iEngage, iEducate, and iEmpower:

A Collaborative Apprenticeship Project in a "Bring Your Own Technology" School

by

Michelle Lynn Otstot

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Graduate Supervisory Committee:

Ray R. Buss, Chair
Stanley Zucker
Jeffrey Thomas

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ABSTRACT

The purpose of the iE3 Project was to explore the effect of using a collaborative apprenticeship model on the integration of student-owned mobile devices into classroom instruction. The iE3 Project was designed to overcome perceived barriers that prevented teachers from using student-owned mobile devices in the classroom. Based on earlier work, teachers suggested those barriers were support, time, resources, and professional development. Thus, the iE3 Project was conducted to empower teachers initiating the use of student-owned mobile devices as instructional tools. The study is grounded in situated cognition theory, situated learning theory, social cultural theory, and extends Evan Glazer's study of collaborative apprenticeship in a "bring your own technology" (BYOT) school environment. The literature review includes relevant studies from such areas as providing teacher support, employing collaborative planning time, using mobile technology resources, and offering authentic professional development within situated contexts. Participants included K-8th grade teachers. The 11 "non-user" participants established roles as peer-teachers (PT) and worked collaboratively with 11 "mobile device user" teacher leaders (TL) for twelve weeks during the iEngage, iEducate, and iEmpower phases of the iE3 Project. Participants completed pre- and post-intervention Stages of Concern Questionnaires and Innovation Configuration Maps, engaged in collaborative planning time, posted collaborative weekly

reflections and descriptions of digital images online, completed a Perceived User Level retrospective survey, and participated in semi-structured interviews. The results of the project indicated a collaborative apprenticeship model as implemented in the current project was successful in addressing perceived barriers and empowered teachers to use student-owned mobile devices as instructional tools. Generally, results showed PT made substantial gains in using student-owned devices during instruction; reduced instructional, management, and other concerns about using mobile devices; and transformed them in terms of their thinking about using mobile devices for classroom instruction. Moreover, the perceived barriers were mitigated by using the collaborative apprenticeship model. In the discussion, complementarity of the quantitative and qualitative data were discussed and connections were made to the extant literature. Additionally, lessons learned, limitations, implications for practice, and implications for additional action research were discussed.

DEDICATION

This dissertation is whole-heartedly dedicated to my husband and children. Three years ago, the four of us sat down and discussed our family commitment to my dream of earning a doctorate. Never once did any of you falter on your commitment, support and belief in me. Never once.

To Kyle, my little man. I have watched you go from half my size to towering over me throughout this doctoral program. Your patient demeanor, understanding nature, and dedication to your success in school and sports have made parenting stress-free. Thank you for your positive attitude and always going with the flow. I am so proud of you!

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Chapter 1

Introduction and Purpose of the Study

Brrrrriiiiinnngg!! It is 8:40 a.m. and a barrage of middle school students saunter in herds to their homeroom classrooms. Among the rumblings about the latest Miley Cyrus parody on YouTube and an embarrassing picture posted on Instagram, a teacher on morning duty is heard exclaiming across the breezeway "Bell to bell, teacher-directed, guys!" One by one students power down and stuff their mobile devices into their backpack as they scurry through the classroom doors for another day of textbook learning.

Increasingly, national attention has been given to the standardization of essential knowledge and skills to adequately prepare today's students to compete in the global society of the twenty-first century. The Common Core State Standards (CCSS) were designed to provide a rigorous and relevant education for K-12 students in preparation for college and careers and have been adopted by states across the country (Common Core State Standards Initiative, 2012). In 2010, the Arizona State Board of Education approved the Arizona Common Core State Standards (ACCSS), making Arizona the 46th state to recognize the essential need for students to master critical thinking and information skills as they navigate through today's extensive platforms of written and digital media. The Arizona Department of Education (ADE, 2012) recognized the importance of technology in preparing students when it acknowledged the role of technology in the preparation of students

> to be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, and report on information and ideas, to conduct original research in order to answer questions or solve problems, and to analyze and create a high volume and extensive range of print and nonprint texts in media forms old and new. (p. iv)

The adoption of the ACCSS, recently renamed the Arizona College and Career Readiness Standards (ACCRS), has triggered the need to provide teacher training, not only in the standards themselves, but also in the effective utilization and integration of various technologies as instructional tools.

In 2010, the United States Department of Education (USDE) published the National Education Technology Plan (NETP) to address the continuous "push of emerging technology and the pull of the critical national need to radically improve our education system" (USDE, 2010, p. xi). In NETP, the USDE maintained,

> technology is at the core of virtually every aspect of our daily lives and work, and we must leverage it to provide engaging and powerful learning experiences and content, as well as resources and assessments that measure student achievement in more complete, authentic, and meaningful ways. (USDE, 2010, p. v)

Although, the USDE acknowledged the need for teachers to integrate technology with instruction is immense, conditions vary greatly with respect to which teachers may be able to leverage technology. In fact, the level of knowledge, skills, attitudes, and understanding of technologies may inhibit the utilization of technology, which might otherwise increase learning outcomes and improve effective instructional practices.

Across districts and organizations, the USDE called for action to develop innovative programs that support and provide resources for teacher training to address the demands for effective technology integration throughout the country (USDE, 2010).

The problem of effective teacher training using technology integration is exacerbated by the fast-paced emergence of technologies and their applications in the educational setting. Research has been conducted to study emerging technologies and practices that influence learning outcomes and instruction (National Media Consortium [NMC], 2013; Ross, 2013). Researchers who wrote the NMC 2013 Horizon Report concluded learning with mobile devices was a rapidly emerging key trend. Specifically, many schools have been implementing Bring Your Own Device (BYOD) or Bring Your Own Technology (BYOT) practices in which students bring their own mobile devices or mobile technology to school (e.g., Forsyth County District, 2012; Paradise Valley Unified School District, 2012; Scottsdale Unified School District, 2012; William County Schools, 2012). According to the report, reduced costs for mobile devices and increased access policies in school districts have made mobile technology more common place in school settings (NMC, 2013). Nevertheless, a particularly troublesome problem has been that teachers have not been prepared to effectively utilize mobile technology as instructional tools in the classroom.

Research studies conducted on teacher training that prepared teachers to use mobile technology in their classrooms have been quite limited (Dunleavy, Dexter, & Heinecke, 2007; Shohel & Power, 2010). Only a handful of studies (Raths, 2012; Ross, 2013; Violino, 2012) have specifically explored BYOD/T. These studies primarily

focused on the challenges of deploying a BYOD/T initiative. Lee and Levins (2012) published the book, *Bring your own technology, a guide for families and schools*, which outlined how to develop a BYOT framework and relied heavily on case studies and newspaper articles. Taken together, the literature has demonstrated a clear gap exists with respect to instructing teachers how to utilize student-owned mobile devices as instructional tools in the classroom. In the present situation, the dearth of work in the area has limited how teachers and students can navigate their ways during the deployment of a BYOD/T framework.

Situational Context

During the 2010-2011 school year, our unified school district enacted a new district strategic plan and marketed the tagline, *Engage, Educate, and Empower Every Student, Every Day.* Under the strategic area of technology, our Superintendent called for a district-wide *Bring Your Own Technology (BYOT)* initiative with goals to (a) increase student access to technology resources and digital content and (b) increase student achievement (SUSD, 2011). Initially, the implementation of BYOT developed across the school district using various forms of technology. For example, during the 2011-2012 school year, several pilot studies were conducted at one high school and one middle school to capitalize on the use of mobile communication devices, specifically cell phones (Ross, 2013). Additionally, faculty members at several elementary schools developed BYOT site policies. Despite the offering of several district-wide professional development workshops, school district faculty members expressed concerns about use,

management, and the responsibility for the student-owned mobile devices in the classroom (Project Tomorrow, 2012).

In May 2012, I was appointed Interim Principal of a PreK-8th grade school within the District. The school is situated in an affluent neighborhood and is currently serving 1,130 students. The school is among the highest-ranked academic facilities in the state of Arizona and has received an 'A' rating for the last five years (Arizona Department of Education, 2014). As the new school leader, I was expected to develop community-wide support of the district's BYOT initiative.

At our first staff meeting of the 2012-13 school year, I provided a survey to the teachers to determine the current set of beliefs and dispositions with respect to student-owned mobile devices and their use at the school. Results of the survey indicated 'low to no administrative leadership' with regard to the BYOT initiative during the year prior to my arrival. Interestingly, 69% of the teachers indicated they were comfortable or very comfortable with the notion of students using their own mobile devices in their classrooms; 24% indicated they were not comfortable; and 7.5% indicated they did not want students to bring mobile devices to their classroom at all. Conclusions drawn from the initial survey suggested a need for a BYOT implementation plan that included (a) support for teachers and (b) a strategy to address teachers' concerns regarding the use of student-owned mobile devices as instructional tools in the classroom.

Based on the results of the initial survey, a BYOT implementation plan was developed and enacted at the beginning of the 2012-13 school year. Feedback from the previous district pilot studies and BYOT professional development sessions provided a

foundation for the plan. The plan consisted of implementation stages that were differentiated for middle school grades, 6-8, and elementary grades, K-5. Components addressed in the plan included (a) the creation of a school-wide 'Responsible Use

Figure 1. BYOT Implementation Timeline

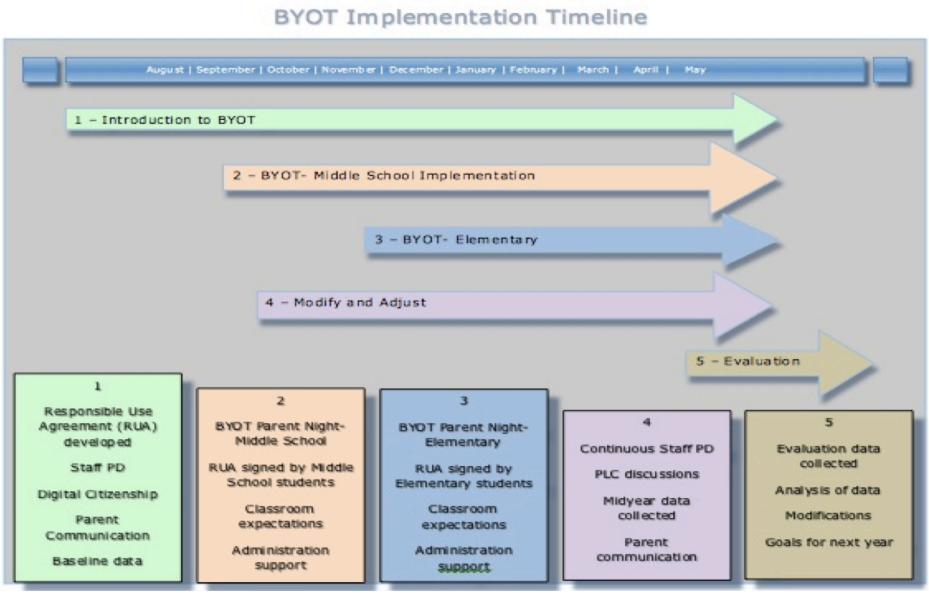


Figure 1. Schematic of the elements and timeline of the implementation of BYOT at the school.

Agreement', (b) professional development, (c) parent communication, (d) instruction in digital citizenship, (e) data collection, (f) administrative support, and (g) continuous monitoring and adjustment. Further, two community-wide goals, aligned to the school district strategic plan goals, were established: (a) implement K-8th grade BYOT instructional practices within one school year and (b) increase the percent of student access to technology. The elements of the plan and the timeline for implementation are presented in Figure 1.

In early October, just two months after the start of the 2012-13 school year, a second teacher survey was conducted to determine whether the BYOT implementation plan was on target and what support teachers needed to effectively integrate student-owned mobile devices into teaching and learning in their classrooms. Of the 68 faculty members, 55 teachers, 81% completed the survey and several key findings emerged. The results showed 10 teachers, 18.2 % of the respondents, were already utilizing student-owned mobile devices in their instruction. Another group of 29 responding teachers, 52.7%, were completing instruction in digital citizenship, collecting responsible use agreements, and were just beginning their classroom implementation of BYOT. A third group of 16 teachers, 29.1% of the respondents had not begun implementing BYOT yet. Finally, 13 teachers did not complete the survey. Teacher comments ranged from, "Full steam ahead!" to "Still looking into it for future use." By analyzing this qualitative data through the lens of Hord and Hall's (1987) Levels of Use of an innovation approach, the data clearly indicated that approximately 1/5 of the teachers were 'users', yet nearly 82% of the teachers continued to be 'non-users' of student-owned mobile devices in their classrooms.

Importantly, non-using teachers perceived several barriers to the integration of student-owned devices in their classrooms. A thematic analysis of the survey data indicated four barriers: support, time, resources, and professional development. One teacher stated, "I would love ideas for lessons and how to manage the control of devices in my room. I can use an iPad, but haven't used some of the other devices students will bring to class." I began to consider how to provide administrative support and empower

our teachers to overcome barriers that prevented the successful integration of student-owned mobile devices in their classrooms.

To further understand the perceived barriers of BYOT implementation and how I could provide administrative support, I conducted a focus group of staff members who were intensely involved in the BYOT initiative. The participants consisted of two district instructional technology coaches, our campus computer technician, an eighth-grade social studies teacher, and me. I asked the following questions during the focus group: (a) What would a model BYOT classroom look like? (b) What skills do teachers need to run a BYOT classroom? (c) What resources are available to teachers implementing BYOT? and (d) How can we empower teachers to begin BYOT? Responses of the focus group participants were recorded and transcribed.

Utilizing deductive data analysis and themes that had emerged from the previous staff survey, I anticipated the data would materialize around the same four themes: support, time, resources, and professional development. The data were readily organized into these predetermined themes. From these data, I developed a number of key assertions that are presented in Table 1 on the next page.

Table 1

Theme-Related Components, Themes, and Assertions Related to BYOT Implementation

Theme-Related Components	Themes	Assertions
1. Teachers new to using BYOT need support from other teachers who are actually doing BYOT. 2. Teachers new to using BYOT want to know what activities other teachers are accomplishing with the devices. 3. Teachers new to using BYOT would like to observe how other teachers are managing and using the mobile devices.	Support to implement BYOT	Teachers require various types of support such as knowledge, observation of others, and mentoring to implement BYOT in their classrooms.
1. Teachers new to using BYOT do not have time to develop lesson plans and search for resources. 2. Teachers do not have enough time to explore all the operating systems.	Time to develop BYOT materials and expertise	Teachers require time to develop lessons, resources, and expertise of BYOT technology.
1. Teachers new to using BYOT need resources for activities in their content area. 2. Mobile devices are being used primarily for research. What else can they be used for? 3. Teachers like having an iPad for teacher use. 4. Digital Citizenship skills must be the basis for classroom management with respect to technology use. Teachers need a curriculum for Digital Citizenship.	Resources to implement BYOT	Teachers require resources such as curriculum, devices for teaching, and online sites related to the content areas they teach to implement BYOT.

1. Teachers new to using BYOT need practice with the new wireless infrastructure and devices. 2. Teachers new to using BYOT are using basic technologies and are not familiar with the devices that the students bring to the classroom. 3. Teachers new to using BYOT need training on how to manage the class when some students do not have devices. 4. Teachers new to using BYOT must set the expectations for the use of devices from the beginning-management skills.	Professional development to support implementing BYOT	Teachers require various types of professional development such as logging on to the guest network, an introduction to various mobile devices, behavior management, and Digital Citizenship to implement BYOT in their classrooms.

Purpose of the Study

Based on the assertions in Table 1, there appeared to be multiple issues with respect to effective teacher training for integrating student-owned mobile devices. Further, it appeared that appropriate training strategies had not been established. The implementation of a BYOT framework would be a community-wide change that required administrative support, teacher-buy in, and a school environment that accepted the challenge to overcome barriers that stood in the way of the successful integration of student-owned mobile devices. The cumulative data from the surveys and focus group provided consistent information: teachers were in need of support, time, resources, and professional development to effectively infuse student-owned mobile devices with instruction in the classroom.

Research results have demonstrated the successful integration of interactive whiteboards (Knight, Pennant, & Piggott, 2005), and one-to-one laptops (Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010). Nevertheless, much less is known about strategies to overcome perceived barriers and empower teachers to initiate the utilization of student-owned mobile devices with their instruction. Given the infancy of BYOT nationwide and the fact that few districts are piloting BYOT technology integration practices, much remains to be learned about supporting teachers in their attempts to implement student-owned mobile devices within their classrooms. As the school leader, I identified the perceived barriers that were inhibiting the implementation of our BYOT plan. Taken together, the problem was: how do I address these perceived barriers and empower teachers to initiate the utilization of student-owned mobile devices as instructional tools? Given the problem of preparing teachers to use mobile devices in their classrooms to aid instruction, the purpose of this study was to determine whether a collaborative apprenticeship model would provide a framework for effective teacher training to initiate the use of student-owned mobile devices as instructional tools.

Innovation—the iE3 Project

The *iEngage, iEducate, and iEmpower Project (iE3 Project),* based on the collaborative apprenticeship model, was the innovation used in this study to address the perceived barriers to implementation of BYOT and to empower teachers to utilize student-owned mobile devices for instructional purposes in their classrooms. Key features of a collaborative apprenticeship model are mentoring and support, shared planning time, exchange of resources, opportunities for observation, and authentic

professional development within situated contexts (Glazer, Hannafin, & Song, 2005). The iE3 Project design and the collaborative apprenticeship model used in this action research project will be described in greater detail in subsequent chapters.

Summary of Introduction and Purpose of the Study

Some school districts are implementing a BYOT framework to capitalize on the power of mobile technology. Nevertheless, many educators continue to struggle with barriers that prevent effective integration of student-owned mobile devices in the classroom. Preliminary data suggested that teachers, specifically at this school, perceived support, time, resources, and professional development as barriers to the utilization of student-owned mobile devices as instructional tools in their classrooms. The innovation in this study was used to address teachers' perceived barriers and to empower them to initiate the utilization of student-owned mobile devices as classroom instructional tools. The innovation was based on the collaborative apprenticeship model.

Research Questions

This study was conducted to answer the following research questions:

RQ1: How and to what extent are student-owned mobile devices utilized throughout the iE3 Project?

RQ2: How and to what extent does participation in the iE3 Project help teachers to overcome the perceived barriers of support, time, resources, and professional development, which inhibit the implementation of instruction utilizing student-owned mobile devices?

RQ3: What concerns do teachers have about student-owned mobile devices and to what extent do these concerns change throughout their participation in the iE3 Project?

