-to-one laptop initiative. *Journal of School Leadership*, 30(4), 356–374. https://doi.org/10.1177/1052684619852114

Mouza, C., Cavalier, A., & Nadolny, L. (2008). Implementation and outcomes of a laptop initiative in career and technical high school education. *Journal of Educational Computing Research, 38*(4), 411-452. doi:10.2190/EC.38.4.c

Nadelson, L. S. & Seifert, A. L. (2016). Putting the pieces together: A model K-12 teachers' educational innovation implementation behaviors. *Journal of Research in Innovative Teaching*, *9*(1), 47-67.

Noguerón-Liu, S. (2017) Expanding notions of digital access: Parents' negotiation of school-based technology initiatives in new immigrant communities. *Equity & Excellence in Education, 50*:4, 387-399, doi: 10.1080/10665684.2017.1395301

Ozerbas, M. A. & Erdogan, B. H. (2016). The effect of the digital classroom on academic success and online technologies self-efficacy. *Journal of Educational Technology & Society, 19*(4), 203-212. Retrieved from www.jstor.org/stable/jeductechsoci.19.4.203

Parsons, D., & Adhikari, J. (2016). Bring your own device to secondary School: The perceptions of teachers, students and parents. *Electronic Journal of E-Learning*, *14*(1), 66–79.

Pautz, S. & Sadera, W. A. (2017) Leadership practice in a one-to-one computing initiative: Principals' experiences in a technology driven, second-order change. *Computers in the*

Schools Interdisciplinary Journal of Practice, Theory, and Applied Research 34(1-2), 45-59, doi: 10.1080/07380569.2017.1296314

Peled, Y., Blau, I., & Grinberg, R. (2015). Does 1:1 computing in a junior high-school change the pedagogical perspectives of teachers and their educational discourse? *Interdisciplinary Journal of e-Skills and Lifelong Learning*, *11*, 257-271. https://doi.org/10.28945/2311

Penuel, W. R. (2006). Implementation and effects of one-to-one computing initiatives: A research synthesis. *Journal of Research on Technology in Education*, *38*(3), 329– 348. doi: 10.1080/15391523.2006.10782463

Penuel, W. R., Fishman, B.J., Yamaguchi, R., & Gallagher, L. P. (2007) What makes professional development effective? Strategies that foster curriculum implementation. *American Educational Research Journal 44*(4), 921-958. doi:10.3102/0002831207308221

Puentedura, R. (2006). Transformation, technology, and education [Blog post]. Retrieved from http://hippasus.com/resources/tte/.

Ravitch, S. & Riggan, M. (2017). *Reason & Rigor 2nd ed.* Sage Publications, Inc.

Retalis, S., Paraskeva, F., Alexiou, A., Litou, Z., Sbrini, T., & Limperaki, Y. (2018). Leveraging the 1:1 iPad approach for enhanced learning in the classroom. *Educational Media International*, *55*(3), 213–230. Doi: 10.1080/09523987.2018.1512463

Richardson, J. W., McLeod, S., Flora, K., Sauers, N. J., Kannan, S., & Sincar, M. (2013). Large-scale 1:1 computing initiatives: An open Access database. *International Journal of*

Education and Development Using Information and Communication Technology, *9*(1), 4–18.

Rideout, V. & Robb M.B. (2019) *The Common Sense census: Media use by tweens and teens.* Common Sense Media. https://www.commonsensemedia.org/sites/default/files/uploads/research/2019-census-8-to-18-full-report-updated.pdf

Rogers, E. M. (2010). *Diffusion of innovations* (4th ed.). Simon & Schuster.

Rosen, Y. & Beck-Hill, D. (2012). Intertwining digital content and a one-to-one laptop environment in teaching and learning: Lessons from the Time to Know Program. *Journal of Research on Technology in Education*, *44*(3), 225–241. doi: 10.1080/15391523.2012.10782588

Saldaña, J. (2009). *The coding manual for qualitative researchers*. Sage Publications Ltd.

Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M.J., & Shin, T. S. (2009). Technological Pedagogical Content Knowledge (TPACK): The development and validation of an assessment instrument for preservice teachers. *Journal of Research on Technology in Education, 40* (2), 123-149.

Scully, D. , Lehane, P. , & Scully, C. (2021). 'It is no longer scary': Digital learning before and during the Covid-19 pandemic in Irish secondary schools. *Technology, Pedagogy and Education , 30*(1), 155-177. https://doi.org/10.1080/1475939X.2020.1854844

Seidman, I. (2019). *Interviewing as Qualitative Research: A Guide for Researchers in Education and the Social Sciences.* New York, NY: Teachers College Press.

Starkey, L., Shonfeld, M., Prestridge, S. & Cervera. M.G. (2021) Special issue: Covid-19 and the role of technology and pedagogy on school education during a pandemic. *Technology, Pedagogy and Education*, doi: 10.1080/1475939X.2021.1866838

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, *22*(2), 63-75. https://doi.org/10.3233/efi-2004-22201

Sin, S. (2010). Considerations of quality in phenomenographic research. *International Journal of Qualitative Methods*. December 2010:305-319. doi:10.1177/160940691000900401

Sjöström, B., & Dahlgren, L. O. (2002). Applying phenomenography in nursing research. *Journal of Advanced Nursing*, *40* (3), 339-345.

Spanos, D., & Sofos, A. (2015). The views and attitudes of students participating in a one-to-one laptop initiative in Greece. *Education and Information Technologies*, *20*, 519-535. Doi: 10.1007/s10639-013-9299-z

Stavert, B. (2013). *Bring your own device (BYOD) in schools: 2013 literature review*. NSW Department of Education and Communities. Retrieved from https://education.nsw.gov.au/policy-library

Stake, R. E. (2010). *Qualitative Research: Studying How Things Work*. Guilford Press.