Organization of the Dissertation

The following chapters in this dissertation provide a descriptive analysis of a mixed methods action research project that was designed to empower teachers to utilize student-owned mobile devices as instructional tools. In Chapter 2, a theoretical lens that frames the project, offers literature to support the study, and describes a previous cycle of action research is presented. In Chapter 3, the methodology, including the setting and participants, innovation, instruments and data sources, as well as data analysis used in the study are portrayed.

Chapter 2

Theoretical Perspective and Research Guiding the Project

Don't judge each day by the harvest you reap
but by the seeds that you plant.
~Robert L. Stevenson
~Inspiration by John Watkins, Atlanta, GA

Chapter 1 provided an overview of the context and purpose of this project. I described the situated context, provided preliminary data collected on a problem of practice, and introduced the iE3 Project as an innovation to address the problem. First, in Chapter 2, theoretical perspectives and studies relative to the problem of practice will be discussed. Second, supporting scholarship on BYOT, as well as the perceived barriers—support, time, resources, and professional development—will be reviewed. Third, a previous cycle of action research conducted on utilizing the collaborative apprenticeship model will be described. Finally, conclusions and implications of the theoretical perspectives and supporting research will be provided.

Theoretical Perspectives

Two theories provided the overarching perspectives for this action research project. According to LeCompte and Preissle (1993), "The purpose of theories is to help us sort out our world, make sense of it, guide how we behave in it, and predict what might happen next" (p. 120). The theoretical perspectives of situated cognition and situated learning theory, as well as Vygotsky's social cultural theory provided the lenses through which the innovation could be understood as it affected the problem of practice.

Situated cognition and situated learning theory. Situated cognition theory (SCT) appeared to be a useful framework that allowed for the integration of the needs of teachers—support, time, resources, and professional development—with opportunities to empower teachers to utilize student-owned mobile devices as instructional tools. Proponents of SCT contended that learning and cognition were directly linked to *activity and situation*. Based on this theory, teachers should participate in authentic, real- world learning activities that are naturally tied to the culture of the school community and lie within the context of their own classrooms. Brown, Collins, & Duguid (1989) suggested that conceptual knowledge was similar to a set of tools when they contended:

> Tools share several significant features with knowledge: They can only be fully understood through use, and using them entails both changing the user's view of the world and adopting the belief system of the culture in which they are used. (p. 3)

With respect to empowering teachers to utilize student-owned mobile devices, SCT suggested teachers built a rich and robust understanding of the instructional practices utilizing the student-owned devices within the culture of their classroom. Merely understanding the devices, their capability, and possible uses for educational purposes was not sufficient. Importantly, the teacher's choice for using such devices and his/her contextual viewpoint determined how the "tools" were used.

Additionally, situated learning theory (SLT), with its vital recognition of the importance of apprenticeship emerges as a powerful framework that undergirds the work of the project. In their thoughtful consideration of apprenticeship and its value for

learning, Lave and Wenger (1991) constructed SLT. These authors contended, "learning is an integral and inseparable aspect of social practice" (p. 31). Further, in their discussion of *legitimate peripheral participation*, Lave and Wenger expressed the importance of the apprentice observing within the "community of practice." Thus participants began learning by observing, that is peripheral participation, and as the involvement in the culture increased, the participant moved from the role of an observer toward an active, fully functioning member of the community of practice. Moreover, Lave and Wenger maintained the primary functions of legitimate peripheral participation, observation for instance, were to learn how to interact within the community including the common language and stories of the community.

Studies based on SCT and SLT. Several research studies have supported the notion that learning is directly linked to activity and situation. Hurt (2007) conducted research on the use of adult learning theories in training adults to use software. As he examined the training process of software trainers, he claimed the highest level of training was situated cognition. Further, Hurt asserted, "Situated training focuses on connecting the applications of the software to the student's job" (p. 6). In conclusion, Hurt maintained professional development designed through the lens of situated cognition was a successful model for assisting teachers to integrate technology into their instructional practices. In another study, Szymanski & Morrell (2009) explored technology integration skills of K-12 teachers using SCT. The results suggested creating cohorts of teachers who learned collaboratively provided an "in-house" system of support and developed teacher leadership.

Similarly, Herrington and Oliver (2000) proposed an instructional design framework for an authentic learning environment that featured nine elements of SLT. Herrington and Oliver proposed the following principles for their framework:

1. Provide authentic content that reflects the way knowledge will be used in real life - non-linear design, no attempt to simplify.
2. Provide authentic activities – activities that have real world relevance.
3. Provide access to expert performances and the modeling of process – access to social periphery, access to expert thinking.
4. Provide multiple roles and perspectives – the opportunity to express different points of view.
5. Support collaborative construction of knowledge – classroom organization into small groups.
6. Promote reflection – opportunity for learners to compare with experts.
7. Promote articulation – publicly present argument to enable defense of learning.
8. Provide coaching and scaffolding – complex open-ended learning environment.
9. Provide for authentic assessment – multiple indicators of learning (pp. 30-31)

In summary, results of the study suggested that pre-service teachers acquired advanced knowledge with the use of the situated learning framework.

Communities of practice. Communities of practice have been defined as groups of people who interact regularly, sharing a common passion or concern. Wenger (2006) asserted that communities of practice were characterized by three components: (a) the

domain, (b) the community, and (c) the practice. These components are described in more detail below:

(a) The domain represents an area of interest that is shared by members of a community of practice. Further, these individuals share a strong commitment to this area of common interest. Outsiders may not recognize or value the domain.

(b) The community refers to the participants or members of the community of practice who engage in discussions, assist one another, share ideas, and participate in common activities. As a result, relationships are built that promote learning within the group and as members learn from one another, they value the collective competence of the group.

(c) The practice signifies the experiences and activities in which members of a community of practice share. These experiences may include communicating about resources and solutions to problems in a shared practice.

Taken together, a community of practice is defined by the development and on-going deployment of these three components (Wenger, 2006).

Social cultural theory. SCT and SLT are based on the earlier work of Lev Vygotsky. In social cultural theory (SoCT), Vygotsky (1978) posited that social interaction plays a fundamental role in cognitive development. Vygotsky proposed three theoretical components that promoted cognitive growth: (a) social learning preceded development, (b) a more knowledgeable other (MKO) fostered growth, and (c) the zone of proximal development (ZPD) influenced development. In the theory, for example, a

MKO can support cognitive growth or advancement by sharing their understandings with a less mature learner to facilitate learning. The ZPD reflects the fact that a learner can function at a higher level when someone who has more expertise supports her.

Vygotsky theorized that psychological development was dependent on outside social forces, for example the influence of a parent or teacher, which acted in conjunction with inner resources of the child or learner. Vygotsky delineated ZPD as the distance between an individual's "actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable experts" (Vygotsky, 1978, p. 86). Vygotsky believed that providing individuals with experiences within their ZPD would advance their learning. This theory can be applied to adult learning at this school as teacher-leaders (TL) using student-owned mobile devices within their instruction begin to support peer-teachers (PT) who are less knowledgeable than they were about the use of student-owned mobile devices in the classroom.

Studies based on SoCT. Outcomes from several studies related to the current project have been consistent with Vygotsky's notion that learners benefit from constructing meaning through active participation in social and reciprocal experiences. For example, Dang (2013) examined the professional development of paired student and mentor teachers as it was related to professional identities in a collaborative setting. Dang capitalized on Vygotsky's ZPD to determine what the student teachers could perform independently as compared with their efforts when they were supported. Dang

found that both the student teacher and the mentor worked within a 'jointly created' ZPD and developed a teacher identity and a mentor identity, respectively.

Nilssen (2003) presented a case study of mentoring in teacher education. The focus of the study was how student teachers participated in reflective practices with their mentor teachers and developed pedagogical content knowledge. Mentor teachers assisted student teachers to work within the ZPD by scaffolding and imitation practices. Nilssen found learning occurred most readily after student teachers demonstrated interest in the task and they were provided opportunities to observe a mentor and imitate her behaviors. Finally, Colby and Atkinson (2004) demonstrated Vygotsky's principles of ZPD were critical in explaining how a university professor's provision of support, feedback, opportunities for learning extensions, and extensive resources to her graduate students facilitated learning of how to support struggling readers.

Thus, the research on Vygotsky's notions of MKO and ZPD have shown learning is fostered in the social environment in which a person with more experience and knowledge supports an individual to acquire skills and information at a higher level than she could by herself. Together, the principles of SLT and SoCT provided a theoretical lens to the proposed innovation at this school.

Review of Supporting Scholarship

Bring your own technology. Bring your own technology/device, (BYOT or BYOD used interchangeably), is a term used to describe the trend of allowing students to bring their own mobile device to school to use as an instructional tool. Lee and Levins (2012) defined BYOT as:

> an educational development and a supplementary school technology resourcing model, where the home and the school collaborate in arranging for students' 24/7/365 use of their own digital technology/ies to be extended into the classroom, and in doing so to assist their teaching and learning and the organization of their schooling and, where relevant, the complimentary education outside the classroom. (p. 11)

The key to this mobile technology trend is the term "student-owned." Student-owned mobile device refers to any type of mobile device that is owned by the student such as a laptop, iPad, smartphone, or a tablet. The concept of BYOT is so fresh that many school districts are working toward the establishment of procedures, acceptable use policies, and management of the student-owned devices on their campuses (Forsyth County District, 2012; Scottsdale Unified School District, 2012; William County Schools, 2012).

Studies related to BYOT. Although substantial media attention has swirled around BYOT in K-12 educational settings, very few research studies have been conducted to explore this innovative way to increase student access to technology and potentially increase student achievement. Ross (2013) studied teachers in a high-SES high school during its third year of BYOT implementation. Results showed teachers made instructional decisions about BYOT related to their level of use (Hall & Hord, 2006) and their collaboration with other teachers who were also integrating student-owned mobile devices into their instruction. Moreover, Ross (2013) also found teachers reported time, equity/access, and student behavior as barriers to effective implementation of BYOT.

In the NMC Horizon Report K-12 Edition (NMC, 2013), authors suggested learning with mobile devices was positioned for widespread adoption across K-12 schools within one year. For example, the authors claimed,

> Tablets, smartphones, and mobile apps have become too capable, too ubiquitous, and too useful to ignore, and their distribution defies traditional patterns of adoption, both by consumers, where even economically disadvantaged families find ways to make use of mobile technology, and in schools, where the tide of opinion has dramatically shifted when it comes to mobiles in schools. (p. 17)

Although systematic research has not been conducted, several other school districts such as Williamson (Tennessee) County Schools and Forsyth (Georgia) have pilot tested the implementation of student-owned mobile devices to provide student access to technology and to increase collaboration, provide immediate feedback, and foster student accountability (Stanley, 2012). "The problem is that it's impossible for a public school system to provide devices to all students in the classroom" states Giordano of the Tennessean (2011, p. 2). "BYOD makes one-to-one easier by simply leveraging the devices that students already have" according to the NMC Horizon Report K-12 (2013, p. 17).

The next section of the literature review is organized around the four barriers perceived by the teachers at this school. For each of the barriers, literature is reviewed that is consistent with posing a possible resolution to the barrier.

Perceived barrier #1: support. Teachers at this school indicated a need for support from expert teachers who were currently integrating student-owned mobile

devices with instruction, as well as support from colleagues who were currently navigating the same barriers to implementation. Support to overcome these two types of barriers can be provided through mentoring and communities of practice.

Mentoring. Mentoring in technology integration has many benefits. Mentors often provided just-in time support (Bullock, 2004; Lai, Trewen, & Pratt, 2002), provided individualized assistance (Swan, Holmes, Vargas, Jennings, Meier, & Rubenfeld, 2002), and offered different models of teaching (Ertmer, 1999; Glazer et al., 2005). Lowther, Inan, Strahl, and Ross (2008) conducted a large-scale study of the practices and attitudes of teachers implementing technology integration and found that teachers with mentors demonstrated more confidence in integrating technology into their classrooms. Research results have shown teachers who were mentored demonstrated effective problem-solving with technology (Boulay & Folford, 2009), sustained technology integration more frequently over time than those teachers without a mentor (Lowther et al., 2008, Swan & Dixon, 2006), exhibited positive attitudes toward technology (Franklin, Turner, Kariuki, & Duran, 2001; Levin & Wadmany, 2008), and were more likely to employ student-centered activities with technology (Lowther et al., 2008).

Communities of practice. Recall, communities of practice allowed practitioners to form groups to share insights and experiences (Lave & Wenger, 1991). Communities of practice have provided teachers with opportunities to meet regularly, establish goals, share ideas and solutions, and receive peer support while integrating new technologies (Glazer et al., 2005). In a study of cognition in everyday activities, Brown et al. (1989) suggested an essential component of a community of practice was a learning environment

in which 'war stories' and narratives were shared and added to the collective wisdom of all the participants. Finally, Glazer, Hannafin, Polly, and Rich (2009) reported that "deliberate efforts to socially construct and negotiate meaning, develop a collective vision, and share strategies and insights have been reported to sustain communities of practice" (p. 22).

Perceived barrier #2: time. Learning new skills and instructional practices with technology takes time. The attempt to integrate student-owned mobile devices into instruction is no exception. Teachers often perceived the training, planning, and integration of technology as burdensome (Lim & Khine, 2006; Swan & Dixon, 2006). Collinson and Cook (2004) studied the dissemination of knowledge and skills related to a new innovation and found the most important factor that restrained dissemination was not enough time to share. Results from other research studies indicated teachers needed time to learn the new technologies and time to prepare for instruction using the technologies (Bauer & Kenton, 2005; Cuban, Kirkpatrick, & Peck, 2001; Feist, 2003). Glazer et al. (2009) found shared planning time was used to collaborate, develop, and exchange learning materials positively influenced interactions among members of a community of practice.

Perceived barrier # 3: resources. Effective principals and administrators advocate for the resources teachers need to support technology integration. Chang, Chin & Hsu (2008) found a strong relation between the leadership of principals in Taiwanese elementary schools and the success attained by teachers who were integrating technology into their instruction. The authors concluded that principals must identify key players

and resources to support an effective instructional technology plan. Although resources may be provided, results from several research studies indicated many teachers do not have the skills to utilize the resources effectively during instruction (Shapley, Benner, Heikes, & Pieper, 2002; Smerdon, Cronen, Lanahan, Anderson, Iannotti, & Angeles, 2000), thus professional development must be included to supplement the resources.

Perceived barrier # 4: professional development. It has been demonstrated that professional development must address the specific needs of each individual (Ball & Cohen, 1999). Research results confirmed that equipping teachers with the skills, attitudes, and tools necessary to navigate the perceived barriers of technology integration was an important step to ensure technology integration (Kopcha, 2010; Hermans, Tondeur, Van Braak, & Valcke, 2008). For the implementation of BYOT at this school, teachers indicated the need for professional development in basic mobile technologies and pedagogy. Research results have supported the need for teachers to obtain basic technology skills (Hew & Bruch, 2007; Zhao, Pugh, Sheldon, & Byers, 2002) as well as exposure to pedagogy consistent with the design of meaningful learning experiences with technology (Bauer & Kenton, 2005; Koehler & Mishra, 2005).

Cognitive apprenticeship model. Together, the SCT, SLT and Vygotsky's MKO and ZPD suggested the professional development model for this project should be designed based on a cognitive apprenticeship framework. Cognitive apprenticeship can best be described as methods that embed learners in authentic activity and social practices leading to the development of knowledge in a situated context. In this form of apprenticeship, learners acquire general principles from a master teacher who models in

situ and engages in scaffolding practices to foster learning of relevant skills. The knowledge assimilated is within the learner's ZPD and acquired with the assistance of a master teacher, a MKO. As the learner develops skills and confidence, she moves into a more collaborative phase in which she and the master teacher participate in the learning together. Through the development of knowledge, skills, and strategies, the learner moves toward a higher level of proficiency.

Collaborative apprenticeship model. As I continued to explore ways to address the perceived barriers to the implementation to BYOT and to empower my teachers to begin using student-owned mobile devices with instruction, I was naturally led toward the collaborative apprenticeship model. The collaborative apprenticeship model is an extension of Collins, Brown, and Duguid's (1989) cognitive apprenticeship framework and is integrated with the domain, community, and practice elements of Wenger's (2006) communities of practice. Teachers participate in professional development featuring reciprocal interactions among group members who are committed to the specified domain (Glazer et al., 2005). The model consists of ongoing mentorship and scaffolding strategies through four phrases of learning. During each phase, novice learners (PT) work to varying extents with more experienced learners (TL) until knowledge and skills are mastered (Glazer & Hannafin, 2006). Key features of the collaborative apprenticeship model are mentoring and support, shared planning time, exchange of resources, opportunities for observation, and authentic professional development within situated contexts (Glazer & Hannafin, 2006, 2008; Glazer et al., 2009). These features

aligned directly with the perceived barriers to implementation of BYOT expressed by the teachers of the school.

Previous Cycle of Action Research

The design for the iE3 Project was influenced by a previous cycle of action research conducted in spring 2013 employing the collaborative apprenticeship model. During that cycle of action research, I sought to understand whether a collaborative apprenticeship model could adequately help teachers to overcome the perceived barriers they believed inhibited their efforts in integrating student-owned mobile devices into their instructional practices. This previous study attempted to answer the following research questions.

RQ1 How and to what extent do teachers utilize student-owned mobile devices as instructional tools as a result of their participation in a collaborative apprenticeship?

RQ2 How and to what extent does a collaborative apprenticeship model help teachers to overcome the perceived BYOT implementation barriers: support, time, resources, and professional development?

RQ3 How and to what extent does a teacher's stage of concern change after participating in a collaborative apprenticeship?

From the total population of teachers at this school ($N = 68$), a smaller convenience sample ($n = 4$) was selected based on a staff survey and their interest in volunteering to serve in a pilot professional development model for mobile technology integration. These four peer-teachers (PT) selected were all members of the fourth-grade

team. In addition, four additional teacher-leaders (TL) participated in the study as more knowledgeable others (MKO). All participants were female and each had participated in the initial deployment of BYOT in fall 2012.

Collaborative apprenticeship model. The collaborative apprentice model served as the innovation to address the perceived barriers to implementation of BYOT—support, time, resources, and professional development. It was anticipated this innovation would empower teachers to utilize student-owned mobile devices. According to Glazer et al. (2005), collaborative apprenticeship is a professional development model that "features reciprocal interactions between peer-teachers [PT] and teacher-leaders [TL]" (p. 59). The innovation during the previous cycle of action research consisted of four two-week phases: (a) introduction, (b) developmental, (c) proficient, and (d) mastery. Each phase provided support, resources, collaborative planning time, and professional development for the PT who were aided by the TL. Participants were introduced to the model, as seen in Figure 2 on the next page, in early February and participated in the phases of the model for eight weeks.