Stone, J. A. (2017). The impact of technology exposure on student perceptions of a 1:1 program. *Education and Information Technologies, 22*(5), 2281-2309. Doi: 10.1007/s10639-016-9541-6

Storz, M. G., & Hoffman, A. R. (2013). Examining response to a one-to-one computer initiative: Student and teacher voices. *RMLE Online*, *36*(6), 1-18. https://doi.org/10.1080/19404476.2013.11462099

Sung, Y., Chang, K., & Liu, T. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers & Education*, *94,* 252-275. doi:10.1016/j.compedu.2015.11.008

Tabbara, O. S. (2017). *Stakeholder perspectives on student mobile device use in illinois high schools: An exploratory study* (Order No. 10279383). Available from ProQuest Central; ProQuest Dissertations & Theses A&I; ProQuest Dissertations & Theses Global; Social Science Premium Collection. (1959333060).

Thieman, G. Y., & Cevallos, T. (2017). Promoting educational opportunity and achievement through 1:1 iPads. *International Journal of Information and Learning Technology, 34*(5), 409-427. doi:10.1108/IJILT-06-2017-0047

Thoma, J., Hutchison, A., Johnson, D., Johnson, K., & Stromer, E. (2017). Planning for technology integration in a professional learning community. *The Reading Teacher*, *71*(2), 167-175. https://doi.org/10.1002/trtr.1604

Thomas, K., & Munoz, M. A. (2016). Hold the phone! High school students' perceptions of mobile phone integration in the classroom. *American Secondary Education*, *44*(3), 19.

Topper, A., & Lancaster, S. (2013). Common challenges and experiences of school districts that are implementing one-to-one computing initiatives. *Computers in the Schools*, *30*(4), 346-358. https://doi.org/10.1080/07380569.2013.844640

Ukpokodu, O. (2009). The practice of transformative pedagogy. *Journal on Excellence in College Teaching, 20(*2), 43-67.

U.S. Department of Education. (2018). *Reimagining the Role of Technology in Education: 2017 National Education Technology Plan Update.* Retrieved July 16, 2019 from https://tech.ed.gov/files/2017/01/NETP17.pdf

U.S. Department of Education. (2010). *Transforming American Education: Learning Powered by Technology: The National Educational Technology Plan.* Retrieved August 1, 2020, from https://www.ed.gov/sites/default/files/NETP-2010-final- report.pdf

U.S. Department of Education. (2004). *Toward a New Golden Age in American Education: How the Internet, the Law, and Today's Students are Revolutionizing Expectations: The National Educational Technology Plan.* Retrieved August 1, 2020 from https://files.eric.ed.gov/fulltext/ED484046.pdf

U.S. Department of Education. (2000). *e-Learning: Putting a World-Class Education at the Fingertips of All Children:. The National Educational Technology Plan.* Retrieved August 1, 2020, from https://files.eric.ed.gov/fulltext/ED444604.pdf

U.S. Department of Education. (1996). *Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge: The National Educational Technology Plan.* Retrieved August 1, 2020, from https://files.eric.ed.gov/fulltext/ED398899.pdf

Vu, P., Fredrickson, S., & Gaskill, M. (2019). One-to-one initiative implementation from insiders' perspectives. *TechTrends 63*(1), 62–67. Doi:

Wang, Q., Myers, M. D. & Sundaram, D. (2013) Digital natives and digital immigrants - towards a model of digital fluency. *Business & Information Systems Engineering, 5*(6). 409-419.

Wainwright, A. (2013). BYOD: Coming to a school near you. *SecureEdge.* Retrieved from https://www.securedgenetworks.com/blog/BYOD-Coming-to-a-School-Near-You- Infographic

Weston, M.E. & Bain, A. (2010). The end of techno-critique: The naked truth about 1:1 laptop initiatives and educational change. *Journal of Technology, Learning, and Assessment*, 9(6). Retrieved 8 December 2019 from https://ejournals.bc.edu/index.php/jtla/article/view/1611

Yeop, Y. H., Ali Othman, Z., Huda Sheikh Abdullah, S. N., Asmar Mokhtar, U., Paizi Fauzi, W. F., & Ahmad, N. (n.d.). Key factors to implement BYOD in schools. *Proceedings of the 2018 Cyber Resilience Conference, CRC 2018*. doi: 10.1109/CR.2018.8626864

Zucker, A.A. & Hug, S.T. (2007). A study of the 1:1 laptop program at the Denver School of Science & Technology. Denver, CO: Denver School of Science and Technology. Retrieved from https://files.eric.ed.gov/fulltext/ED500425.pdf

Appendix A: Consent Form

SIGNED CONSENT FORM

Title of Research Study: Teacher Experiences with Multiple One-to-One Technology Integration Models: A Phenomenography

Researcher's Contact Information: Tiffany Post, tglenn2@kennesaw.edu, 404-695-2365

Introduction

You are being invited to take part in a research study conducted by Tiffany Post of Kennesaw State University. Before you decide to participate in this study, you should read this form and ask questions about anything that you do not understand.

Description of Project

The purpose of the study is to find out how teachers have experienced using 1:1 devices in the classroom, both BYOD and school-issued.

Explanation of Procedures

Participants will be asked to respond to semi-structured interview questions in three interviews via Zoom which will be recorded. If participants have a lesson plan that they can provide and discuss relevant to their use of 1:1 technology in the classroom.

Time Required

Each interview will be 20 minutes for a total of 60 minutes of interview time.

Risks or Discomforts

There are no known discomforts expected from taking part in this study.

Benefits

Although there will be no direct benefits to you for taking part in the study, the researcher may learn more about how the 1:1 implementation model effects the classroom environment and the teachers involved in it.

Compensation

Participation is voluntary and without compensation.

Confidentiality

The results of this participation will be confidential. Confidentiality will be maintained through password protected recordings of interviews and pseudonyms in transcripts and the final document.