Figure 2. BYOT Collaborative Apprenticeship Model

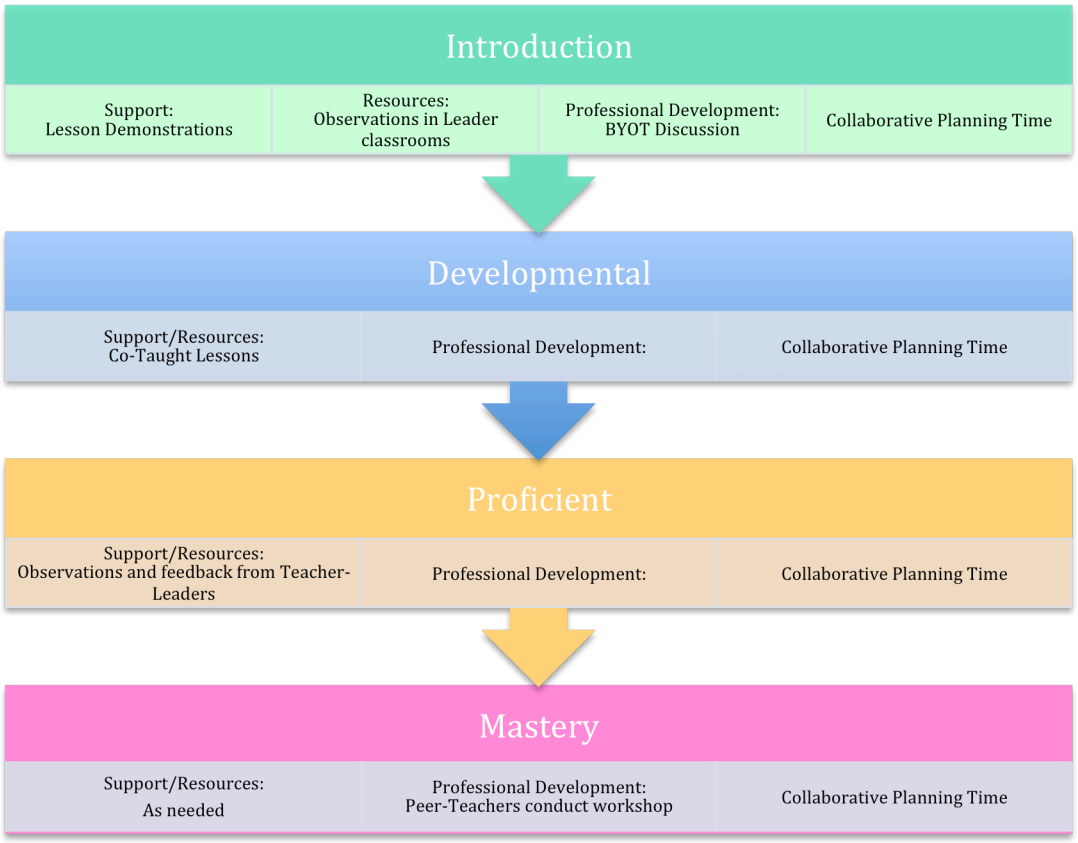


Figure 3. Collaborative Apprenticeship model utilized for eight weeks in K-8 school used to empower teachers to utilize student-owned devices as instructional tools. Adapted from "Promoting technology integration through collaborative apprenticeships," by E. Glazer, M. J. Hannafin, and L. Song, 2005, *Educational Technology Research and Development, 53*, p. 60. Copyright 2005 by the Wilson Web.

Method. A mixed method research design was employed. A combination of both quantitative and qualitative tools was utilized to evaluate the three research questions. The quantitative data were gathered using the Stages of Concern Questionnaire (SoCQ) based on the Concerns-Based Adoption Model (CBAM) formulated by Hall and Hord

(2006). The qualitative data gathered consisted of audio transcriptions of both the collaborative planning time and semi-structured interviews of the PT. A collaborative Google Doc was also used to gather qualitative data to answer the research questions. In this Google Doc, participants wrote about lessons utilizing student--owned mobile devices, the resources used, and what they learned from the experience.

Findings. The results of the quantitative and qualitative data sets were analyzed and examined for triangulation and complementarity (Greene, 2007). These analyses led to three assertions as they related to the three research questions: (a) Assertion #1: Teachers increased their utilization of student-owned mobile devices as instructional tools for assessment, research, and collaboration as a result of participation in the collaborative apprenticeship; (b) Assertion #2: A collaborative apprenticeship model addressed the perceived barriers of support, time, resources, and professional development; and (c) Assertion #3: Teachers decreased the intensity of their concerns about utilizing student-owned mobile devices as instructional tools after participating in the collaborative apprenticeship.

Implications of Previous Cycle of Action Research

This first cycle of action research suggested several implications for further research and practice. First, additional research should be conducted on how a collaborative apprenticeship model can be implemented on a larger scale to effectively overcome the barriers of support, time, resources, and professional development when implementing a BYOT framework for technology integration. Second, administrators must be strong advocates for risk-taking and learning from failure. Third, administrators

must develop an understanding of the foundation that must be established with respect to digital citizenship (ethical and appropriate use of technology) prior to unleashing students with their devices on campus. Fourth, teachers must be willing to seek and accept support from innovative colleagues through models such as a collaborative apprenticeship. The practice of providing support, collaborative planning time, shared resources, and embedded professional development should be further refined and offered to overcome teachers' perceived barriers to integrate student-owned mobile devices into their classroom instruction.

Rationale for iE3 Project

The theoretical perspectives, supporting research, and previous cycle of action research outlined provide a foundation for the conduct of the iE3 Project at this school. The SCT, SLT, and Vygotsky's SoCT offer theoretical lenses to understand the need for situated professional development for teachers in their zone of proximal development and how being mentored by more knowledgeable, innovative others can provide the necessary professional development, other supports, and implementation opportunities to effectively employ student-owned mobile devices as instructional tools in the classroom. The scholarly work clarifies the need for effective teacher support, allotted time, resources, and professional development to empower teachers to use student-owned mobile devices as instructional tools. In addition, the previous cycle of action research provided a foundation for a larger scale study employing the collaborative apprenticeship model as a vehicle to empower teachers in a BYOT school. Taken together, the rationale for iE3 Project is clearly evident.

Summary of Theoretical Perspectives and Research Guiding the Project

In Chapter 2, theoretical perspectives and studies based on the various theoretical perspectives that support the problem of practice and the implementation of the iE3 Project were discussed in detail. Second, supporting scholarship on BYOT, as well as the perceived barriers—support, time, resources, and professional development—were reviewed. Third, a previous cycle of action research utilizing the collaborative apprenticeship model was described. Finally, conclusions and implications of the theoretical perspectives and supporting research as they relate to the rationale for the iE3 Project were provided. In Chapter 3, the methodology of this action research project will be explained.

Chapter 3

Method

Celebrate the small wins.

~Adapted from John Kotter

In Chapter 3, the methodology of this action research project will be explained in detail. Before presenting the details of the methodology, a brief introduction to the study and some context is provided. Then the various parts of the method section will be presented. First, the setting, participants, and role of the researcher will be described. Second, the instruments and data collection will be depicted. Third, the iE3 Project as an innovative intervention to address the perceived barriers to the effective implementation of student-owned mobile devices as instructional tools will be portrayed. Fourth, the data collection and data analysis procedures will be illustrated. Finally, the validity, reliability, and conclusions will be outlined.

The purpose of this action research study was to explore the influence of the iE3 Project on teachers with minimal or no previous utilization of student-owned mobile devices as instructional tools in the classroom. Recall, the school implemented a BYOT initiative during the 2012-2013 school year during which 82% of the teachers indicated minimal or no use of the student-owned mobile devices during instruction. Teachers reported four perceived barriers—support, time, resources, and professional development—which prevented them from initiating the infusion of the devices into their instruction. The iE3 Project was an intervention based on the collaborative apprenticeship model designed to empower teachers to utilize their students' mobile

devices as tools for instruction and to address the barriers preventing successful integration.

The iE3 Project utilized an action research approach and employed a mixed methods research design. Both quantitative and qualitative data were collected and analyzed. This research was situated in the context of the participants' classrooms and was guided by the needs of teachers as they participated in the iE3 Project.

The iE3 Project was grounded in action research. "Action research is a systematic approach to investigation that enables people to find effective solutions to problems they confront in their everyday lives" (Stringer, 2013, p. 1). This approach allows a practitioner to focus on a problem of practice, employ a systematic process of inquiry, and develop explanations that lead to a deeper understanding (Stringer, 2013).

A mixed method research design integrates both quantitative and qualitative data collection in a research study (Creswell, 2014). Specifically for the iE3 Project, the researcher employed a convergent parallel mixed methods approach in which it was expected that the quantitative and qualitative data would converge to provide a comprehensive analysis of the problem of practice. The data were collected throughout the project and were examined for complementarity of the results (Greene, 2007).

The iE3 Project included three phases designed to influence teachers to engage, educate, and empower themselves and others to use student-owned mobile devices as instructional tools in their own classrooms. The phases of the project were entitled (a) *iEngage,* (b) *iEducate,* and (c) *iEmpower* and were directly aligned with the school district's vision and tagline, *Engage, educate and empower every student, every day*. The

protocol for the iE3 Project was similar in structure to the procedures used in the 2013 pilot study, although some adaptations were made to the phases of the collaborative apprenticeship model that was used. The iE3 Project protocol was designed to simultaneously empower teachers to utilize student-owned mobile devices as instructional tools while addressing participants' perceived barriers to effective integration of BYOT. Data was gathered to answer three research questions:

RQ1: How and to what extent are student-owned mobile devices utilized throughout the iE3 Project?

RQ2: How and to what extent does participation in the iE3 Project help teachers to overcome the perceived barriers of support, time, resources, and professional development, which inhibit the implementation of instruction utilizing student-owned mobile devices?

RQ3: What concerns do teachers have about student-owned mobile devices and to what extent do these concerns change throughout participation in the iE3 Project?

Setting and Participants

Setting. The setting for this study was a suburban public school where I serve as principal. The PreK-8 campus enrolls largely Caucasian students making up 87.6% of the total student population. The school is located in the northeast area of Scottsdale, Arizona with a socio-economic range of upper-middle- to upper-class families with less than 3% of the students qualifying for the federally funded lunch program. The school enrolls 1,130 students from pre-kindergarten to eighth grade. The English as a second language learner and special education population are 0.7% and 9.3%, respectively,

whereas the gifted population is 9.8%. This school has received Excelling and "A" labels from the Arizona Department of Education from 2001 to 2014 for the demonstration of high academic achievement and student growth.

The school has four computer labs consisting of 34 Dell student desktop computers and one teacher desktop computer per lab. Each classroom is equipped with school-provided technology including a SmartBoard and projector, document camera, audio enhancement equipment, two Dell student desktop computers and one Dell teacher desktop computer or one teacher laptop. Each classroom has wireless Internet with access to both a district network for employees and a guest network for students.

Participants. Participants in the iE3 Project included 11 PT and 11 TL. Purposive sampling was used to select participants who were identified as non-users, PT; or experienced users, TL. The basic index that was used to discriminate non-users and users was whether participants indicated little or no (non-user) or some to daily (user) utilization of student-owned mobile devices as instructional tools in his/her classroom. This identification was made through a participant interest survey provided through an online link located on an iE3 Project email. See Appendix A for the iE3 Project Participant Interest email. Participants were chosen based upon interest, willingness to participate, and initial level of use indicated on the participant interest survey. Participants were initially recruited with a flyer that was provided to staff members at the school. See Appendix B for iE3 Project Participant Interest Flyer. The roles and expectations for each group of participants are described in the following two sections.

Peer-Teachers (PT). Eleven PT were chosen from the total population of the school instructional faculty members to participate in this study. The PT were selected to work collaboratively with 11 TL participating in the project. The 11 PT were the focus of the project, that is to say, comprehensive data were collected for the PT including quantitative pre- and post-intervention data on the SoCQ, pre- and post-intervention data on an Innovation Configuration Map (ICM), Perceived Use Level (PUL) retrospective survey, as well as qualitative data on the digital ethnography (DE), collaborative weekly reflection (CWR), and post-intervention semi-structured interviews. The grade levels of the PT were determined by August 2014. The grade levels taught by the PT include Kindergarten, 2nd, 3rd, 4th, and 5th grades. PT ranged from 26 to 58 years old and, on average, have 23 years experience with a range of 8 to 31 years of teaching. Table 2 provides demographic details about each PT participating in the iE3 Project.

Table 2

Demographics of PT

Participant	Age Range	Years Teaching Experience	Grade Level
PT1	26-30	8	Kindergarten
PT2	56-60	26	Kindergarten
PT3	46-50	28	2nd
PT4	51-55	31	2nd
PT5	31-35	11	2nd
PT6	51-55	25	3rd
PT7	51-55	28	4th
PT8	56-60	20	5th
PT9	46-50	23	5th
PT10	56-60	30	5th
PT11	51-55	26	Kindergarten

PT participants received an incentive of one iPad Mini or iPad and VGA cord, up to 16 hours of professional development, and iE3 Project badges of achievement for their participation in this project. See Appendix C for a sample of badges of achievement. As participants in the iE3 Project, the PT were expected to follow the project protocol and timelines and work collaboratively with the TL participants for the duration of the project.

Teacher-Leaders (TL). Similarly, 11 TL were chosen from the total population of the school's instructional faculty members to participate in the project. The TL were selected to work with 11 PT participating in the project. The 11 TL were purposively selected by their identification as an experienced user based on the same Likert scale that was used by the PT. The content areas taught by the TL included PreK, 3rd-grade, 4th-grade, 6th-grade social studies, 6th-grade mathematics, 7th-grade science, 7th-grade social studies, 7th/8th-grade mathematics, and 8th-grade science.

TL participants received an incentive of one iPad Mini or iPad and VGA cord up to 16 hours of professional development, and iE3 Project badges of achievement for their participation in this study. As participants in the iE3 Project, the TL were expected to follow the project protocol and timelines and work collaboratively with the PT participants for the duration of the project. Although the TL were not the focus of the study, data such as quantitative pre- and post-intervention SoCQ, and qualitative data from the DE and CWR were collected from the TL.

Role of the researcher/practitioner. As principal of the school, the researcher acted as both researcher and practitioner. Initially, I invited appropriately qualified

teachers to participate in the action research project. Additionally, I provided an overview of the iE3 Project and the collaborative apprenticeship model on August 1, 2014. The primary role as a researcher was to collect and analyze quantitative and qualitative data. This included administering the SoCQ and ICM, taking photos of use of student-owned mobile devices during walk-through classroom visits for the DE, administering the PUL, and conducting semi-structured interviews. The primary role as a practitioner was to offer instructional support and resources throughout the iE3 project.

Innovation

The iE3 Project was an innovation designed to (a) address the perceived barriers to BYOT—support, time, resources, and professional development—and (b) empower teachers to utilize student-owned mobile devices. The iE3 Project was based on a collaborative apprenticeship, a professional development model that "features reciprocal interactions between peer-teachers [PT] and teacher-leaders [TL]" (Glazer et al., 2005, p. 59). The innovation included three, 4-week phases. The phases were: (a) iEngage, (b) iEducate, and (c) iEmpower. Each phase consisted of support, collaborative planning time, shared resources, and authentic, extended professional development. Participants were introduced to the project model through a shared, yet secure, access to the iE3 Project site during an initial collaborative planning meeting on August 1, 2014. The iE3 Project site will be described in the procedures section. Refer to Appendix D for a screen shot of the site. The PT and TL participated in the phases of the model from August 10, 2014 through November 7, 2014. The iE3 Project model, which is presented in Figure 3, is explained in the following sections.

Figure 3. iE3 Project Model

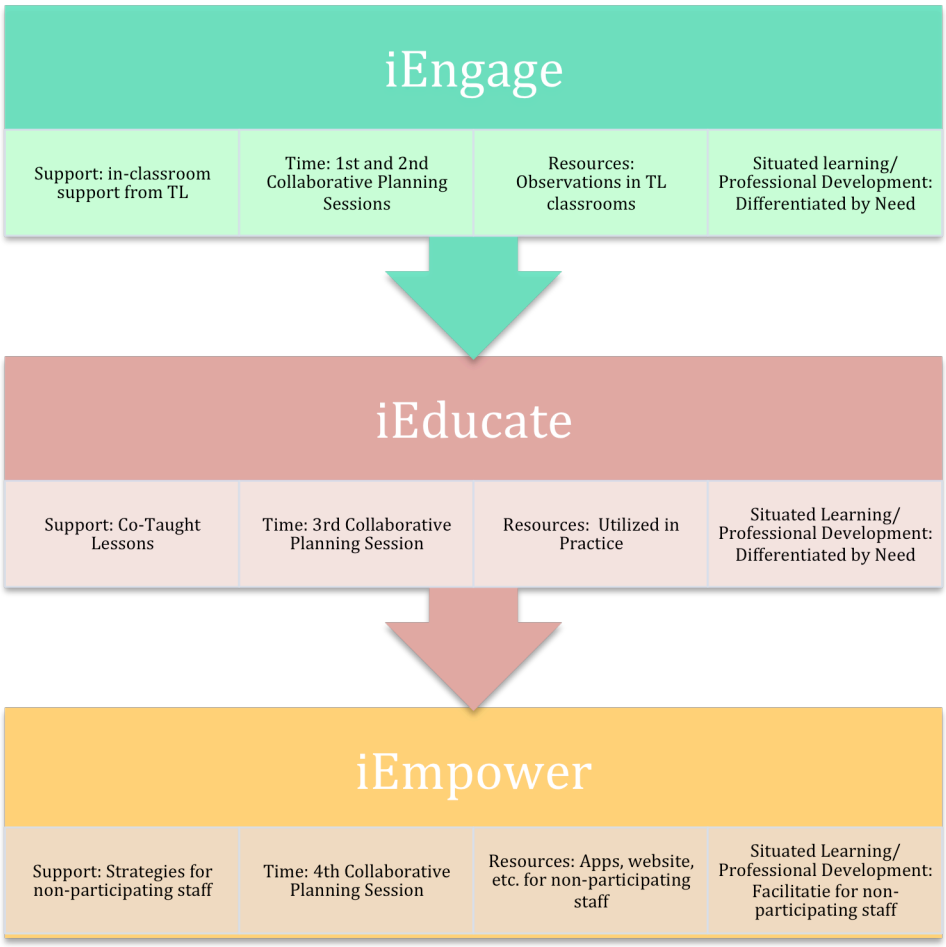


Figure 4. iE3 Project model modified from the collaborative apprenticeship model utilized in the 2013 pilot study. Adapted from Glazer, E., Hannafin, M. J., & Song, L. (2005). Promoting technology integration through collaborative apprenticeships. *Educational Technology Research and Development, 53*(4), 57-67. Copyright 2005 by the Wilson Web.

iEngage phase. During the iEngage phase, PT and TL collaborated to address perceived barriers of support, time, resources, and professional development. The tasks of the participants during this phase were differentiated based on the needs of each

participant. However, at a minimum (a) PT were to be supported by TL in the introduction of student-owned mobile devices as instructional tools in PT's classroom, (b) PT were to observe a TL's instructional practices for utilizing student-owned mobile devices as instructional tools, (c) PT were to participate in two collaborative planning sessions with other PT and TL, and (d) PT were to be introduced to the utilization of student-owned mobile devices as instructional tools through authentic professional development within the situated context of his/her classroom or extended professional development on the campus. PT and TL who completed all tasks of the iEngage phase received an iEngage badge of achievement to be displayed in his/her classroom door window.

iEducate phase. During the iEducate phase, PT and TL continued to collaborate to address perceived barriers of support, time, resources, and professional development. The tasks of the participants during this phase were to be differentiated further based on the needs of each participating PT. However, at a minimum (a) PT were to co-teach a lesson with another PT, TL, or other professional utilizing student-owned mobile devices as instructional tools, (b) PT were to utilize resources shared with them by other PT and TL in instructional practices with student-owned mobile devices, (c) PT were to have participated in at least three (total) collaborative planning meetings with other PT and TL, and **(**d) PT were to obtain skills and strategies to effectively educate students through the participation in authentic professional development within the situated context of his/her classroom or extended professional development on the campus. PT and TL who

completed all tasks of the iEducate phase received an iEducate badge of achievement to be displayed in his/her classroom door window.

iEmpower phase. During the iEmpower phase, PT and TL continued to collaborate on addressing perceived barriers of support, time, resources, and professional development, as well as promoting and modeling of skills and strategies for other faculty members, other PT, or TL at the school. The tasks of the participants during this phase were differentiated based on the growth and empowerment of each participant. However, at a minimum (a) PT were to provide support to other PT or non-participating faculty members, (b) PT were to provide resources to other PT or non-participating faculty members, (c) PT were to have participated in four collaborative (total) planning meetings with other PT and TL, and (d) PT were to promote and model instructional strategies and/or resources to effectively integrate student-owned mobile devices during classroom instruction by facilitating authentic professional development within the situated context of others' classrooms or extended professional development on the campus for either non-participating faculty members, other PT or TL at the school. PT and TL who completed all tasks of the iEmpower phase received an iEmpower badge of achievement to be displayed in his/her classroom door window.