Inclusion Criteria for Participation

Participants must be at least 18 and have taught or student-taught in one school or district that issues school-owned devices and one that has a BYOD policy.

Signed Consent

I agree and give my consent to participate in this research project. I understand that participation is voluntary and that I may withdraw my consent at any time without penalty.

_____

Signature of Participant or Authorized Representative, Date

_____

Signature of Investigator, Date

_____

PLEASE SIGN BOTH COPIES OF THIS FORM, KEEP ONE AND RETURN THE OTHER TO THE INVESTIGATOR

Research at Kennesaw State University that involves human participants is carried out under the oversight of an Institutional Review Board. Questions or problems regarding these activities should be addressed to the Institutional Review Board, Kennesaw State University, 585 Cobb Avenue, KH3417, Kennesaw, GA 30144-5591, (470) 578-7721.

Appendix B: Interview Protocol

Interview Protocol: 1:1 Technology Models

Script

Hello! Thank you for your participation. My name is Tiffany Post and I am a graduate student at Kennesaw State University conducting a research project for my dissertation on 1:1 technology integration models.

Each interview will take about 30 minutes and will include questions regarding your experience with using technology in life and in the classroom. The focus of my study is school-provided 1:1, BYOT, and other 1:1 initiatives in your classroom.

Can I have your permission to audio record this interview so I may accurately document the information you convey? If at any time during the interview you want me to stop the audio recording or the interview itself, please let me know and we will stop.

All of your responses are confidential and will remain confidential. Your responses will be used only for educational purposes. At this time, I would like to ask for your verbal consent to this interview and inform you that your participation in this interview also implies your consent. Your participation in this interview is completely voluntary. If at any time you need to stop or take a break, please let me know. There will be no consequences for withdrawing your participation at any time during the interview.

Do you have any questions or concerns before we begin? Then, with your permission, let's begin the interview.

Background and Demographics

Would you mind telling me your age, gender, ethnicity, subject and grade levels taught? If there is any part you prefer not to answer, please let me know.

How long have you been teaching?

Less than 5 years

5-10 years

11-20 years

More than 20 years

What is your gender?

Male Female NonBinary Other Prefer Not to Answer

What is your Race/Ethnicity?

Hispanic Not Hispanic

White

African-American

Asian/Pacific Islander

Native American

Multi-racial

Other (Not Listed)

Interview Protocol

Part 1:

Can you describe your experiences with technology prior to becoming a teacher? Please provide examples to illustrate your response

Questions specific to area of study

What types of 1:1 models of technology integration has/have your school system(s) implemented while you have been a teacher?

Voluntary BYOT with Smartphones, laptops, and/or tablets

Required BYOT with Smartphones, laptops, and/or tablets

Required BYOT with laptops only

School-issued devices – One device type

School-issued devices – multiple device types

How do you value or have you valued the general implementation of 1:1 technology in your classroom? Please provide examples to illustrate your response.

What kinds of professional development did you get with each model of 1:1 computing in your classroom? What types of professional development did you prefer? How do you think PD has impacted your perceptions of 1:1 computing?

In what ways and to what extent do you integrate technology into your classroom practice?

What is an example of this integration?

In what ways does the chosen model of 1:1 technology integration impact your content delivery and sequencing?

In what ways did the chosen model impact the types of activities and types of assessments you give to your students?

How do BYOT and school-issued devices compare in this respect?

Part 2:

What impact do you think the chosen model of 1:1 technology integration has on student motivation? What is a practical example of this impact?

What impact do you think the chosen model of 1:1 technology integration has on student achievement? What is a practical example of this impact?

What impact do you think the chosen model of 1:1 technology integration has on student behavior? What is a practical example of this impact?

Is there a model you have not experienced that you think might be better for those student factors? In what ways?

Part 3:

How do you think COVID-19 impacted your opinions of the 1:1 technology models available?

Let's review some of your previous ideas to make sure that I represent your experiences accurately.

Reflective question

Is there anything else I or a superintendent should know about the technology integration model you are using or have used that you believe would be helpful for the study that I am conducting or their choice of model or implementation?

Appendix C: Codebook

ATLAS.ti Report

Dissertation

Codes

Report created by Tiffany Post on Apr 30, 2021

● BYOT::Impact of Model During COVID::Ease of Transistion - Hybrid 2020-2021

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

- ● **BYOT::Impact of Model During COVID::Ease of Transistion - Initial Onset** **Created:** 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post
- ● **BYOT::Impact of Model During COVID::Equality of Access - Connection** **Created:** 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post
- ● **BYOT::Impact of Model During COVID::Equality of Access - Devices** **Created:** 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post
- ● **BYOT::Impact of Model During COVID::Introduction of New Programs - Student**

  Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

  ● **BYOT::Impact of Model During COVID::Introduction of New Programs - Teacher**

  Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

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● BYOT::Key factors for positive and effective implementation::Alignment between instructional model and technology model

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● BYOT::Key factors for positive and effective implementation::Instructional Policies

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• BYOT::Key factors for positive and effective implementation::Lack of student training - Hardware and Connectivity

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• BYOT::Key factors for positive and effective implementation::Lack of student training - Software, LMS, Applications

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• BYOT::Key factors for positive and effective implementation::Monitoring of Student Technology Usage

Created: 3/12/21 by Tiffany Post, **Modified:** 4/9/21 by Tiffany Post

• BYOT::Key factors for positive and effective implementation::Working Infrastructure and Hardware

Created: 3/27/21 by Tiffany Post, **Modified:** 3/27/21 by Tiffany Post

• BYOT::Perceived impacts on student outcomes::Achievement - Familiarity of Devices

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• BYOT::Perceived Impacts on student outcomes::Achievement - Technological Skills and Literacies