Instruments and Data Sources

As noted earlier a mixed methods design was utilized to gather data to answer the research questions. Quantitative measures consisted of the SoCQ, ICM and PUL. The qualitative measures consisted of CWR, DE, and audio transcriptions of semi-structured interviews of the 11 PT. Data from the quantitative and qualitative measures were

examined for their complementarity and to achieve a deeper understanding of the results (Greene, 2007). Quantitative and qualitative measures for the TL included the SoCQ, CWR, and DE for reference; however, analyses of the TL data were not conducted.

Quantitative measures. The quantitative measures included a pre- and post-intervention SoCQ, a pre- and post-intervention ICM, as well as a PUL measure. The first quantitative measure administered was the SoCQ (Hall & Hord, 1987). This questionnaire was used to examine the extent to which PTs' stages of concern changed after participating in the iE3 Project. The second quantitative measure administered was the ICM (George, et al., 2006). This map was used to examine how and to what extent the PTs' participation in the iE3 Project model helped to overcome the perceived barriers of the implementation of student-owned mobile devices—support, time, resources, and professional development. The third quantitative measure was the PUL measure. This survey was administered to examine the PTs' perception of his/her use of student-owned mobile devices level before participating in the iE3 Project and after participating in the iE3 Project. The survey was administered retrospectively after the completion of the intervention. The three quantitative measures are described in the following sections.

Stages of Concern Questionnaire (SoCQ). The Concerns-Based Adoption Model (CBAM) designed by Hall and Hord (1987), is a framework that explores changes in teachers' perceptions about adoption of an innovation that is implemented in the school setting. When employing CBAM, researchers typically employ three instruments: (a) the SoCQ, (b) the Levels of Use Survey, and (c) the ICM (George et al., 2006).

The SoCQ was used to gather data to assist in answering RQ2: How and to what extent did teachers' stages of concern change after participating in the iE3 Project? The questionnaire assesses the concerns of teachers about the implementation of an innovation, in this case the employment of student-owned mobile devices during classroom instruction. For the purpose of this action research study, the definition of a concern is any feeling or thought that is heightened when thinking about the utilization of student-owned mobile devices as instructional tools. According to George et al. (2006), the SoCQ:

> is a primary tool for determining where an individual is in the stages [of adoption of an innovation]. The emergence and resolution of concerns about innovations appear to be developmental, in that earlier concerns must be first resolved (lowered in intensity) before later concerns can emerge (increase in intensity). (p. 8)

The SoCQ consists of a cover letter, introductory page, and 35 items for each participant to evaluate online. The constructs measured are seven stages of concern: (0) Unconcerned, (1) Informational, (2) Personal, (3) Management, (4) Consequence, (5) Collaboration, and (6) Refocusing. To illustrate these measures, sample items of two stages are provided. The first is an item that illustrates measurement of Stage 2, Personal concerns, "I would like to know how my role will change when I am using student-owned mobile devices as instructional tools." A second sample item illustrates measurement of the Stage 4, Consequences concerns: "I am concerned about how using student-owned mobile devices as instructional tools affects students." Table 3 provides

descriptions of each stage of concern as it relates to the utilization of student-owned mobile devices as instructional tools.

Table 3

The Seven Stages of Concern About Using Student-Owned Mobile Devices as Instructional Tools

Stage of Concern	Description
0 Unconcerned	The individual has little concern or involvement with student-owned mobile devices as instructional tools
1 Informational	The individual has a general awareness of student-owned mobile devices as instructional tools and is interested in learning more details about it.
2 Personal	The individual is uncertain about his or her role with student-owned mobile devices, the demands of integrating student-owned mobile devices, and his or her own adequacy to meet these demands.
3 Management	The individual focuses on the tasks and processes of utilizing student-owned mobile devices as instructional tools. He or she is concerned with issues of scheduling, managing, organizing, and efficiency.
4 Consequences	The individual is focused on how the utilization of student-owned mobile devices as instructional tools will affect students. Of particular concern are relevance, evaluation, competencies, and student outcomes.
5 Collaboration	The individual is focused on collaborating with others about the utilization of student-owned mobile devices as instructional tools.
6 Refocusing	The individual focuses on universal benefits from the utilization of student-owned mobile devices as instructional tools. He/she has ideas about major changes or replacements.

Note. Adapted from "Measuring implementation in schools. The Stages of Concern Questionnaire" by A. George, G. Hall, and S. Stiegelbauer, 2006, p. 8. Copyright 2006 by SEDL. See Appendix E for SEDL permissions.

In addition to items measuring participants' stages of concern, several items have been added to the questionnaire to provide demographic data. These questions provide data on gender, grade level, age, and teaching experience. See Appendix F for the complete SoCQ and demographic items.

Innovation Configuration Map (ICM). An ICM was used as a tool to measure the application of the collaborative apprenticeship model of professional development. According to Hall and Hord (2003), an ICM:

> creates a mental image of an innovation and helps users understand what it means when [the innovation is] put in[to] action. Thus the IC Map is a tool that shares information and enables individuals to take steps necessary in implementing new policies, programs or processes. (p. 7)

The ICM consisted of components of the innovation (ie. support, time, resources, and professional development) listed vertically and the variations of implementing the innovation (ie. iEngage phase, iEducate phase, and iEmpower phase) listed horizontally. Specifically, the ICM provided a roadmap for the participation in each phase of the collaborative apprenticeship and was utilized as a means to determine the extent to which each PT received support, spent collaborative time, shared resources, and participated in authentic or extended professional development as a participant in the iE3 Project (Hord, Steigelbauer, Hall, & George, 2006).

An ICM is comprised of specified components and aspects of each component. In this study, the ICM focused on four components: (a) support, (b) time, (c) resources, and (d) professional development. Each component refers to variations of "what" ideal participants in the iE3 Project should look like when they put into action the required approaches at each phase. To illustrate these measures, examples of the variations in the "support" component are provided in the following paragraph.

During the iE3 project, the PT received support from TL, which allowed the PT to move through three stages. Thus, during the initial iEngage phase, "PT is supported by a TL in the introduction of student-owned mobile devices as instructional tools in the PT's classroom." A variation of this component in the second, iEducate phase is "PT co-teaches a lesson with a TL utilizing student-owned mobile devices as instructional tools." Finally, a variation of this component in the third, iEmpower phase, is "PT provides instructional strategies to support other non-participating staff members or TL." Thus, the PT moves from being supported to co-teaching to providing support to other faculty members. The data collected from the ICM was combined with the CWR and semi-structured interviews to aid in providing answers to RQ2. See Appendix G for the complete ICM.

Perceived user level retrospective survey (PUL). The PUL was specifically designed to identify how each PT perceived the extent of use of student-owned mobile devices in her classroom. Specifically, the PUL was utilized as a research tool and a means to determine the PT's perceived use *before* participation in the iE3 Project and *after* participation in the iE3 Project.

The PUL for this action research study was comprised of five perceived user levels defined by frequency of utilization of the student-owned mobile devices, each aligned to a number 1-5 on a Likert scale. The five perceived user levels were: (a) Non-User, (b) Rare User, (c) Occasional User, (d) Frequent User, and (e) Daily User. On the next page, Table 4 provides descriptions of each perceived user level as it relates to the

frequency of utilization of student-owned mobile devices as instructional tools in the classroom.

Table 4

Perceived User Levels

Perceived User Level	Description
1 Non-User	A Non-User **does not utilize** student-owned mobile devices as instructional tools in his/her classroom.
2 Rare User	A Rare User utilizes student-owned mobile devices as instructional tools in his/her classroom **scarcely** (i.e. special event such as Show n' Tell, class reward, class buddies, exploration).
3 Occasional User	An Occasional User utilizes student-owned mobile devices as instructional tools in his/her classroom **a couple times throughout the week** (i.e. centers, enrichment projects, independent reading, assessment, exploration).
4 Frequent User	A Frequent User utilizes student-owned mobile devices as instructional tools in his/her classroom **many times throughout the week** (i.e. research, assessment, project-based learning, presentations, supplement to text, demonstration of learning).
5 Daily User	A Daily User utilizes student-owned mobile devices as instructional tools in her classroom **every day** in a variety of ways.

At the completion of the iE3 Project, PT were asked to provide a retrospective self report of their perception of use by selecting from 1-5 on the scale for before the project; as well as after the project. The data collected from the PUL was combined with the CWR, DE and semi-structured interviews to aid in providing answers to RQ1. See Appendix H for the complete PUL.

Qualitative measures. Qualitative measures were used to explore (a) how PT utilized student-owned mobile devices, (b) how perceived barriers were addressed, and (c) PTs' concerns and how their concerns changed throughout the iE3 Project.

Qualitative data sources for this action research project included CWR, DE, and post-intervention semi-structured interviews. These data were used in conjunction with the quantitative data to provide a rich understanding of the influence of the iE3 Project on teachers and their use of student-owned mobile devices as instructional tools.

Collaborative weekly reflections (CWR). Both PT and TL provided written online weekly reflections throughout the iE3 Project.. The CWR consisted of a page on the iE3 Project site that provided a platform for multiple users to view, edit, and share information. The CWR was set up by the researcher to allow PT and TL to collaboratively reflect on experiences around four constructs: (a) support, (b) time, (c) resources, and (d) professional development. To illustrate these measures, one sample reflection is provided. PT10 scribed,

> What has developed over the last few weeks of Trimester One is an ease in having students use their devices to enrich a topic. For instance, in describing the "heraldry" of Columbus' family crest, it was natural for students to use their devices to find/define/examine their own family's crest. In years past when I have taught this lesson, I was supplying the material. It was lovely to have them find the information and examples on their own. (CWR, Nov. 2, 2014)

Moreover, participants were able to share small wins and war stories (Brown et al., 1989) about their use of student-owned mobile devices in their classrooms. The data collected from the CWR was used to assist in developing answers to all three research questions. See Appendix I for an example page in the CWR.

Digital ethnography (DE). DE provides qualitative data by making use of digital images (DI) to construct a digital representation of events over a period of time. For this study, the researcher conducted quick 3-minute, weekly walk-through observations in random PT and TL classrooms to gather digital data by taking a DI of student-owned mobile devices being employed in the classroom. Further, for each DI, PT and/or TL, as well as the researcher, provided written descriptions of what was happening in the DI. To assist in answering RQ1, about how the mobile devices were utilized, PT were asked in an email to provide written responses to three questions. These questions included: (a) What is happening in this photo? (b) How are the students using the mobile device? and (c) What skills are the students learning during this lesson? Participant responses, as well as researcher responses, to the questions were posted with the DI in chronological order on the DE page of the iE3 Project site. A sample page from the DE can be found in Appendix J.

Semi-structured interviews. After the completion of the iE3 Project, all 11 PT participated in a 30-minute semi-structured interview with the researcher. The interview questions were designed around four constructs: (a) support, (b) time, (c) resources, and (d) professional development. To illustrate these items, sample questions for two items are provided. The first is a question that provided a description of support, "Would you please describe to me the support you received throughout the iE3 Project?" A second question provided a description of the participants' involvement in professional development, "Would you please describe the situated learning and/or professional development you experienced throughout the iE3 Project?" Audio transcriptions of

interviews were used to aid in answering all three research questions. The semi-structured interview protocol can be found in Appendix K. Table 5, on the next page, provides an inventory of the complete set of data collection operations and time frame in which data were collected.

Table 5

Data Collection Measures and Timeline

Measure	Data Collection Timeline
Pre-intervention Stages of Concern Questionnaire	August 1, 2014
Pre-Intervention Innovation Configuration Map	August 1, 2014
Collaborative Weekly Reflections	Weekly (Aug. through Nov. 2014)
Digital Ethnography	Weekly (Aug. through Nov. 2014)
Post-intervention Stages of Concern Questionnaire	November 7, 2014
Post-intervention Innovation Configuration Map	November 7, 2014
Perceived User Level Retrospective Survey	November 17-24, 2014
Semi-Structured Interviews	November 17-24, 2014

Procedure and Timeline

In this section, the procedures of the iE3 Project will be described in terms of preparation, phases of the intervention, and data collection. First, the procedure for the preparation for the iE3 Project will be described. Second, the procedure for the pre-intervention data measures, SoCQ and ICM, will be explained. Third, the procedures for each phase—iEngage, iEducate, and iEmpower—will be described in conjunction with

the data measures collected throughout these phases. Finally, the procedures for the post-intervention measures, PUL and semi-structured interviews, will be explicated.

Preparation procedures. The preparation for the iE3 Project began in May 2014. The researcher applied for Institutional Review Board approval, school district approval, prepared the participant consent form, and developed the iE3 Project site. See Appendixes L, M, N for the Institutional Review Board approval, school district approval, and participant consent form, respectively. In July 2014, the researcher selected the participants for the iE3 Project. Eleven teachers were selected as PT for this project. Eleven TL participated in the iE3 Project, although more limited data was collected on their participation. All selected PT and TL were personally invited to participate in the project through an email. This invitation also included information about the initial collaborative planning meeting to discuss the roles, data collection, collaborative planning time, and phases of the iE3 Project. All of the participants were asked to sign a consent form at the initial collaborative planning meeting.

iE3 Project site. The initial collaborative planning meeting was held on August 1, 2014. At this session, participants received access to the iE3 Project site. The iE3 Project site was a website hosted on Google Sites. The site was only accessible to the 22 participants and the researcher for the duration of the project. The researcher created viewable pages with such information as (a) participant information (i.e. the names, grade levels, room numbers and emails of each PT and TL), (b) contextual background of the project, (c) participant consent, (d) participation incentives, (e) an overview of the collaborative apprenticeship model, (f) data collection links, and (g) agendas for the

collaborative planning meetings. Additional pages provided collaborative interactions among the participants and included (a) ideas for support, (b) notable resources, and (c) opportunities for professional development. Finally, the site provided direct access to the CWR and DE for frequent reflection postings and viewable digital images of the learning activities taking place throughout the project. Each participant received access to a personalized action plan as an optional resource to stay on track throughout out the project. The site included a time counter to remind participants when each phase would end and when a new phase would begin.

Pre-intervention SoCQ procedure. The researcher initially secured a license for the SoCQ online questionnaire and database. All participants were provided with access to the questionnaire through a link on the iE3 Project site. The actual SoCQ was housed on the SEDL website at https://www.sedl.org/concerns/index.cgi?sc=ie3project (SEDL, 2013). All PT and TL were asked to complete the pre-intervention SoCQ online during the initial collaborative planning meeting. Respondents marked a score of 0-7 on a Likert scale according to how they presently felt about how true each item was of them with respect to the adoption of the innovation of using student-owned mobile devices as instructional tools. A response of 0 would indicate the statement was completely irrelevant, whereas a response of 7 would indicate the statement was absolutely true of them (George et al., 2006). The questionnaire took approximately 10 minutes to complete.

Pre-intervention ICM procedure. The ICM was administered as a pre-intervention measure. Each PT was provided with a link to their individual ICM on the

iE3 Project site. PT were asked to complete the ICM during the initial collaborative planning meeting on August 1, 2014. The researcher provided an overview of the ICM describing each of the components and variations of each component as those components and variations related to expected outcomes of the iE3 Project. Each PT indicated which variation of each component best described her current status in the iE3 Project by typing the number next to the selected variation. Each PT had secure access to her own ICM to use as a roadmap of participation in the collaborative apprenticeship throughout the iE3 project.

iEngage phase procedure. Both PT and TL met for a second collaborative planning meeting on August 15, 2014 from 7:30 a.m. to 8:20 a.m. Participants shared fears, excitement, and individual needs to begin engaging with student-owned mobile devices in their classrooms. PT and TL discussed dates and time to provide support, additional collaborative planning as needed, resources, and professional development opportunities. Specifically for the iEngage phase, PT scheduled an observation of a TL utilizing student-owned mobile devices as instructional tools. Throughout the iEngage phase, August 10, 2014 through September 6, 2014, PT engaged in individual and group reciprocal interactions with other PT, TL, and student mentors as they were introduced to effective practices of instruction utilizing student-owned mobile devices.

iEducate phase procedure. Both PT and TL met for a third collaborative planning meeting on September 5, 2014 from 7:30 a.m. to 8:20 a.m.. Participants shared small wins, war stories, and individual needs to begin educating with student-owned mobile devices. PT and TL discussed dates and times to provide additional individual

and group support, additional collaborative planning as needed, resources, and professional development opportunities. Specifically for the iEducate phase, PT scheduled a co-taught lesson with either a TL or the technology trainer utilizing student-owned mobile devices as instructional tools in the PT's own classroom. In addition, badges of achievement were presented to participants. Throughout the iEducate phase, September 7, 2014 through October 3, 2014, PT acquired skills and strategies to effectively educate students utilizing student-owned mobile devices as instructional tools.

iEmpower phase procedure. Both PT and TL met for a fourth collaborative planning meeting on October 3, 2014 from 7:30 a.m. to 8:20 a.m. Participants again shared small wins, war stories, and individual needs to begin to empower others through the utilization of student-owned mobile devices. PT and TL discussed dates and times to provide additional individual and group support, additional collaborative planning as needed, resources, and professional development opportunities. Specifically for the iEmpower phase, PT scheduled time to empower other PT, TL, or other non-participating staff by sharing newly acquired strategies, resources, and skills. In addition, badges of achievement were presented to participants. Throughout the iEmpower phase, October 5, 2014 through November 8, 2014, PT continued to engage, educate, and empower others by promoting and modeling instructional strategies and resources to effectively integrate student-owned mobile devices with classroom instruction.

CWR procedure. Participants were introduced to the CWR page on the iE3 Project site at the initial collaborative planning meeting on August 1, 2014. All PT and TL were initially asked to post a reflection on the page once each week. Subsequently,

they received weekly email reminders from the researcher to post reflections on the site page. Postings included self-reflections guided by four constructs: support, time, resources, and professional development. The collaborative weekly reflections were posted from August 1, 2014 through November 9, 2014.

DE procedure. The researcher conducted random 3-minute walk-through observations on a weekly basis to develop a DE of the iE3 Project. Thus, during each week, approximately 7-10 walk-through observations took place. The objective of the walk-through observations was to capture the use of student-owned mobile devices through DI. The researcher took a DI using the camera feature on her iPhone and uploaded the photo to the DE page on the iE3 Project site with the name of the PT or TL, content area, website/app, and skill/strategy captured during the moment. Next, the researcher solicited written descriptions from the participant to answer the following questions about the DI: (a) What is happening in this photo? (b) How are the students using the mobile devices? and (c) What skills are the students learning during the lesson? In addition, the researcher provided data to answer the same three questions. Together, each photo, participant response, and researcher response was available on the iE3 Project site for all participants to view as a resource.

Post-intervention SoCQ procedure. The post-intervention SoCQ was administered during the final collaborative planning meeting on November 7, 2014 at the conclusion of 12 weeks of the iE3 Project. The link to the SoCQ was posted on the iE3 Project site. PT were expected to complete the questionnaire online during the meeting.

The questionnaire was in the same format as the pre-intervention SoCQ and took approximately 10 minutes to complete.

Post-intervention ICM procedure. The post-intervention ICM was administered during the final collaborative planning meeting on November 7, 2014. Each PT clicked on her individual ICM link available on the iE3 Project site. Each PT indicated which variation of each component best described her current status in the iE3 project by typing in numbers 0-3 on the right hand column of the tool. PT were expected to complete the ICM during the meeting.

PUL retrospective survey procedure. The PUL was administered just prior to the semi-structured interview during the week of November 17-22, 2014. PT were provided with a one-sheet PUL and asked to read each of the descriptions of the perceived user levels. Then, PT were asked to mark and 'X" on the perceived user level that most accurately described her utilization of student-owned mobile devices "after participating in the iE3 Project" as well as "before participating in the iE3 Project." PT were expected to complete the PUL prior to the semi-structured interview.

Semi-structured interview procedure. PT signed up on the iE3 Project site for a 30-minute interview with the researcher. Interview questions were also posted on the site for preview. PT met one-on-one with the researcher and they were provided with the complete set of interview questions. PT were informed that the questions would provide a framework for the discussion; however, the researcher indicated she may ask additional questions during the interview. The interviews were audio recorded on the researcher's iPad with the Soundnote app. The audio recordings were transcribed into a Microsoft

Word document for further interpretive analyses. Table 6 outlines the iE3 Project timeline and protocol.

Table 6

iE3 Project Timeline and Protocol

Procedure	Sequence	Action
Preparation	May 2014	• Researcher prepared consent form, iE3 Project site, and IRB approval materials.
	July 2014	• Researcher sent an email to the entire faculty to invite teachers to participate in the study. Researcher selected 11 PT (non-users) and 11 TL (users).
Pre-intervention data collection	August 1, 2014	• Researcher facilitated initial collaborative planning meeting with PT and TL. • Consent forms were signed. • Pre-SoCQ and Pre-ICM were completed. • Initial reflections were completed. • PT and TL collaborated on dates for participation in the iEngage phase
iEngage phase	August 10-September 6, 2014	• PT were supported by TL in the introduction of student-owned mobile devices as instructional tools. • PT and TL participated in a second collaborative planning meeting. • PT engaged in the observation of TLs' instructional practices utilizing student-owned mobile devices as instructional tools. • PT were introduced to using student-owned mobile devices as instructional tools through authentic or extended professional development opportunities. • PT and TL completed collaborative weekly reflections. • Researcher took photos and gathered qualitative data on the use of

		student-owned mobile devices for DE.
iEducate phase	September 7-October 4, 2014	• PT co-taught a lesson with another PT, TL, or trainer using student-owned mobile devices as instructional tools. • PT and TL participated in a third collaborative planning meeting. • PT utilized resources learned from other PT, TL or trainer during instructional practices with student-owned mobile devices. • PT developed skills and strategies to effectively educate students through the participation in a situated learning or professional development opportunities. • PT and TL completed collaborative weekly reflections. • Researcher took photos and gathered qualitative data on the use of student-owned mobile devices for the DE.
iEmpower phase	October 5-November 8, 2014	• PT provided instructional strategies to other PT, TL or non-participating staff members. • PT provided resources to other PT, TL, or non-participating staff members. • PT and TL participated in a fourth collaborative planning session. • PT promoted and modeled instructional strategies and/or resources to effectively integrate student-owned mobile devices with classroom instruction by facilitating authentic or extended professional development for other PT, TL, or non-participating staff members. • PT and TL completed collaborative weekly reflections. • Researcher took photos and gathered qualitative data on the use of

		student-owned mobile devices for the DE.
Post-intervention data measures	November 7-22, 2014	• Researcher collected post-intervention SoCQ and ICM data. • PT and TL completed final collaborative weekly reflections. • Researcher collected PUL data. • Researcher conducted semi-structured interviews with each PT.

Data Analysis

To answer the research questions effectively, the quantitative and qualitative data were analyzed separately and then brought together to examine the complementarity of the data (Greene, 2007). In this section of the chapter, a detailed description of the data analysis procedures is provided.

Quantitative data. Numerical data gathered from the pre- and post-intervention SOCQ, pre- and post-intervention ICM, as well as the PUL retrospective survey were analyzed using descriptive statistical procedures. Given the small number of participants, $n = 11$, and the nature of these data, frequency data were presented, i.e., pre- to post-intervention data on the SOCQ and the ICM, as well as retrospective data on the PUL were presented to examine growth.

Qualitative data. Transcripts, photos, and other descriptive data from the CWR, DE, and semi-structured interviews constituted the qualitative data. The constant comparative method was used to code these data (Strauss & Corbin, 1998). The qualitative data were initially coded for concepts and subsequent coding processes were employed to gather these initial codes into larger categories, which have been interpreted in meaningful ways with respect to the utilization of student-owned mobile devices as

instructional tools. For example, for the semi-structured interview data, the researcher took the following steps to analyze the data: (a) transcription of audio recording into a Word document, (b) read and re-read the data, (c) initial coding using key words and phrases, (d) subsequent coding by aggregating initial codes into categories, and (e) finally gathered the categories into more meaningful sets and applied interpretive processes to examine patterns in the data, which led to theme-related components, themes, and assertions about the data.

Validity, Reliability, Strengths

In any research project, the goal is to eliminate competing hypotheses that might otherwise account for the outcomes in the data, which ensures validity of the data. In most research studies two kinds of validity are sought: internal and external validity. Internal validity is concerned with the degree to which differences or changes in the dependent variables, for example, SoCQ, ICM, and PUL are due to the iE3 Project interventions and not due to something else. Thus, ensuring internal validity is important in the project. By comparison, external validity is concerned with generalizability of the results to other groups or settings. In action research, generalizability is not a primary concern.

Because the project employed a one-group, pretest-posttest design, there are several threats to internal validity (Campbell & Stanley, 1963). The threats to internal validity for this project include: history, maturation, testing, instrumentation, and possibly regression. History refers to events beyond the intervention being used in the project, which affected the results. One possible example of history would be a teacher who

obtained a smart phone during the iE3 Project and who subsequently became highly skilled in using student-owned technology for instruction because of her extraordinary use of her new smart phone rather than changing her skill because of the iE3 Project intervention. Maturation refers to changes that occur within the participants. For example, a participant may have become disenchanted with the iE3 Project process and not put her best efforts into participation in the project. Testing refers to how exposure to a pre-test assessment may influence a post-test appraisal. This may have occurred with the frequent planning and reflecting throughout the project with the ICM. Finally, regression refers to participant scores regressing to the mean from very low or very high initial scores. Regression is most likely to occur among participants who had extreme scores on the SoCQ at the beginning of the project.

The role of the researcher/practitioner also could have had adverse effects on the validity/credibility of this project. Participants may have been motivated to effectively integrate student-owned mobile devices into the classroom due to the fact that the researcher/practitioner is their supervisor. The researcher took precautionary steps to increase credibility by ensuring that each participant in the study was not receiving his/her annual teacher evaluation from the researcher, but instead receiving it from another administrator on campus. In addition, the researcher/practitioner may have been biased toward the successful outcome of this project to further her staff's implementation of BYOT. This information was fully disclosed during the initial collaborative planning meeting and in this document.

To ensure validity/credibility of the study, the researcher conducted several verification procedures. The first verification procedure was the assessment of the complementarity of the data (Greene, 2007). For each of the research questions, at least three data measures were analyzed to confirm the assertion made about the data. Another verification procedure was the incorporation of thick, rich descriptions from the data. The researcher utilized qualitative data collected from the participants to verify each assertion made. Together, the use of these verification procedures increased the validity/credibility of this study. Additionally, member checks were performed with participants to ensure the researcher's interpretations of participants' CWR and DE responses were consistent with their intentions/understandings.

By comparison, reliability is concerned with the consistent measure of some construct and whether the scores would be repeated over time. In terms of the quantitative data collection, the SoCQ has been shown to produce highly reliable data. According to George et al. (2006), the alpha coefficients of internal consistency for Stage 1 through Stage 6 have a range from .71 to .83, while Stage 0 has an alpha coefficient of .64. In contrast, there are no known studies of the reliability of data attained from an ICM (Hord et al., 2006) or the PUL designed specifically for this study.

Several strengths of this study have been identified. Strengths can be defined as features of the study that increase reliability and validity. The strengths of this study are described below:

1. A valid and reliable measure, the SoCQ, was utilized to collect quantitative data.

2. Qualitative data was collected to provide a rich, descriptive exploration of what was happening to and between the participants during the iE3 Project.
3. The researcher used a mixed methods approach and examined the complementarity of the quantitative and qualitative data. Complementarity can be defined as a cross examination of two or more measures that determine the extent to which the different types of data support the same conclusions.
4. Member checks were employed to ensure credibility in interpreting participants' responses.

Chapter 4

Data Analysis and Results

Fail forward.

~ John Maxwell

Chapter 4 consists of the analysis and results of the quantitative and qualitative data collected throughout the iE3 Project. Overall, the analysis and results are organized by the three research questions:

RQ1: How and to what extent are student-owned mobile devices utilized throughout the iE3 Project?

RQ2: How and to what extent does participation in the iE3 Project help teachers overcome the perceived barriers of support, time, resources, and professional development, which inhibit the implementation of instruction utilizing student owned mobile devices?

RQ3: What concerns do teachers have about student-owned mobile devices and to what extent do these concerns change throughout the participation in the iE3 Project?

For each research question, the related quantitative data are reported first. Results analyzed from the quantitative data consisted of descriptive statistical data from the 11 participating PT and included their Perceived User Level (PUL) Retrospective Surveys, Innovation Configuration Maps (ICM), and Stages of Concern Questionnaire (SoCQ) because these data pertain to the research questions. Qualitative data are reported second. These results consisted of rich descriptions and digital images representing the

participants' account of the iE3 Project framed by theme-related components, themes, and assertions made from analysis of the collaborative weekly reflections (CWR), digital ethnography (DE) materials, and semi-structured interviews. Table 7 provides further details about the qualitative data sources. For each research question, a summary table of theme-related components, themes and assertions is presented.

Table 7

Description of Qualitative Data Sources Collected for PT

Data Source	Word Count	Number of Photos
Collaborative Weekly Reflections	14,012	0
Digital Ethnography	12,585	55
Semi-Structured Interviews	44,837	0

Digital Ethnography Reliability

The researcher sought to ensure the DE had high reliability. To do this, the researcher, in addition to each participant, answered each of the three questions pertaining to the photos taken during random classroom visits throughout the duration of the iE3 Project. The self-reported PT results were compared with the researcher's results to each question to determine % of agreement. The number of agreements was divided by the total entries to find the percent agreement. The data analysis for question 1 (What is happening in this photo?) resulted in 100% agreement between PT and the researcher. The data analysis for question 2 (How are the students using the mobile devices?) showed a 98.2% agreement between PT and the researcher. The data analysis for question 3 (What skills are the students learning during the lesson?) indicated 90.9% agreement

between the PT and the researcher. Based on these high levels of agreement, only the PT responses from the digital ethnography are presented throughout the results section.

Data Collection Summary

Results from quantitative and qualitative data are reported for each research question. The quantitative data source, PUL retrospective survey, was administered to address RQ1: How and to what extent are student-owned mobile devices utilized throughout the iE3 Project? Qualitative data from the CWR, DE, and semi-structured interviews were analyzed to develop assertions through triangulation of these four data sources (Creswell, 2009; Greene, 2007). The quantitative data source, ICM, was administered to address RQ2: How and to what extent does participation in the iE3 Project help teachers address the perceived barriers of support, time, resources, and professional development, which inhibit the implementation of instruction utilizing student-owned mobile devices? Qualitative data from the CWR and semi-structured interviews were analyzed to develop assertions through triangulation of these three data sources. The quantitative data source, SoCQ, was administered to address RQ3: What concerns do teacher have about student-owned mobile devices and to what extent do these concerns change throughout the participation in the iE3 Project? Qualitative data from the CWR and semi-structured interviews were analyzed to develop assertions through triangulation of these three data sources.

Research question #1: How and to what extent are student-owned mobile devices utilized throughout the iE3 Project?

Quantitative and qualitative data were collected and analyzed to answer RQ1. Quantitative data sources included 11 PUL retrospective surveys. Qualitative data sources included 107 PT CWR, 55 PT DE entries, and 11 PT semi-structured interviews. The quantitative data results are presented first and the qualitative data results are presented subsequently.

Introduction to quantitative findings related to the utilization of student-owned mobile devices. The PUL was administered to the PT from November 17 through November 21, 2014. On a Likert scale of 1-5, PT reported their perceived user level before they participated in the iE3 Project and after they participated in the iE3 Project based on the definitions of a level (a) Non-User, (b) Rare User, (c) Occasional User, (d) Frequent User, and (e) Daily User.

Overall, 91% of the PT perceived personal growth in their utilization of student-owned mobile devices. Six of the PT perceived themselves at the Non-User level before participating in the iE3 Project. After participating in the project, two of these Non-Users reported an increase to the Rare User level and four self-reported an increase to the Occasional User level. Four of the PT perceived themselves at the Rare User level before participating in the project. After participating in the project, one of the Rare Users reported an increase to the Occasional User level, whereas the two others reported an increase to the Frequent User level. Interestingly, one PT indicated no change in perceived user level and remained at the Rare User level throughout the implementation

of the project. Finally, one PT reported being at the Occasional User level prior to participation and moved to the Frequent User level after participation in the iE3 Project. Table 8 provides the details of the PUL data. The findings have been organized by the perceived user levels *after participation* in the iE3 Project and provide a user group reference for the qualitative data analysis for the remainder of the results section.

Table 8

PT Perceived User Levels Before and After Participation in the iE3 Project

Perceived User Level Groups	Participant	Perceived User Level Before the iE3 Project	Perceived User Level After the iE3 Project
Rare User	PT1	1	2
	PT2	1	2
	PT5	2	2
Occasional User	PT3	1	3
	PT4	1	3
	PT8	1	3
	PT9	1	3
	PT11	2	3
Frequent User	PT6	2	4
	PT7	3	4
	PT10	2	4

Introduction to qualitative findings related to the utilization of student-owned mobile devices. To answer RQ1, the researcher continuously revised and collapsed identified codes to formulate a final group of 18 categories based on 76 related codes. Using further interpretive analysis procedures, theme-related components emerged that resulted in two themes. The two themes that emerged were: (a) student-owned mobile devices were utilized across content areas and (b) student-owned mobile devices were utilized for teaching and learning. For each set of theme-related

components and theme, the researcher formulated an assertion. Table 9 presents the theme-related components, themes, and assertions as they were related to the utilization of student-owned mobile devices throughout the iE3 Project, which was related to RQ1.

Table 9

RQ1: Theme-Related Components, Themes, and Assertions Related to Utilization of Student-Owned Mobile Devices

Theme-Related Component	Theme	Assertion
1. All PT engaged in instructional practices to support the development of content knowledge in digital citizenship to prepare students to bring and demonstrate the responsible use of student-owned mobile devices. 2. Student-owned mobile devices were utilized for instruction across core content areas: English language arts, social studies, science, and mathematics.	Student-owned mobile devices were utilized across content areas.	Student-owned mobile devices were utilized to support the development of digital citizenship skills, as well as content knowledge across core content areas in English language arts, social studies, science, and mathematics.

1. Student-owned mobile devices were utilized to develop academic skills through various instructional strategies. 2. Student-owned mobile devices were utilized to develop basic 21st century skills. 3. Student-owned mobile devices were utilized to develop collaboration skills. 4. Student-owned mobile devices were utilized to gather formative data.	Student-owned mobile devices were utilized for teaching and learning.	Student-owned mobile devices were utilized to support the development of student academic skills, 21st century skills, and collaboration skills; and to gather formative assessment information to inform instruction.