Created: 3/20/21 by Tiffany Post, **Modified:** 3/20/21 by Tiffany Post

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• BYOT::Perceived impacts on student outcomes::Behaviors - Distractions

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• BYOT::Perceived impacts on student outcomes::Behaviors - Intentional Off Task

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● BYOT::Perceived impacts on student outcomes::Motivation - Completion Rate

Created: 3/11/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● BYOT::Perceived impacts on student outcomes::Motivation - Device Fatigue

Created: 3/11/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● BYOT::Perceived impacts on student outcomes::Motivation - Equity

Created: 3/11/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● BYOT::Perceptions when comparing models for effectiveness::Impact on Pedagogy

Created: 3/20/21 by Tiffany Post, **Modified:** 3/20/21 by Tiffany Post

● BYOT::Perceptions when comparing models for effectiveness::Remote Monitoring of Student Technology Use

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● BYOT::Perceptions when comparing models for effectiveness::Student Engagement

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

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● BYOT::Perceptions when comparing models for effectiveness::Tech Support - District Provided

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● BYOT::Perceptions when comparing models for effectiveness::Tech Support - Teacher Provided

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• BYOT::Perceptions when comparing models for effectiveness::Value of Technology

Created: 3/20/21 by Tiffany Post, **Modified:** 3/20/21 by Tiffany Post

• BYOT::Role of Professional Development on Teacher Experience:: PD Received - Instructional Method of PD

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• BYOT::Role of Professional Development on Teacher Experience:: PD Received - Quality

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• BYOT::Role of Professional Development on Teacher Experience:: PD Received - Quantity

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• SI::Impact of Model During COVID::Ease of Transistion - Hybrid 2020-2021

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• SI::Impact of Model During COVID::Ease of Transistion - Initial Onset

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

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• SI::Impact of Model During COVID::Equality of Access - Connection

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• SI::Impact of Model During COVID::Equality of Access - Devices

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

• SI::Impact of Model During COVID::Introduction of New Programs - Student

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● SI::Impact of Model During COVID::Introduction of New Programs - Teacher

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● SI::Key factors for positive and effective implementation::Alignment between instructional model and technology model

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● SI::Key factors for positive and effective implementation::Instructional Policies

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● SI::Key factors for positive and effective implementation::Lack of student training - Software, LMS, Applications

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● SI::Key factors for positive and effective implementation::Monitoring of Student Technology Usage

Created: 3/12/21 by Tiffany Post, **Modified:** 4/9/21 by Tiffany Post

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● SI::Key factors for positive and effective implementation::Working Infrastructure and Hardware

Created: 3/27/21 by Tiffany Post, **Modified:**

● SI::Perceived impacts on student of Devices

Created: 3/12/21 by Tiffany Post, **Modified:**

● SI::Perceived Impacts on student Technological Skills and Literacies

Created: 3/20/21 by Tiffany Post, **Modified:**

- **SI::Perceived impacts on student** **Created:** 3/28/21 by Tiffany Post, **Modified:**
- **SI::Perceived impacts on student** **Created:** 3/12/21 by Tiffany Post, **Modified:**
- **SI::Perceived impacts on student** **Created:** 3/12/21 by Tiffany Post, **Modified:**
- **SI::Perceived impacts on student Task**

  Created: 3/12/21 by Tiffany Post, **Modified:**

  - **SI::Perceived impacts on student Rate**

  Created: 3/12/21 by Tiffany Post, **Modified:**

3/27/21 by Tiffany Post

outcomes::Achievement - Familiarity

3/12/21 by Tiffany Post

outcomes::Achievement -

3/20/21 by Tiffany Post

outcomes::Achievement - Test scores

3/28/21 by Tiffany Post

outcomes::Behaviors - Distractions

3/12/21 by Tiffany Post

outcomes::Behaviors - Fraud

3/12/21 by Tiffany Post

outcomes::Behaviors - Intentional Off

3/12/21 by Tiffany Post

outcomes::Motivation - Completion

3/12/21 by Tiffany Post

- ● **SI::Perceived impacts on student outcomes::Motivation - Device Fatigue** **Created:** 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post
- ● **SI::Perceived impacts on student outcomes::Motivation - Equity** **Created:** 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post
- ● **SI::Perceptions when comparing models for effectiveness::Impact on Pedagogy**

  Created: 3/20/21 by Tiffany Post, **Modified:** 3/20/21 by Tiffany Post

  ● **SI::Perceptions when comparing models for effectiveness::Remote Monitoring of Student Technology Use**

  Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

  ● **SI::Perceptions when comparing models for effectiveness::Student Engagement**

  Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

  ● **SI::Perceptions when comparing models for effectiveness::Tech Support - District Provided**

  Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

  ● **SI::Perceptions when comparing models for effectiveness::Tech Support - Teacher Provided**

  Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

  ● **SI::Perceptions when comparing models for effectiveness::Value of Technology**

  Created: 3/20/21 by Tiffany Post, **Modified:** 3/20/21 by Tiffany Post

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● SI::Role of Professional Development on Teacher Experience:: PD Received - Instructional Method of PD

Created: 3/12/21 by Tiffany Post, **Modified:** 3/19/21 by Tiffany Post

● SI::Role of Professional Development on Teacher Experience:: PD Received - Quality

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

● SI::Role of Professional Development on Teacher Experience:: PD Received - Quantity

Created: 3/12/21 by Tiffany Post, **Modified:** 3/12/21 by Tiffany Post

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Appendix D: Outcome Space Table