Student-owned mobile devices were utilized across content areas. *Student-owned mobile devices were utilized to support the development of digital citizenship skills, as well as content knowledge across core content in English language arts, social studies, science, and mathematics.* PT responses from the CWR, DE, and semi-structured interviews merged to support two theme-related components: (a) All PT engaged in instructional practices to support the development of content knowledge in digital citizenship to prepare students to bring and demonstrate the responsible use of student-owned mobile devices and (b) Student-owned mobile devices were utilized for instruction across core content areas in English language arts, social studies, science, and mathematics.

All of the PT engaged in instructional practices to support the development of content knowledge in digital citizenship to prepare students to bring and demonstrate the responsible use of student-owned mobile devices. The instruction of foundational skills in digital citizenship was mandated by the administration at this BYOT school. PT provided qualitative data about the (a) instructional strategies employed to teach digital citizenship, (b) digital citizenship skills developed, and (c) resources to support the responsible use of student-owned mobile devices in the classroom.

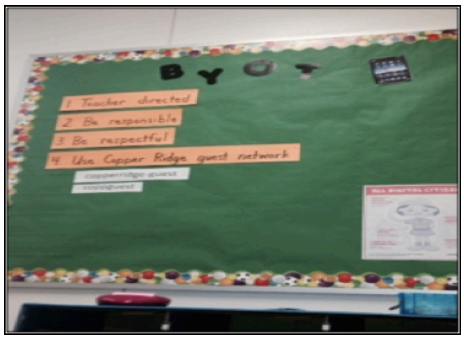
PT employed various instructional strategies to develop digital citizenship skills in preparation to bring student-owned mobile devices to school for instructional purposes. Some PT and TL worked collaboratively to develop digital citizenship centers. PT1 described how her students were instructed about digital citizenship when she wrote, "my students worked collaboratively with TL2's third-grade students during center time" (CWR, Sept. 21, 2014). Several of the PT and TL rotated classrooms for lessons. PT6 indicated early on in the iE3 Project about her plans to teach digital citizenship when she scribed, "I collaborated with TL2 and TL3 to set up our digital citizenship lessons." She shared how her grade level team divided up the standards and used "the www.commonsense.org site for lessons" to "rotate third grade classes through the curriculum" (PT6, CWR, Aug. 8, 2014). Other PT reported providing direct instruction about digital citizenship within their classrooms.

Qualitative data indicated that PT utilized the student-owned mobile devices to develop digital citizenship skills. Skills reported included online safety, combating cyberbullying, online privacy, online communication, and responsible use of technology. For example, PT5 shared how her students learned how to decipher a safe website from an inappropriate website. She stated "red means it's a place they shouldn't go…yellow means it's one where you probably want to check it out with a parent…green means it's for kids, completely for kids" (Interview, Nov. 24, 2014). Both PT1 and PT2 reported their students participated in instruction about online safety by "listening to an Ebook" and learned about "responsible use of technology on www.Brainpopjr.com", (PT1, CWR, Sept. 21, 2014).

DI 1. Digital Citizenship Centers

Most PT offered resources to support the responsible use of student-owned mobile devices in the classroom. For example, the researcher observed bulletin boards throughout the classrooms exhibiting classroom expectations about responsible use of student-owned mobile devices. "This bulletin board [DI 2] is a resource for BYOT. It lists the 4 rules for BYOT for our classroom: teacher directed; be responsible; be respectful; use the guest network" (PT4, DE, Aug. 29, 2014). In addition, PT reported

DI 2. Responsible Use Bulletin Board



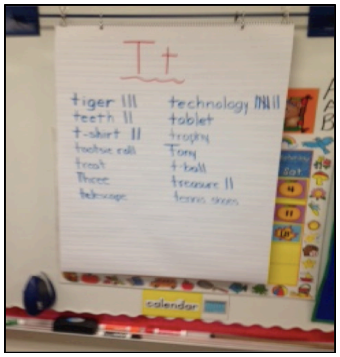
collecting student and parent signatures on the school's responsible use agreement as a prerequisite to bringing personal devices to school. Through the responsible use agreement, students committed to being responsible for the storage, charging, ethical, and legal use of their own device if brought to campus. PT instructed students that student-owned mobile devices were to be used at the teacher's discretion and for educational purposes only. "As soon as the bell rings, they're ready to put the devices in the container until I give them further instructions" stated PT7, describing her BYOT classroom storage system depicted in DI 3 (DE, Aug. 8, 2014).

DI 3. BYOT Storage System

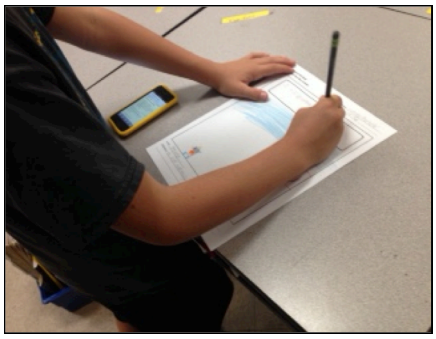
Student-owned mobile devices were utilized for instruction across core content areas: English language arts, social studies, science, and mathematics. Although data indicated the devices were used for instruction across content areas, variance among user level groups was evident. Rare Users reported utilizing the student-owned and school-owned devices primarily for instruction in English language arts. Occasional and Frequent Users reported utilizing the student-owned devices across core content areas; however Occasional Users utilized them heavily in social studies, whereas Frequent Users utilized them heavily in science. The following sections discuss the utilization across the four core content areas: English language arts, social studies, science, and mathematics.

Utilization in English language arts. Results indicated student-owned mobile devices were utilized for basic reading skills, as well as intermediate language arts skills. First, some PT reported utilizing the mobile devices for instruction in basic reading skills such as letter formation, phonics, and reading stories. Websites most frequently visited for basic reading skills included www.starfall.com, www.pbskids.org and www.dogonews.com. For example, "my students used our iPod Touches during center time to practice letter formation…during our reading block, students worked in groups to read stories on RazKids and Bob Books" (PT1, CWR, Nov. 2, 2014). Depicted in DI 4, PT2 described how seven students brought in "technology" during a phonics lesson on the letter "T" (DE, Oct. 24, 2014). PT5 described her amazement, "I don't know what it is about reading something on an iPad or an iReader that pushes them to the next level or to be more determined to figure it out, but they really are" (Interview, Nov. 24, 2014).

DI 4. Phonics Discussion



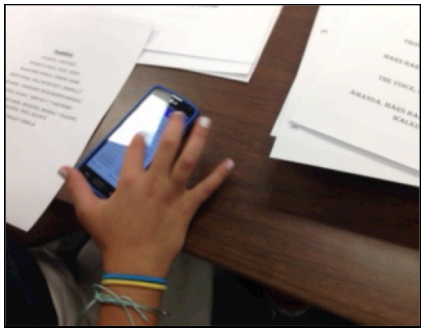
DI 5. Vocabulary Development



Second, some PT reported utilizing the student-owned devices for instruction in intermediate language arts skills such as grammar, spelling, writing and publishing. Websites most frequently visited for intermediate grammar skills included

www.dictionary.com, www.spellingcity.com, www.edmodo.com, as well as with Google Docs. PT4 described how she used www.todaysmeet.com to practice sentence structures, "I posted a sentence with spelling, capitalization, and punctuation errors. Students had to edit then post the corrected sentence" (DE, Sept. 24, 2014). PT7 described what was happening in a vocabulary lesson depicted in DI 5, "The student is working on the week's vocabulary word. He is using his device to search dictionary.com. By using his device he searches for the definition and part of speech of the word" (DE, Sept. 19, 2014). Depicted in DI 6, PT10 also described how a student published her writing on Google Docs, "She's using her device to help her present her work in a unique way. She works independently and often exceeds requirements to take ownership of her work" (DE, Sept. 24, 2014).

DI 6. Publishing on Google Docs



Utilization of student-owned mobile devices in social studies. The qualitative results indicated many PT employed student-owned mobile devices for instruction in social studies primarily for site navigation, research, and supplements to textbooks. The most frequent websites and apps reported were www.lizardpoint.com, www.worldbookonline.com, www.webquest.org and the World Map app. Depicted in DI

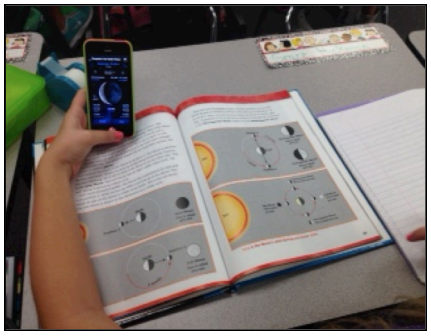
DI 7. American Explorer Timelines

7, PT9 described how student-owned mobile devices were applied to develop timelines, "library books and online resources are being used to research their chosen early American explorer" (DE, Oct. 3, 2014). PT7 described a social studies lesson digitally represented in DI 8, "The students are researching information on a globe or social studies site on latitude and longitude lines" (DE, Sept. 5, 2014). PT6 shared online resources for social studies with other teachers by describing, "My students used KidInfo.com to read about Black, Hispanic, female, and male inventors. Then we used Kidzworld.com and Time for Kids to read about kid inventors" (CWR, Oct. 14, 2014).

DI 8. Social Studies Research

Utilization of student-owned mobile devices in science. PT reported employing student-owned mobile devices for instruction in science primarily for research, supplements to textbooks and hands-on science kits, and the demonstration of learning. The most frequent websites and apps reported were www.discoveryeducation.com and www.brainpopjr.com, Stop Motion Studio and Moon. PT3 described how student mentors visited her classroom to "use Brainpop to support our science unit of study, Solids and Liquids" (CWR, Sept. 14, 2014). Depicted in DI 9, PT9 described how her students operated their devices to supplement the textbook, "the kids are reading in their Foss science book about the

DI 9. Supplement to Textbook



various phases and checking their Moon app to see which phase the moon was in" (DE, Sept.19, 2014). Several PT reported the production of videos to demonstrate their scientific knowledge. "This week, my students also learned how to add music and voice-over to their Stop Motion Studio movies. Thanks to TL6's sixth grade students for helping us out! Next week, I am going to integrate these movies into our science study of the human body using skeletons" (PT6, CWR, Sept. 12, 2014).

Utilization of student-owned mobile devices in mathematics. The qualitative results indicated many PT capitalized on student-owned mobile devices for instruction in mathematics primarily for vocabulary, concept practice, and as an assessment tool. The most frequent websites reported were http://connected.mcgraw-hill.com, www.mathfactspro.com, www.socrative.com, and www.kahoot.it. For example, PT9 shared how she provided choices to students, "sometimes they have to look up unknown words that we haven't discussed in math yet, so they used their glossary in their book or their devices" (Interview, Nov. 19, 2014). The school's My Math website was also frequently visited on the students' mobile devices. "They've gotten jazzed about the math website, which they still don't use at home, but they'll use it in class on their devices, isn't that funny?" (PT8, Interview, Nov. 19, 2014). In addition, PT3 shared how they employed the devices for concept practice, "They also use them for 10-minute fluency practice for math facts" (CWR, Oct. 27, 2014). PT7 described a mathematics lesson depicted in DI 10, "Students

DI 10. Mathematics Assessment

are responding to math questions on Socrative.com that I designed. They were allowed to use their workbook as a reference if they could not answer the questions" (DE, Sept. 24, 2014). Taken together, student-owned mobile devices were utilized as instructional tools across all core content areas.

Student-owned mobile devices were utilized for teaching and learning. S*tudent-owned mobiles devices were utilized to support the development of their students' academic skills, 21st century skills, and collaboration skills; and to gather formative assessment information to inform instruction.* PT responses from the CWR, DE, and semi-structured interviews merged to support four theme-related components: (a) Student-owned mobile devices were utilized to develop academic skills through various instructional strategies, (b) Student-owned mobile devices were utilized to develop basic 21st century skills, (c) Student-owned mobile devices were utilized to develop collaboration skills, and (d) Student-owned mobile devices were utilized to gather formative assessment data. Examples of each theme-related component will be discussed next.

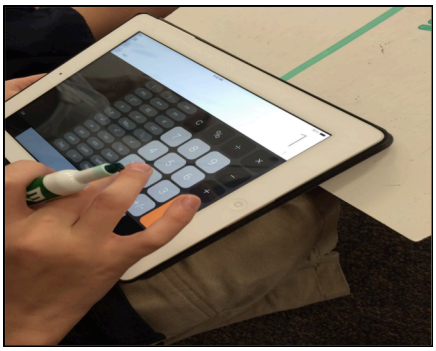
Student-owned mobile devices were utilized to develop academic skills through various instructional strategies. The results of this theme-related component are easily organized into three types of instructional strategies employed by PT throughout the iE3 Project. The three types of instructional strategies include (a) whole group instruction, (b) guided practice, and (c) independent practice. Whole group instruction included scheduled activities such as Show 'n' Tell, Research Fridays, or direct instruction to the whole class. Guided practice included small groups with adult or student mentor support,

collaborative groups, or buddy class activities. Independent practice included differentiated enrichment projects and individualized use of the students' own mobile devices for instructional purposes.

PT engaged students in whole group instruction such as Show'n'Tell, Research Fridays which took place once a week. Results indicated students participated in academic discussions about phonics and vocabulary during Show 'n' Tell, whereby students shared information about their mobile devices. Students also operated student-owned mobile devices as a supplement to their instructional resources by gathering information and answering research questions on Research Fridays. "We'll keep a list of questions and then when they actually do bring their devices on Friday, when we have time in the day; we'll research to find out" (PT5, Interview, Nov. 24, 2014).

Many PT also engaged students in whole group activities using direct instruction. PT reported using the devices for comparing texts to digital media, employing the calculator feature during mathematics instruction, and using websites such as www.todaysmeet.com and www.spellingcity.com to provide grammar lessons. Depicted in DI 11, "Students are using their mobile devices to check their long division math work" (PT8, DE, Sept. 8, 2014). Results also indicated academic skills in vocabulary and spelling were fostered through the use of student-owned devices during whole group instruction. For example, PT6 reported utilizing www.dictionary.com when she scribed, "My class also used devices to

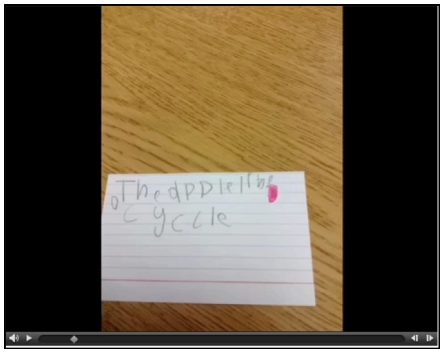
DI 11. Mathematics Calculation



look up vocabulary definitions for our new novel" (CWR, Oct. 24, 2014), whereas PT10 penned, "we used a matching game on www.eduplace.com to restate vocabulary from a selection in our anthology" (CWR, Oct. 17, 2014).

PT engaged students in guided practice activities such as taking pictures, creating movies, collaborating on enrichment projects, and making presentations. Academic skills most frequently developed from opportunities of guided practice included sequencing, story-telling, editing, following directions, and listening and speaking. Depicted in DI 12, PT1 shared how her students took "pictures of their life cycle cards. They then uploaded the images to the app, *30 Hands*, and learned how to record themselves. I was amazed how easy it was for my students to create a movie on the app" (CWR, Sept. 29, 2014).

DI 12. Taking/Uploading Pictures



Results also indicated how PT also provided opportunities for guided practice through collaborative groups and buddy classes. As depicted in DI 13, PT6 described creating movies integrated with academic content, "Students had choices to use science or reading curriculum or family/interests content. They used creativity, photography skills, content knowledge, and sequencing to film pictures to make a movie. Students also had to find music on their devices to upload to the movie" (PT6, DE, Sept. 11, 2014). PT6 also remarked how her

DI 13. Making Movies

students applied their new skills with their buddy class. "TL1 and I did a spontaneous buddy activity today where my students and Pre-K buddies created a Stop Motion Studio about counting or reading. The Pre-Ks [students] learned to take pictures and practiced writing numbers, words, and letters" (CWR, Sept. 26, 2014). Another example of guided practice with buddies was recounted by PT7 when she wrote, "My students used their Google Docs account to create the presentation with their second-grade partner. I enjoyed seeing the fourth graders teaching their second-grade partners as they navigated, created, and edited their projects." (PT7, CWR, Nov. 7, 2014).

Finally, a noteworthy culminating activity took place in which students guided and trained other students with new apps. PT10 shared an example when she wrote,

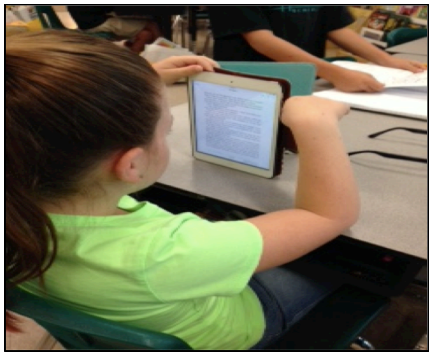
> Five of my students had a small-group share with third graders in PT6's class. Mine taught hers where to look for "I Spy"-type pictures to help write detailed and descriptive statements, and hers showed mine how they use "Stop Motion" to produce a product. The small group interchange was focused and productive, and now gives those ten students a chance to teach others. (CWR, Nov. 2, 2014)

Taken together, student-owned mobile devices were employed for guided practice to develop academic skills.

PT engaged students in differentiated independent practice such as taking notes, organizing assignments, independent research, online publishing and journaling, and independent reading, and lesson extensions. PT8 shared how students used their devices independently when she maintained, "They've gotten jazzed about taking pictures of their

homework and stuff like that on the board rather than writing it" (Interview, Nov. 19, 2014). Students also worked independently operating their devices as they researched a variety of topics such as Native Americans and early explorers. PT9 shared information about the independent projects students presented when she recorded, "They presented the boards to their parents today during our Native American Fair. Many of the groups also used their devices to show pictures or videos of Native American homes, tools, food, etc. to go along with their presentation boards" (CWR, Sept. 3, 2014). PT10 wrote about how her students independently developed editing, writing and publishing, and online journaling when she shared, "to review the steps we're taking to get our gardens growing, students took pictures on their devices to record the progress" (CWR, Oct. 17, 2014). Independent reading was another academic skill reported by the Frequent Users. PT7 described what was happening in DI 14 when she recorded, "My student is reading independently on her device the book, *The Giver*" (DE, Nov. 7, 2014). In sum, student-owned mobile devices were an excellent instructional resource for independent learning.