Outcome Space Table

What are teachers' experiences with BYOT and school-issued 1:1 technology initiatives in Northern Georgia?		
Code Group	Descriptions	Representative Statements
Category 1: Key factors for positive and effective implementation		
School-Issued	Ability to monitor is preferred	We have so many different apps, like we have the security app, where we can say what every kid as long as their own are the Chromebook, what even at home, I can monitor them from home and look at their screen and see what they're looking at and make sure that they're on the right tab, make sure that they're not cheating, and you know, or have something inappropriate on another tab, and I can close their tab right from my computer, even if they're at home. So I like that. It's just easier to monitor. – Amanda So we've hit the point where we can't trust the ad like the website blockers that the school filters anymore – Danielle control the apps from in house – Heather
	Instructional and technology models must align.	"I am able to like actually do things that are technology based." Bailey and Georgina also reflect the ease of technology integration with their instructional models in their 1:1 school-issued environments: [In Riverside SD] we were PBL. And so I taught sixth grade and eighth grade. And so with sixth graders, we have the laptops, we use a lot of research based or creative. And also with group work, creating slides, Google Slides in them to do some research and work on presentations together. So that was used a lot. I'm trying to remember, it's been a few years. So that's what I think at the sixth grade level, we used a lot of that. It was independent, students had to be independent learners. So they had to be able to Okay, come in, log in, let's look at our lesson. And I was

		the facilitator. So I think the laptops and that access to technology was building a lot more of an independent skill base, being a learner being responsible for their learning. – Georgina They could do stuff. I feel like that was more organized like that. We had an online prep platform that we put out notes with and things like that, that we built the curriculum on. And so in our PLC, you know, we would kind of just really kind of build our class. And then that class the kids would have access to they could access the work, the notes, the worksheets, and all that stuff. So the more that they had the ability to you know. - Bailey
	Students need training	The kids don't understand a lot of the technology. And they kind of there's no like, support for them in that instance, other than, like, we as teachers have to repeatedly go over how to do things, how to submit things, how to attach things, and they're not learning those computer skills at any point before they get to us. So, I mean, I've had kids who have been with me since August, and are still like, how do I attach something, just submit it on Schoology I still have kids sending me things in Schoology messages and I'm like, “No, no, that's not where that goes.”- Danielle When we get new students in to the district, or ones who are coming from a place that wasn't one that weren't what they're not a one-to-one school, or they didn't use the same learning platform that we use, they have no clue what they're doing. And it can be a huge learning curve, to sit like to sit there with them and walk them through all the steps that are kids who have been there since kindergarten kind of grew up, like grew up knowing as they grew. It would be nice for those incoming students are just like, sixth grade, you've entered Middle School, here are the things we're gonna hear the technology tools we're going to

		use, like, not even necessarily connections class that's like we have a focus block built in was if there was a focus period once a week that focused on, like tech training for the kids. Like I have a student I have to walk him through how to save a file to find it to upload it to Schoology every single time we do that. - Cara
BYOT	Ability to monitor is preferred	**Interview Quotations** But again, they were devices, they weren't phones. - Georgina **District Document** Student filtering is a requirement of all public schools. The Children's Internet Protection Act requires all [Lakeside]-provided network access to be filtered, regardless of the device you used to access it while in a public school." – Lakeside
	Instructional and technology models must align.	I had 10 laptops in the room. And everything, especially in the language arts program, they had designed a new curriculum for us. And all of the we were the only middle school that wasn't one to one. So, it was all very much get on this website, research this thing, create a PowerPoint do that, like it was all web based. And I had 10 laptops, and the kids could bring devices, but if they brought devices, it was their cell phone that couldn't do that thing, or that they didn't want to sit and type a whole essay on, or just or they were too embarrassed to bring it out, because it was not as cool as everyone else's brand new iPhones or whatever. So yeah, there were there were big discrepancies in what I was able to do there, versus what they expected us to be able to do. And we were constantly told to stop making so much copies, because that will show them that we're using paper. So, I don't know how to not make copies when I can't have them all on a laptop. Because I do not have enough laptops. They're never gonna give us funding for

	one to one if we're, we're making all those copies. That's not how this works. But that was the that was the message from the top. So yeah, it was stressful.-Cara
	Only having 10. I couldn't, I couldn't plan for whole class, anything with the technology, it had to either be small groups, or I had to like wheedle. 10 from this classroom and 10 from that classroom, so I had a total of 32 to use with my students.-Cara
Students need training	The county was pushing us to use technology. But that was the problem. We didn't have the available technology to use, they wanted us to use USA test prep, they wanted us to do the SRI Lexile testing, they wanted us to do some stuff on Google Classroom. They wanted us to - I don't know if you're familiar with Revision Assistant - they want us to do revision assistant. And so it's like they had all these technology things that they wanted us to do. And we couldn't get the labs to do that with our kids. -Amanda
Dysfunctional infrastructure and hardware create a barrier.	A lot of the students didn't have laptops or tablets or anything like that, that they could bring. So for the most part, the only technology my students had that they could bring were their phones. And so we were still operating primarily out of desktop computer labs, which had 25 computers for a class of 30 or 32 students.-Danielle
	District Documents "Whenever possible the school will provide a District owned device for use during the class period as needed for instruction purposes and at the discretion of the teacher. Advance planning is recommended.
	It's very frustrating it is and I try really hard not to take it out on the kid but I become extremely frustrated because

		there's, there's only so many times I can can take how to how to make a copy of a Google Doc like that, in itself, simple skills, how to do that? – Georgina
		Kids, some kids can open certain documents, or sometimes they're sending me things, and I can't open it. And then in the classroom, I can't, I can't really plan or I'm always having to plan paper copies or alternatives. Because I don't know exactly who's going to have what when they come in. It is stressful for the child to and even sent a lot of times they may not have the support at home. And then when they are issued something it sometimes it breaks, or it's not working, and they can't log into the zoom, or they can't get into [The LMS] - Georgins
		When students are bringing their own technology, at the very least, the minimal thing that should occur is that we should have internet access for all classrooms. – Heather
		The other kind of thing that I have to be aware of is internet because it's spotty, to say the least, and the wireless connection that's in my classroom. - Heather
Category 2: Perceived impacts on student outcomes		
School-Issued	Technology results in off-task Behaviors	They would, let's say we would do an assignment and I would walk around and get their scores off the screen, they would highlight the scores, right click, and then change the text on the screen and type in a different score. Did you ever see that? Oh, oh, gosh, yes. I forget what it's called. But you can actually highlight something, go into the HTML, basically change what the screen says and they would all be putting in 100 for their assignment. So I had to make it to where we couldn't just simply go by what was on the screen, I had to go by - use - programs that would actually record in a gradebook instead of something that was visual on the screen. - Emily
		playing porno noises - Cara

	playing games instead of working - Danielle
	where on their school issued device, that's going to be a more of a hassle. – Amanda
	I just think it's because they generally don't have like, social media on their computer, really, you know, so I'm sure there's way but, you know, it's just not common. So, I would say that would be the only the only thing you know, you know, with a phone versus, or their individual, you know, iPad or whatever, versus what school-issued. - Bailey
Technology motivates until overused	The software or the technology students, I felt like got tired of it if it was overused, because being one to one and having it with you all the time. That meant every single class they had each day, always had access to technology. And it would get overused I feel like as well. So if each content didn't really focus in and say, Hey, we're going to be doing this all day in my class with the computer, and then they get to my class and we're using the computers, again, all class period, they **would just get tired** of sitting and staring at the screens. – Emily
	I think technology is technology, it doesn't matter if it's school, a school device or their own device, if they are told that they have to put something away, not gonna be happy about it, if they're told that they can use it as as a reward they're going to be happy. – Emily
	I have some kids who are super self motivated and are able to just sit down on a computer and get their work done. And then I have kids, where you put them in front of a computer screen, and they lose all sense of motivation. – Danielle
	it was in those classrooms where they just opened up their devices, and they were on their devices for the entire period that that's where I saw, some of my students

	told me, they just couldn't take that on behaviorally. – Heather:
	When it comes to the end of the day, if you're like, Okay, we're gonna do this, get out your laptops, they're like, Oh, my God. - Cara
Technology might improve test scores	when you have resources and you put in, you know, training the people to do PBL and supporting them and then devices that these kids who, you know, were bought behind grade level and probably never passed, milestones tests, were able to raise, we did see, we were able to do much better testing what I mean, it was very heavy. And that was the trade off with having that technology was, you know, and being a charter school, you have to prove yourself. - Georgina
Students gain technology skills with familiar devices.	That was the expectation that, hey, you're giving all this you have this great opportunity, you have technology, you have everything that you need to educate this whole child. Now you got to perform. And they did, they did work hard, and they did rise to the occasion. -Georgina
	they're gonna know how to navigate better around the test. They're gonna know how to use the tools on there, you know, they've got highlighting tools and all these little tools, you can use own actual tests, and they just are going to be more familiar with technology in general. And hopefully now that they have their own devices, their typing skills will be better, and they can move faster and get those, you know, the free response things done a lot quicker just because they're familiar with it. - Amanda
	And whereas now my kids are typing all the time, and they know how their computers work better than most of the adults in the building do to be completely honest -Danielle

BYOT	Technology results in off-task Behaviors	I think that's definitely more the thing for them because they can use their own minutes their own data, and be able to look at what that whatever they want to, and then go on their Snapchat and then go on their, their Facebook and whatever so easily – Amanda
	Technology motivates until it is overused	Students are tired of the computers. - Emily It's also a motivator to where if they can just take you know, five or 10 minutes at the end of class or if they finish their work to use the technology - Emily I think technology is technology, it doesn't matter if it's school, a school device or their own device, if they are told that they have to put something away, not gonna be happy about it, if they're told that they can use it as as a reward they're going to be happy. - Emily
	Lack of device familiarity could reduce technical skills/test performance	They had only done a few assignments over the course of the year at a lab at a computer. And then they had to go take their end, of course tests and they didn't, they weren't super comfortable with sitting in front of a computer for that long, and it was physically uncomfortable for them. But then it was also just kind of, they didn't know what to do, like if the monitor randomly turned off, or, you know if any of these sort of issues happened, whereas they didn't get a lot of typing practice in – Danielle I could see them struggling with? How do I do that all the new tools and the different things…?-Cara Very few kids had their own computer or any type of technology, I can definitely see how far behind they are in comparison to other schools where they had technology - Amanda

Category 3: Role of Professional Development

School-Issued	PD occurs more frequently early in implementation.	[…] talking about Quizlet and Schoology. We use the platform Schoology. So we have, we had trainings on how to use that. But really, we were just introduced to it. And there wasn't anything that was a big training that we just more of 30 minutes to 15 minutes for planning and that was it." "four days of Google training" - Amanda We went through a lot of training, because we were one of the first schools to roll it out. And each school was allowed to choose which operating system they wanted to use. So our school, they administrators chose to use apple and I was there during the rollout. So there was a lot of, you know, really great sort of hands on basics, that I really appreciated, that I'm not sure that other teachers would have gotten had they not been there in the initial phases - Heather I am the technical development for my team. I'm the person that the other teachers on my team come to when they're like, Schoology is not working, I can't make it do this, or how do I do this with Microsoft? I got some Schoology training, when I was student teaching at [Foothill HS], and then that's the extent of the technology development I've gotten in the last three years. We'll have it at like grade level meetings where it will kind of sit and show us how to do something like she'll project her computer and walk us through how to do something, or the new kind of technology person from central office will send us a screencast and be like, here's how you do this. And then we're like, hope at least one person I know actually understood it. - Danielle
	Preferred PD is content specific and hands-on.	They brought different people in that could show you how to use the technology, different things that were out there to use, there's all kinds of different programs for teachers, and having