DI 14. Independent Reading



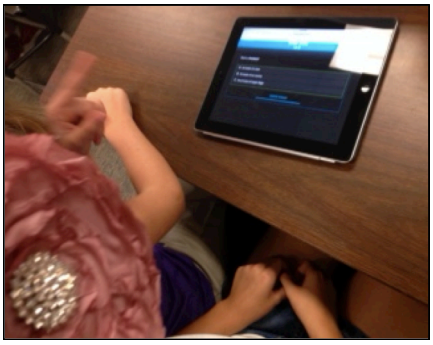
Several distinctions between user level groups were evident regarding instructional strategies PT employed with regard to student-owned mobile devices. First, it is important to note that two of three Rare Users primarily utilized the teacher's iPad and a set of school-owned iPod Touches during instructional practice with mobile devices. In addition, these two Rare Users employed mobile devices owned by student

mentors and/or buddy class students. Second, although Frequent Users indicated they conducted some whole group activities using the devices, generally, Frequent Users engaged students in more guided and independent activities. Despite the distinctions among the user level groups, all three groups, Rare, Occasional, and Frequent Users employed student-owned mobile devices to develop academic skills through various instructional strategies.

Student-owned mobile devices were utilized to develop basic 21st century skills. Qualitative data showed student-owned mobile devices were employed as instructional tools to teach students basic 21st century skills. The data suggested three types of 21st Century skills were taught: (a) basic operational skills, (b) navigational skills, and (c) production skills. Basic operational skills included turning on the devices, getting to know the devices, logging into the network, and keyboarding skills. Navigational skills included exploration of sites, key word searches, and identifying key information within a site. Production skills included digital photography, downloading and uploading, voice recording, and creating videos.

In general, PT reported teaching basic operational skills such as terminology related to mobile devices, keyboarding, and logging into the school's guest network. Some PT reported spending time discussing the terminology related to mobile devices such as the name of the devices, home button, apps, websites, and what type of devices each student may have. "During Show and Share, students discussed what mobile devices they have at home" (PT1, CWR, Aug. 30, 2014). In addition, several PT discussed keyboarding skills throughout the qualitative data including "practice with a paper

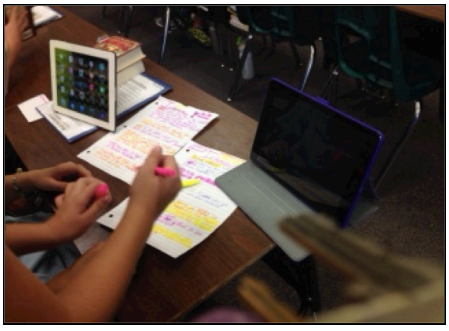
DI 15. Logging Into Website



'keyboard' (PT2, CWT, Sept. 26, 2014) and transferring paper and pencil writing to technology "so they could get those typing skills in" (PT8, Interview, Nov.18, 2014). Most of the PT reported spending instructional time on how to log in to the school's guest network with both an ID and a password. PT3 described the basic operational skills the student was demonstrating in DI 15 when she authored, "The student had to log on to the guest network and type in the correct address and room number to access the specific Socrative quiz" (DE, Sept. 26, 2014).

PT reported teaching navigational skills such as exploring and using websites and apps, keyword searches and identifying key information, and site navigational skills. PT2 communicated how eighth-grade student mentors taught her class about using apps.

DI 16. Site Navigation



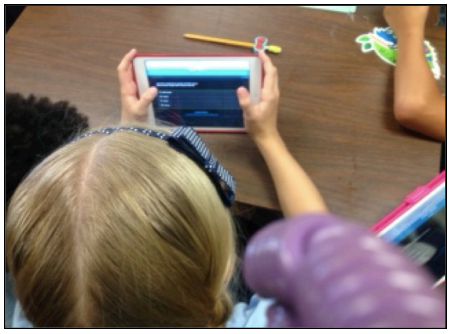
"They delivered a Power Point Presentation to the kindergarteners on apps for their devices" (CWR, Sept. 14, 2014). Describing her students' ability to conduct key word searches, PT5 declared, "there are a few who don't understand about how to do a search in the browser and so that was a huge thing to be able to teach them" (Interview, Nov. 21, 2014). As depicted in DI 16, PT8 explained how students lacked site navigational skills when she mimicked a student's struggle, "gosh, what do I put in the Google search so that I can find exactly

what I need?" (Interview, Nov. 18, 2014). PT8 also reported students found vague information or information that did not apply to their topic, including sites that were not student-friendly.

Moreover, qualitative data showed student-owned devices were used to support the development of production skills. Most PT reported teaching students how to take photos, whereas some PT demonstrated how to utilize the camera feature as a resource to support academic learning. For example, PT8 indicated her students took photos for homework, spelling, and screenshots of the textbook. PT10 also reported using photography to produce a documentary of the growth in the school garden. "We're trying to take pictures so we have a scrapbook story. We can tell our story throughout the stages" (Interview, Nov. 21, 2014). Additionally, PT6 had her students share their photography skills with the younger PreK students.

The results indicated several other production skills were developed throughout the iE3 Project. Most PT taught students how to record their voices. For example, PT2 authored, "My students brought in a favorite stuffed animal. Using sentence starters, they gave their animals a voice as they told a brief story. The children loved it!" (CWR, Sept. 29, 2014). In addition, some PT indicated practicing downloading apps. "My students downloaded a free moon app in order to support our science unit 'Sun, Moon, and Planets'" (PT9, CWR, Sept. 11, 2014). PT6 described what was happening in DI 17 when she penned,

DI 17. Downloading an App



"Students learned to type in the Socrative website or download the app" (DE, Sept. 9, 2014). Finally, several PT taught their students how to add music to digital presentations.

Student-owned mobile devices were utilized to develop collaboration skills. Results from qualitative data indicated collaboration skills developed as students engaged in learning activities with the student-owned mobile devices. The data suggested three types of collaboration skills emerged: (a) helping/teaching others, (b) problem solving, and (c) collaboration/teamwork. All of the PT engaged in instructional activities that supported the development of these collaboration skills.

Throughout the iE3 Project, students were observed helping and/or teaching other students in their own and other classrooms as they used student-owned mobile devices for learning. For example, PT4 wrote, "…I began to see the leaders in the classroom who are able to navigate their devices pretty easily and those that are able to help others (CWR, Sept. 24, 2014). Student mentors were reported teaching younger students as noted by PT9 when she affirmed, "I look at my students I had last year and they're teaching my students….Now all of a sudden they're teaching!" (PT9, Interview, Nov. 17, 2014). PT8 also described the value of helping others when she suggested, "All my students were successful with logging on, creating new accounts, and navigating the site with the help of the 8th grade students" (CWR, Aug. 25, 2014). In addition, many PT reported students were teaching the teachers about resources and the capability of their students' devices. The value of these student mentors was noted when one teacher said, "I couldn't do it without them, I was definitely a learner and they were the teachers"

(PT6, Interview, Nov. 17, 2014). A couple of PT began to capitalize on the skills of their students and set up opportunities for students to train other students on various technology resources. PT6's response indicated this benefit when she shared what was happening in DI 18, "PT10's five students met with my five students to exchange learning" (DE, Oct. 30, 2014). Finally, students helped TL7 and TL11 to teach a group of PT during an extended professional development opportunity.

DI 18. Students Train Students

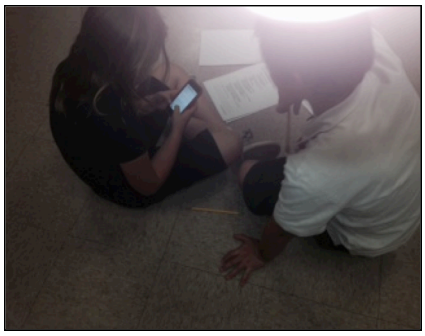
Qualitative results indicated students also engaged in problem solving while using their mobile devices. When discussing solving issues with technology, PT5 shared, "We learned how to troubleshoot some things, you know, if it wasn't working, they learned, okay, let's start over from the beginning…" (Interview, Nov. 21, 2014). PT3, even expressed her connection to the African proverb, "Smooth seas do not make skillful sailors," as she developed collaboration skills alongside her students. She reflected on her work when she testified,

> I truly have embraced this proverb as I have found thus far with this iE[3] project that my most powerful lessons have come from lessons in which experiences did not go as planned. I am finding that often these unexpected moments allow for my students and myself to monitor and adjust and finish the journey stronger than when we began. It often feels and sounds like more 'chaos' but as a result, this captain is observing firsthand problem solving, patience and collaborative

learning. I wonder what storm lies ahead for this captain? (CWR, Oct. 25, 2014) Finally PT6, described modeling problem solving for students. "It's good for kids to see that, too, because I kind of try to model problem solving and being calm, so...they're not constantly freaking out when something is not working. They try to problem solve it on their own" (Interview, Nov. 17, 2014).

Throughout the iE3 Project, classrooms of students could be observed collaborating and demonstrating teamwork. The qualitative results indicated all PT encouraged collaboration in pairs, with buddy classes, or with student mentors. DI 19 demonstrated how students worked in teams to gather information on their student-owned mobile devices. "The students are reinforcing their reading comprehension, developing their vocabulary skills and learning how to look for information on a specific topic through team work and peer collaboration" (PT7, DE, Aug. 29, 2014). Students were also observed to be highly engaged in collaborative projects in which older students were paired with younger students through buddy classes. PT11 describes what was happening in DI 20, "the students are learning research and informational skills, reading and literacy, as well as collaborative and social skills (DE, Aug. 20, 2014). Finally, the entire group of PT engaged student mentors from TL

DI 19. Student Collaboration

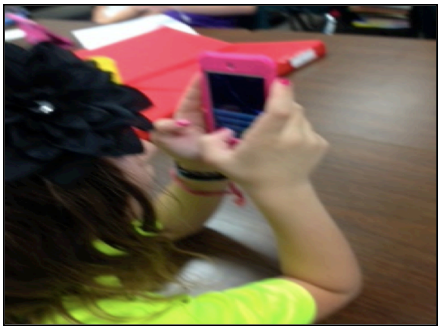


DI 20. Buddy Class Collaboration

classrooms to work collaboratively with their students to assist in the development of academic and 21st century skills. PT7 remarked, "TL7's class came in and he teamed up my students with a group of his students. They were teaching them how to use these apps and so they were getting excited" (Interview, November 19, 2014). Together, students in the classrooms of both the PT and TL participants exhibited collaboration and teamwork to enhance their learning through the use of mobile technology.

Student-owned mobile devices were utilized to gather formative assessment data. PT reported the utilization of school- and student-owned mobile devices to gather and provide feedback on formative assessment data, check for understanding, review content, and/or assess learning to guide instruction. PT1 shared that she utilized the school-owned iPod Touches to gather data about student progress in reading fluency. "I recorded the kids reading at different stages….I showed [parents] the book while it was playing so they could see how their child had progressed" (Interview, Nov. 20, 2014). PT5 reported utilizing the student-owned devices on Fridays. "I used it more to, I guess, to review concepts" (Interview, Nov. 24, 2014). DI 21 depicts PT5's class as students attempt to complete a language arts review.

DI 21. Language Arts Review

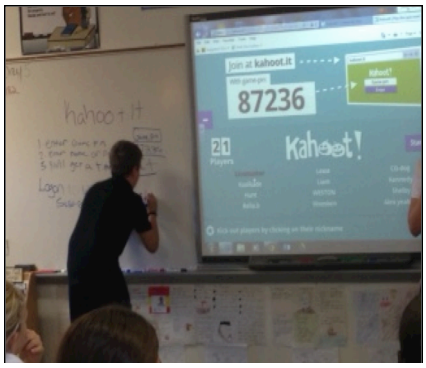


In addition, students learned how to use several new websites that offered opportunities for students to provide formative data to teachers. The first site was www.socrative.com. "I loved the fact that I could 'monitor' the questions and we could

discuss each answer that was **not** the correct answer and why" (PT3, CWR, Sept. 26, 2014). This site allowed teachers to input questions pertaining to relevant content, monitor students' performance on quizzes and responses to exit tickets, and gather immediate data regarding student performance. PT3 also described how her students used their own devices to review content by "…utilizing the device as a digital resource to review social studies questions from the current unit of study" (DE, Sept. 26, 2014).

A second website that was introduced to students for assessment was www.kahoot.com. This site allowed students to interact in a game-based assessment that promoted high student engagement. PT8 described an interactive lesson with Kahoot in DI 22, "The 5th grade students are learning how to log on to Kahoot and participate in the online assessment. The middle school student in the picture is writing the instructions on the board to teach the younger students (DE, Oct. 28, 2014). PT9 also shared what she especially liked about Kahoot when she suggested, "I can offer my class immediate feedback after each question. The class and I are able to see which answers were chosen and we could quickly discuss the right and wrong answers (reteach) before proceeding to the next question" (CWR, Sept. 29, 2014).

DI 22. Interactive Online Assessment



Finally, several PT analyzed data collected on the mobile devices. For example, PT3 reported how she utilized the data gathered to drive instruction, "I would go back and really focus in on those skills or those concepts that needed to be reviewed or

practiced" (Interview, Nov. 23, 2014). PT6 also discussed how she utilized Socrative to gather formative data to increase efficiency when she wrote, "…I did 3 quizzes this week...and I loved not having to grade the quizzes" (CWR, Sept. 26, 2014). Some PT reported using the student-owned mobile devices to check for understanding of content knowledge. "I have been successfully using it more as a morning review warm up on prior lessons in all subjects," stated PT7 about her use of BYOT (CWR, Sept. 30, 2014). PT6 described how she was gathering data depicted in DI 23 when she scribed, "This is a formative assessment of vocabulary definitions after reading Charlie and the Chocolate Factory" (DE, Sept. 9, 2014). Together, the qualitative data collected from the PT indicated a strong use of student-owned mobile devices to gather formative assessment data.

DI 23. Gathering Formative Data

Summary of data analysis and results for research question #1. Quantitative and qualitative data were collected and analyzed to answer RQ1: How and to what extent are student-owned mobile devices utilized throughout the iE3 Project? Quantitative data evaluated from the Perceived User Levels Retrospective Survey indicated 91% of PT perceived increased frequency of use of student-owned mobile devices throughout the iE3 Project. Qualitative data from the CWT, DE, and semi-structured interviews indicated student-owned mobile devices were utilized to develop digital citizenship skills and were integrated across content areas for teaching and learning. In addition, qualitative data provided a rich description of the utilization of student-owned mobile

devices to support the development of skills in basic operations, 21st century abilities, problem solving, and collaboration/teamwork. Finally, results indicated many PT utilized the mobile technology to efficiently gather formative data to drive instruction.

Results for Research Question #2: How and to what extent does participation in the iE3 Project help teachers to overcome the perceived barriers of support, time, resources, and professional development, which may inhibit the implementation of instruction utilizing student-owned mobile devices?

Quantitative and qualitative data were collected and analyzed to answer RQ2. Quantitative data sources included 11 Innovation Configuration Maps. Qualitative data sources included 107 PT collaborative weekly reflections and 11 PT semi-structured interviews. The quantitative data results will be presented first and the qualitative data results will be presented second.

Introduction of quantitative findings related to empowering teachers to overcome perceived barriers. The quantitative data for RQ2 included frequency counts on the Innovation Configuration Map (ICM). PT completed the pre-ICM on August 1, 2014 and completed the post-ICM on November 7, 2014. The ICM was used as a professional development tool to measure the extent to which PT demonstrated progress in the various phases of the collaborative apprenticeship. PT used the tool to plan, modify, and reflect on the support received, collaborative planning time, shared resources, and their individual participation in situated or extended professional development throughout the iE3 Project. Using a Likert scale from 0 to 3, PT indicated perceived level of performance with respect to the four barriers prior to participation in

the iE3 Project (pre-ICM) as compared to the perceived level of performance after completion of the iE3 Project (post-ICM). Refer to Appendix G for a sample ICM. Frequency counts were evaluated for the participation in each phase of the collaborative apprenticeship with respect to four components: support, time, resources, and professional development.

On the pre-ICM, 100% of the PT indicated no support, collaborative planning time, or shared resources pertaining to their utilization of student-owned mobile devices as instructional tools prior to participation in the collaborative apprenticeship. However, 27% of the PT reported participation in some professional development with regard to mobile devices prior to participation in this project. Frequency data on the post-ICM pertaining to each phase of the collaborative apprenticeship is described in this next section.

iEngage phase. On the post-ICM, three PT reported remaining in the iEngage phase throughout the iE3 Project for one or more components. Two PT indicated receiving support from a TL in the introduction of student-owned mobile devices as instructional tools, but did not participate in co-teaching or supporting other staff members themselves. Of these two PT, one remained in the iEngage phase across all four components; whereas a third PT reported participating in the introduction of student-owned mobile devices through authentic, situated professional development, but did not report engaging students or modeling skills learned from the professional development with other staff members. Overall, 73% of the PT indicated completing the iEngage phase on all four components and progressing to the iEducate phase.

iEducate phase. On the post-ICM, 91% of the PT reported progressing to the iEducate phase on one or more components. Nine PT reported receiving support through co-teaching a lesson with student-owned mobile devices. Four PT indicated attending a minimum of three collaborative planning times with other PT and/or TL. Shared resources received throughout the project were reported to be used during instruction by 10 PT. In addition, eight PT utilized the skills and strategies learned from authentic, situated or extended professional development to effectively educate students.

iEmpower phase. On the post-ICM, 64% of the PT reported progressing to the iEmpower phase on one or more components. Four PT reported providing instructional strategy and/or resource support to other staff members. Six PT indicated participating in four or more collaborative planning times with other PT and/or TL. Seven PT reported empowering students to use resources learned from other PT or TL to support academic achievement. Finally, two PT were empowered to promote and model instructional strategies and/or resources by facilitating authentic, situated learning or extended professional development for other staff members.

Introduction of qualitative findings related to empowering teachers to overcome perceived barriers. Specifically to answer RQ2, the researcher continuously revised and collapsed identified codes into larger categories and then into theme-related components from which five final themes emerged. The five emerging themes were: (a) PT received support, (b) PT needed time, (c) PT were introduced to instructional resources, (d) PT participated in professional development, and (e) PT developed an innovative mindset. For each set of theme-related components and theme, the researcher

was able to formulate an assertion. Table 10 presents the theme-related components, themes, and assertions, which were related to empowering teachers to overcome perceived barriers.

Table 10

RQ2. Theme-Related Components, Themes and Assertions Related to Perceived Barriers

Theme-Related Component	Theme	Assertion
1. PT had the opportunity to interact with more knowledgeable others on the campus. 2. PT received support from TL. 3. PT received support from the technology trainer. 4. PT received support from student mentors.	PT received support.	PT received support from other participants in the iE3 Project, teacher leaders, a technology trainer, and student mentors to empower them to utilize student-owned mobile devices as instructional tools in their classrooms.
1. PT needed time to explore, practice, and improve 21st century skills. 2. PT needed time for planning for learning activities utilizing student-owned mobile devices. 3. PT needed time to teach learning activities utilizing student-owned mobile devices. 4. PT developed collaborative strategies throughout the iE3 Project to address the barrier of time.	PT needed time.	PT needed time to learn how to use their time effectively to integrate student-owned mobile devices.