		somebody do that with you, I think really made a big difference. You know, they brought a guy in that that. I mean, we did Goosechase, we did some other things. And it was, I think, really what they tried to do is they said, "Okay, this is it, do it once in your classes week, and see what you think." And I think, by I don't know, forcing it, not really forcing but having teachers implement it and use it made people more comfortable with it, where it wasn't just like a go by the wayside type thing. -Bailey
BYOT	PD is focused on LMS and software, when available.	"ongoing" (Emily) "centered around using the learning management system" (Georgina). "I'd say none. Yeah, I'd say none [...] non-existent." - Heather I find myself having to seek things seek trainings, like I'll actually go on Twitter and I will tag the actual companies, Pear Deck, you know, Padlet, all these things and ask them questions. I'll private message them and whatnot to get what I need, Flocabulary all the things, but the trainings that are required in my current BYOD district are on a need to know basis.-Faith
	Preferred PD is content specific and hands-on	"very little" and "it wasn't functional, hands-on type stuff" – Bailey We did have – we were a canvas school, and I loved Canvas – We had weekly training on Canvas and how to use it in the different features of it. We had, we had weekly tech training where the door the lady from the county would come and teach us different things like we learned about Nearpod, and all these different kind of web-based things. - Cara "I like it when I can actually see when the PD is focused in on my actual content area. I think when it's specific to a subject, it makes it more valuable information and

		it's kind of like oh, I see I can use it like that." -Emily
Category 4: Perception when comparing models		
School-Issued	School-issued results in monitoring	We have so many different apps, like we have the security app, where we can say what every kid as long as their own are the Chromebook, what even at home, I can monitor them from home and look at their screen and see what they're looking at and make sure that they're on the right tab, make sure that they're not cheating, and you know, or have something inappropriate on another tab, and I can close their tab right from my computer, even if they're at home. So I like that. It's just easier to monitor. – Amanda So we've hit the point where we can't trust the ad like the website blockers that the school filters anymore – Danielle control the apps from in house – Heather
	Transformational change in pedagogy occurs.	…to do really complex thinking projects - Danielle Confer with multiple students rapidly - Faith One of the biggest differences that is kind of outside of the technology scope first was that when I was in [Riverside], I actually was the assessment lead up at our school. And so we worked really hard to create our own benchmarks by, you know, team, what we call stts, of course. And I just felt like that was really important that those assessments were authentic and collaborative. And, and had some performance aspect to it as well. And, and that was, you know, when everyone had the same technology, that was a little easier to navigate. We used in [Riverside] we used we use Google platforms. So we use Google Classroom, with our iPads, which proved a little difficult at times. But mainly we use Google Forms. I still use Google Forms on primarily, I don't use the where I put the assessments in [Metro-LMS]. Now that I'm back in

		[Metro], it just is clunky. For me, Google Forms is so much easier, it's so much more accessible. And I will tell you that what I'm what the use of technology has brought to light for me as a teacher, both in [Riverside] and [Metro]. Well, in my little stint in [Lakeside] as well, is that students have access to everything at their fingertips. And, and even in the situation where I have a hybrid model where I have students in front of me and I have students at home. I am very aware that they have the internet at their fingertips, they have their notes right there. They can't be babysat. Right. And so it changed the way back when I was in [Riverside] of thinking about how to assess students. So, you know, not so much. You know, it's sort of like gaming the higher order you know, complexity of questioning, and performance tasks[. . .] **And so my assessments have organically become, you know, something where they, they have to use material as opposed to memorizing material. - Georgina**
	Technology engages students.	It just became, you know, kids would just sit there at a computer answering questions and be like, Look, I'll engage my students are but they weren't, they were compliant. And they were just answering worksheets, or, you know, doing a basic search or something. And so wild technology is amazing. And so much can be done with it. If teachers are not trained on it, or at least comfortable with technology. It just becomes a digital worksheet. - Faith Technology, to me, it doesn't really matter, the actual model, the type of technology [. . .] the students know, let's say, we're going to be playing a Kahoot game, and they majority of them will be excited to play a Kahoot game no matter what the technology type is. - Emily
	School-issued gets better support	We had a, not a Genius Bar, they called it a Genius Bar, where they hired tech, like real like software, guys, that you would get who came from corporate world who

		fixed the laptop, so the kid had an issue with their laptop, we, you know, put in, and we would turn it in, and then he would tell us when to come back and pick it up, they look at it right and fix it, send it off whatever it needs to be that they had dedicated staff members for that building to look after the technology and support us. - Georgina If a kid had a problem, she'd give them a loaner. And she would get it fixed – Amanda **District Document** Click HERE to access troubleshooting tips for your Chromebook. If you are still having issues after trying our tips, fill out the Chromebook repair form online or at your school library. What do I do if my Chromebook has been damaged? A: Bring your Chromebook to the Media Center. Explain the issue to the Library Media Specialist and/or fill out the MCS Chromebook Repair Form. This form must be placed inside the closed Chromebook. If we are at home for Distance Learning, fill out the Chromebook repair form online and a school technician will get back to you. – Mountain SD
	School-issued is preferred	the school should provide them a device - Amanda having a school issued device that you know, that all kids have is kind of big – Bailey I love the one to one. - Cara I absolutely rather have one to one. I mean, hands down. – Georgina
BYOT	BYOT support is inconsistent	“I don't know all devices and all systems.” – Heather And some students are getting on on a cell phone and some on an iPad and some

	on a, you know, Kindle Fire and some on a laptop, and some on a Chromebook and some on a MacBook. And it is none, nothing looks the same on any of those devices. And some things aren't even accessible on some of those devices. And so it drastically would change. Probably even my desire to use technology beyond. Here's how you get to the [METRO] Digital Library.- Heather
	[My media specialist] ha[s] been absolutely amazing with [her] knowledge, not only of just running the Learning Commons, but I think [she has] the most knowledge of technology out of anyone I've ever met for media specialists, definitely. So. So we do have support with [her, the field technician], and then at the county level, we have our helpdesk tickets, we can always do if something is a bigger problem. And then there is the web, not the Web Help the line to call, I have called that line. But that phone call did take quite a while. It was like an hour plus phone call. And then the issue took over a week to resolve but the people on the end of the phone didn't quite understand what we were needing fixed compared to someone that's in the building. - Emily
Technology engages students	**District Documents** It is not the responsibility of your teachers or other [Lakeside] staff to troubleshoot individual devices. - Lakeside
	teachers may “assist if [they] choose.” - Lakeside
	Kids are just more, they’re into the cell phones. - Georgina
	So I feel like the best way is to just, you know, engage them through what they know. And through technology. So a lot of them are a lot more motivated. and attentive, sometimes when they have, they're in front of a computer. And it just feels like it's been forever since we were

		even in a - or everyone had a laptop - or in a computer lab. - Georgina A lot of times you resort to like, “Hey, let's get some butcher paper, let's do some, let's just draw” and the kids don't, you know, have to like the arts. You tell them you can do it at home if you want and a lot of them they'll want to do it at home. But you do I mean, it's things you could do with a computer, you end up doing like, you know, paper or something, it's just less engaging. - Georgina It just became, you know, kids would just sit there at a computer answering questions and be like, Look, I'll engage my students are but they weren't, they were compliant. And they were just answering worksheets, or, you know, doing a basic search or something. And so wild technology is amazing. And so much can be done with it. If teachers are not trained on it, or at least comfortable with technology. It just becomes a digital worksheet. - Faith Technology, to me, it doesn't really matter, the actual model, the type of technology [. . .] the students know, let's say, we're going to be playing a Kahoot game, and they majority of them will be excited to play a Kahoot game no matter what the technology type is. - Emily And there were a lot of times with the prescribed curriculum that I Wish we had the one to one because it was set up for one to one. And I felt that we, in my school were at an incredible disadvantage, because we weren't able to do the things that were built into the curriculum to make sense going to the next step, and moving forward and everything. - Cara
	Pedagogy experiences slight shifts or stalls	
Category 5Impact of Model During COVID		
School-Issued	It’s a matter of equity.	But the technology does make that easier, because of the way they can share their docs, they can share slideshows, and they can work on those, even if they're sitting

	on the opposite side of the room, or one kid in the group is at home. - Amanda
School-issued allows for easier transitions.	I'll give the district a lot of credit, man, they, they did a lot of troubleshoot, and they got, you know, hotspots out. And, you know, I don't really know what it was called, but it was a way for them to get on so that they could take something to the house and make that happen. There was I think it was, you know, good for equity for those kids. - Bailey
	As I sit at home in my COVID-19 quarantine. I was posting assignments for my classes this morning. And so you know, it's not one of those things where you have to have kind of an emergency sub folder with 10 days of work ready to go and all the copies made. - Danielle
	I like the idea of being able to reach out and do things. I like the idea of the kids that are quarantined, because we do have kids that are in class that, you know, are really, really super motivated and want to do good things, and they'll, they'll email you to send workouts and things like that, and then they get quarantine or when, when they're quarantine but it's, you know, how do you serve them when they're not here? You know, that's, that's one of the things that makes me excited about that program is you could send them stuff, they could see it. - Bailey
	If we had one to one they would have been prepared. Okay, they would have been better prepared, we would have already been over a lot of these challenges. - Georgina
New programs for teachers and students increased stress.	They've told me that it was so easy for them to switch to all virtual, because they were already with those kids, when COVID first hit; they had had almost an entire year, because they were year-long classes, with these students with their devices, and, and, you know, moving in and out of platforms. So, you know, I know that it was “easier” for them.

		Because there wasn't like this learning curve of how to use the technology; they had it. - Heather
		You're doing too much
BYOT	It's a matter of equity.	Our current county does not offer devices for our kids, and to assume that all kids have access to devices is ludicrous. And it angers me to no end because I saw it firsthand, I saw students who would confide in me, you know, I only have my phone, and I am on your zoom call on my phone, but I can't do all this other stuff. While I'm on the zoom call on the phone. I don't know how to do it. I'm, or, I'm, you know, we can't afford to have the, you know, I have a device that I borrowed from the school because our school had a limited amount that they could borrow from our media center. And, you know, but my Wi Fi is so spotty that when I'm on the zoom call, if I also have my camera on, or, you know, all this other stuff it my internet will go out and it constantly will kick me off. Right. So it's, it's COVID has, I think, really exposed the in equitability of, of technology. And in terms of our student populations across our county. - Heather
		It has helped in the fact that students have their hands on technology, whether through the district or from home, parents, allowing them to now bring their bring an actual device to school. - Emily
	BYOT transitions were complicated.	It was just it was unacceptable, is unfair. And then so many students had zero schooling in my particular district from March till September, when our school district went back face to face or up to whatever it was at our school district, October, when our school district went back face to face. So seven months of no schooling, because they didn't have a device. And then when my district finally

	started issuing devices, it was one device per family. So if I have a brother or sister in the same gradeband spectrum as me, we can't both be on classes at the same time. So one of us is missing out on learning. Just, it was absolutely unacceptable. - Faith
New programs for teachers and students increased stress.	COVID brought to light the fact that not having regular technology use and technology accessibility in a school or school district puts students at a deficit, and puts teachers at a deficit as well. I saw teachers go into absolute panic mode on top of the already crisis mode that we were in having to completely switch from their -I don't want to use the word antiquated - but their standard style of teaching. - Faith The LMS “is being built as it is we're building the boat as we are sailing. So basically, we were kind of introduced and it was I feel like we're almost like a beta version the entire time we're in it because it's like, Hey, let's try it out while we're still using it and see what works and what doesn't.” - Emily