1. PT were introduced to instructional resources through observations, collaboration, and mentoring. 2. PT were introduced to instructional strategies for student grouping, device management, and technology integration to effectively utilize student-owned mobile devices in the classroom.	PT were introduced to instructional resources.	PT were introduced to instructional resources and strategies to utilize student-owned mobile devices as instructional tools.
1. PT experienced authentic professional development with the situated context of their own classrooms. 2. PT experienced some extended professional development on the school campus.	PT participated in professional development.	Overall, PT experienced authentic professional development within a situated context, as well as some extended professional development.
1. PT developed determination. 2. PT developed patience. 3. PT developed courage to take risks.	PT developed an innovative mindset.	PT developed characteristics that empowered a new innovative mindset to utilize student-owned mobile devices as instructional tools.

PT received support. *PT received support from other participants in the iE3 Project, teacher leaders, a technology trainer, and student mentors to empower the utilization of student-owned mobile devices as instructional tools in their classrooms.* PT responses from the collaborative weekly reflections and semi-structured interviews supported four theme-related components: (a) PT had the opportunity to interact with

more knowledgeable others on the campus (b) PT received support from TL, (c) PT received support from a technology trainer, and (d) PT received support from student mentors. Both PT and TL, alike, actively provided collaborative support for one another throughout the iE3 Project as demonstrated in the following sections.

PT had the opportunity to work with more knowledgeable others on the campus. The data from the CWR and semi-structured interviews clearly indicated that PT were introduced to and interacted with TL who were more knowledgeable and experienced in integrating student-owned mobile devices with content. For example, PT3 offered the following comment, "we were all like sponges trying to soak up technology ideas from one another" (CWR, Nov. 9, 2014). When discussing the teachers' various ability levels, PT5 explained, "I had no idea that we have so many different levels," (Interview, Nov. 21, 2014), whereas PT1 proclaimed, "I actually also got to talk to other teachers who I don't talk to normally on my daily teaching (Interview, Nov. 19, 2014). PT9 added, "I met a lot of people who I didn't know on campus that opened my eyes to technology that I did not know existed" (Interview, Nov. 17, 2014). Similarly, PT4 acknowledged, "Now, I know on campus who I can go to as I continue" (Interview, Nov. 20, 2014). PT6 commented, "I felt like I had a lot of support along the way and I had a mentor, or a lot of mentors to turn to when I needed help or had questions to ask" (Interview, Nov. 17, 2014), and PT10 reflected, "I am blessed to have so many patient and caring people around me that helped me take the baby steps I needed to improve and increase my technology sense" (CWR, Nov. 8, 2014). Taken together, PT benefitted from working with more knowledgeable TLs participating in the iE3 Project.

PT received support from TL. The most frequently reported ways that TL provided support for PT were (a) engaging in informal conversations about use of technology, (b) providing instructional strategies and resources, (c) offering observations of instruction with student-owned mobile devices, and (d) providing mentorship through co-teaching.

First, qualitative data indicated that TLs supported PTs by engaging in informal conversations about how to instruct with the student-owned mobile devices. PT1 maintained, "…two wonderful third grade teachers…invited my class to participate in digital citizenship centers" (CWR, Sept. 7, 2014), whereas PT3 posted how she "talked with TL4 at the Xerox machine to discuss how she manages her students' mobile devices in her classroom" (CWR, Aug. 29, 2014). Informal discussions with TL consisted of answering questions and problem solving. For example, PT8 described her need for support when an error was occurring with her class Edmodo accounts when she wrote, "I spoke with TL7 at our meeting on Aug. 15th and he helped me figure out what may have gone wrong" (CWR, Aug. 15, 2014).

PT also received support from TL in the form of strategies and resources to encourage attempts to employ their students' devices for instruction. For example, PT9 suggested, "even something that the preschool teacher used I went back right away and used because it was not kid specific, it was teaching specific that you could use with any student, any topic, any subject" (Interview, Nov. 17, 2014). Instructional strategies, skills and resources will be discussed in the next section.

Specifically during the iEngage phase, PT had the opportunity to observe instructional practices in the TL classrooms. Although 27%, 3 of 11 PT did not report participating in observations in the TL classrooms, they reported combining their students with TLs' students for learning activities with the student-owned mobile devices. Of the PT, 73%, 8 of 11 PT reported observing TL in their classrooms and learning both instructional strategies and tips for managing the devices. For example, PT4 scribed,

> Besides being introduced to a new resource, I was able to see the 3rd graders in action. I observed students successfully navigating the site, helping others when needed, and being totally engaged on a Friday afternoon before a 3 day weekend! I also saw how seamlessly TL2 dealt with technology that wasn't working. Additionally, I saw the class storage of devices. (CWR, Aug. 30, 2014)

Those PT who conducted observations in the classrooms of the TL also reported refocusing their own implementation practices to incorporate what they observed. For example, PT6 affirmed, "just being able to observe and get ideas and record them and then kind of figure out how it would fit into my curriculum" (Interview, Nov. 17, 2014) as she described her observation of a social studies lesson utilizing www.Webquest.com.

Finally, PT reported receiving support from TL and other PT by setting up student interactions between two classrooms. For example, PT3 reported taking a "field trip" (CWR, Sept. 14, 2014) to a TL's classroom. In general, PT reported whole class or small group exchanges of students, as well as co-teaching. PT8 explained "all my students were successful with logging on, creating new accounts, and navigating the site with the help of the eighth-grade students!" as she reflected about partnering with TL10's students

(CWR, Aug. 25, 2014). PT6 reported "My students learned Socrative from TL2's class this week… TL2 also added an 'open-ended' question, so I could see how multiple choice and short answer questions are used" (CWR, Sept. 12, 2014). Thus, taken together, these qualitative data indicated PT received support from TL.

PT received support from a technology trainer. During the iEducate phase of the iE3 Project, PT were offered opportunities to work together with a technology trainer through a school/community partnership. Each of the 11 PT accepted the invitation to work with the trainer. The technology trainer provided an opportunity to (a) brainstorm about using student-owned mobile devices and (b) co-teach a learning activity utilizing a new resource.

The technology trainer scheduled 45-minute sessions with each of the PT to brainstorm the use of student-owned mobile devices in their classroom. PT reported several common ideas about the sessions. First, the trainer provided individualized support. PT1 explained that the trainer, "…showed me different strategies I could use because I was a little lost, I didn't really know where I should take my students and she gave me a lot of good ideas to do with small groups" (Interview, Nov. 19, 2014). PT8 also indicated she had received individualized training when she averred, "It was, what do you need? What do you want? What do you want your kids to do?" (Interview, Nov. 18, 2014). Second, PT also reported learning about new resources from the trainer. "She showed me how to set up multiple-choice and open-ended quizzes in Socrative. She also showed me the reports, exit tickets, and spontaneous questions from the teacher's point of view. I then created my first multiple-choice vocabulary quiz" explained PT6 (CWR,

Sept. 19, 2014). Third, in general, PT spoke about how helpful it was to brainstorm with the trainer prior to co-teaching. PT8's response reflected this outcome when she maintained, "she was very helpful and what was nice was I got to meet with her ahead of time and do some planning, then she came in actually for the lesson which was really, I didn't feel as much in the dark about what was going to happen that way" (Interview, Nov. 18, 2014). Finally, many PT commented about the trainer's encouragement, such as "saying there's no wrong here, you'll be fine, you can do this. It just was a calming effect that helped me come along" (PT10, Interview, Nov. 21, 2014). Similarly, PT11 added the trainer, "…gave me that shove that I needed and to tell me how, 'oh you can do it!', 'you can do it!', and you know what? I did it!" (Interview, Nov. 18, 2014).

The technology trainer provided each PT with the opportunity to co-teach during a learning activity using the students' own mobile devices as an instructional tool. The qualitative data indicated two frequently reported examples of support during co-teaching with the trainer. First, PT felt the trainer provided support by teaching the lesson side-by-side. "The beauty of the co-teaching," according to PT4 was, "having her actually there while I was going through all of this with the kids" (Interview, Nov. 20, 2014). PT8 added, "It was helpful, too, because then when we taught the kids, there were two of us to help them" (Interview, Nov. 18, 2014). Second, the trainer provided support to the PT by solving problems with the student's mobile devices during the actual lesson. PT4 shared, "she [trainer] said, well, let's think about how we can make this work"(Interview, Nov. 20, 2014). In addition, PT9 maintained, "if she weren't there to tell me it wasn't me, it was the program, I would have thought it was me… so it was beneficial to co-teach with

her ” (Interview, Nov. 17, 2014). In sum, the technology trainer provided valuable support to empower PT to employ the student-owned mobile devices in their classrooms.

PT received support from student mentors. At this school, middle school students have the opportunity to enroll as a student mentor to support the integration of technology on the campus. Two courses were offered, *Mobile Technology* and *Digital Art.* Each course provided students with opportunities to teach others about educational websites and apps to support learning. During the iE3 Project, student mentors from these two courses provided support to PT. Early on in the iE3 Project, TL and PT detected that students were clearly ‘more knowledgeable others’ with regard to the use of mobile devices. Naturally, then, student ‘know how’ quickly became a form of support and mentorship for the PT. The most frequently reported ways that PT received support from students were (a) website and/or app lessons from student mentors in the “Mobile Technology” and “Digital Art” middle school elective classes, and (b) older classes of students working with younger classes of students. In addition, many PT discussed the benefits of being in the role of a ‘learner,’ whereas student mentors provided support to them as well as to their classes.

Qualitative data indicated student mentors provided support in four primary ways. First, student mentors provided support for basic technology skills such as logging on to the network. For example, PT4 wrote, “thank you to TL's Mobile Tech class for helping my students log onto the [school] guest network and trying out their devices” (CWR, Sept. 7, 2014). Second, student mentors provided lessons about various educational websites and/or apps to the classes of PT. PT1 described how the student mentors

assisted her class when she declared, “taught the kids how to do different things on the SmartBoard and different apps they could use” (Interview, Nov. 19, 2014). Third, student mentors offered support as PT attempted to utilize the student-owned mobile devices as instructional tools. PT8 expressed her gratitude by saying, “Thanks to TL7's Mobile Tech class who came in while I was giving the quiz to help my students navigate the site” (CWR, Sept. 23, 2014). Finally, student mentors supported PT with the development of content-integrated digital resources. “It really helped me save time and now I have kids…making Socrative reviews for the AzMERIT test for me!” exclaimed PT6 (Interview, Nov. 17, 2014).

Throughout the iE3 Project, TL and PT made arrangements to have classes of older students support classes of younger students as they were introduced to and began to employ new websites and/or apps on their mobile devices. This instructional strategy allowed more knowledgeable others to model for PT and students new to working with student-owned mobile devices. PT1 described her collaborative lesson with a TL’s class in the following way, “I kind of watched the other teacher how she was interacting with the kids. I watched the other kids teaching my students” (Interview, Nov. 19, 2014). TL and classes of older students supported PT and younger students by introducing new resources and demonstrating their use during learning. “My students learned how to make a Power Point [Google presentation] based on similarities and differences between themselves and a 4th grade buddy” according to PT3 (CWR, Oct. 12, 2014). In addition, classes of older students were able to provide personalized learning to the younger students. PT8 described her experience when she affirmed,

> my students were able to be with just another partner or in a one or two small group situations. They got to ask their questions. They didn't feel overwhelmed. They didn't feel like, 'oh, I'm trying to keep up because this is on SmartBoard and I'm not there yet' or 'I can't find this.' So they were able to ask questions which I really liked. It was individualized for them at their needs…So I think it was a win-win all the way around, you know, digitally and socially and academically. (Interview, Nov. 18, 2014)

Additionally, PT frequently mentioned they received an unusual, unanticipated type of support during the iE3 Project, that of being in the role of a 'learner' while student mentors provided support to them as well as to their class. PT3 reflected on her learning in this situation when she claimed, "The Mobile Tech class provided phenomenal support because they really helped get the ball rolling, not only with coming in and putting up instructions and going through that with the kids, but then it allowed me to learn, too, as a student and then I could feel comfortable to do Socrative or whatever it was that I wanted to do" (Interview, Nov. 20, 2014). PT5 described her experience with having the student mentors provide support when she declared, "I'm usually so much engaged in the learning…I get to be like an onlooker and I never [usually] get to do that" (Interview, Nov. 21, 2014). PT6 also commented on the benefit of working with student mentors when she maintained, "I was definitely a learner and they were the teachers…It's sort of like they taught an old dog new tricks" (Interview, Nov. 17, 2014).

PT needed time. *PT needed time to learn how to use their time effectively to integrate student-owned mobile devices.* PT responses from the collaborative weekly

reflections and semi-structured interviews supported four theme-related components: (a) PT needed time to explore, practice, and improve 21st century skills, (b) PT needed time for planning for learning activities utilizing student-owned mobile devices, (c) PT needed time to teach learning activities utilizing the student-owned mobile devices, (d) PT developed collaborative strategies throughout the iE3 Project to address the barrier of time.

PT needed time to explore, practice, and improve their 21st century skills. PT frequently reported the need for time to (a) explore and practice with websites and/or apps and (b) participate in professional development to improve their skills in utilizing student-owned mobile devices as instructional tools.

The qualitative data indicated that PT needed time to explore and practice with websites and/or apps prior to using them as resources in the classroom. "Well, time is still a big factor for me—just me checking out the site ahead of time and really feeling like I know enough about this to teach it or to show it," which PT8 shared (CWR, Nov. 18, 2014). PT4 concurred when she suggested, "Probably my biggest concern, right now, is just finding time in my planning to investigate some of these things so that I can use them" (Interview, Nov. 20, 2014). In support of needing time, PT3 stated, "and some of it you just need time, yourself, to self explore [*sic*]. You need to find, okay, how do they do that, and how am I going to be able to explain that to the children, and how was this going to transpire because it may take a lot longer" (Interview, Nov. 20, 2014). The exploration of the websites and/or apps led to PT needing the time to practice with them as well. PT1 testified, "practicing using the apps-that kind of took a while because I felt

like I needed to get familiar with the apps before I just kind of threw them at my students. So that took the most time…" (Interview, Nov. 19, 2014). By comparison, PT9 noted, "it wasn't a considerable amount of time [learning the app] once you weighed the benefit of learning the strategy" (CWR, Nov. 17, 2014).

The qualitative data also indicated PT frequently considered the amount of time needed for professional development to improve their own 21st century skills relative to the value of what was learned—using a type of cost-benefit assessment. For example, PT4 stated, "sometimes there was time in learning how to do something, for example, attending a workshop on Socrative", however she added, "but, then once I invested that time [in] that one workshop, maybe a half hour or 45 minutes, then I could really easily go on Socrative now very quickly and put together a quiz for the kids to use in probably 10 minutes" (Interview, Nov. 20, 2014). PT3 described how the iE3 Project design addressed the need for time for professional development when she recorded, "having professional development offered at [the school site] made it convenient to attend, since no traveling time was involved (CWR, Nov. 9, 2014). In addition, she added that time spent on professional development, was "well worth my time and effort!" (CWR, Oct. 12, 2014).

PT needed time for planning for learning activities utilizing student-owned mobile devices. Qualitative data indicated PT reported planning to use student-owned mobile devices during their lunchtime, prep time, and before/after school. PT5 described her need for planning time when she averred, "so sometimes it's stressful at lunch 'cause you're trying to eat lunch and get some other things done" (Interview, Nov. 21, 2014).

Similarly, PT9 added, "so my prep time was learning and planning" (Interview, Nov 17, 2014). PT1 indicated she planned for collaborative activities that used student-owned mobile devices when she declared, "so I took time to meet with the other third-grade teachers before and after school" (Interview, Nov. 19. 2014). Moreover, PT11 maintained, "when we planned it took time, but it was well worth it" (Interview, Nov. 18, 2014). Finally, PT7 concurred that planning for the integration of the devices took time when she affirmed it was, "all time management as a teacher because you still have to do that same time and planning with the book" (Interview, Nov. 19, 2014). Taken together, the PT indicated that planning for learning activities employing the student-owned devices took considerable time.

PT needed time to teach learning activities utilizing the student-owned devices. Qualitative data demonstrated that teaching with student-owned mobile devices took additional instructional time. For example, PT2 indicated that when she used the app, Chatterpix, additional time was required. "It did take time…we interviewed each child separately … [and that resulted in] at least an hour and 15 minutes [total time]" (Interview, Nov. 19, 2014). PT4 concurred as she introduced her class to the website, www.todaysmeet.com when she added, "that took a very long time but we managed. It took about probably [*sic*] 25 minutes before we were going" (Interview, Nov. 20, 2014). Nevertheless, as the iE3 Project progressed, comments indicated less instructional time was needed to utilize the devices for instructional purposes. For example, PT6 testified, "now that they've used the same device daily or at least three times a week, they're

already connected to the Wi-Fi when they power up so that helps a lot with the time factor" (Interview, Nov. 17, 2014).

PT also reported additional instructional time was needed to solve problems with respect to individual issues on the devices. For example, PT5 shared, "so some of the devices they were bringing weren't connecting as fast, or 'oh, I got kicked off, I don't know why', and I spent a lot of time dealing with that" (Interview, Nov. 21, 2014). Frequently, PT indicated a lengthy amount of time was required just to get the student up and running on the Internet. PT4 described the time issue when she discussed using the student-owned mobile devices for instruction,

> It took my class a very long time to get started...I mean a very long time. Some students are still struggling with simply logging on to the guest network on their devices, even when other classmates are trying to help. (CWR, Sept. 26, 2014)

The amount of time required to solve problems with using the devices also appeared to diminish as the PT became more accustomed to their students' devices. PT6 suggested it's, "the little glitches that you didn't know about, and then once you learn how to handle that, then the next time it's so much easier" (Interview, Nov. 17, 2014).

PT developed collaborative strategies throughout the iE3 Project to address the barrier of time. These collaborative strategies included (a) the utilization of student mentors, (b) sharing of lesson plans, and (c) empowering each other through the sharing of new knowledge. First, PT frequently mentioned how student mentors created lessons, taught lessons, and solved problems related to the devices. PT6 maintained, "it really helped me save time" and that she acquired "resources of other students helping me from

the middle school" (Interview, Nov. 17, 2014). Second, PT began to share lessons that they developed. PT5 commented on how her grade level team learned how to use Google docs to share files of homework lessons. She averred, "it saves time and energy and they're useful" (Interview, Nov. 21, 2014). PT5 also indicated participants empowered each other by sharing new knowledge. "We sent somebody on one direction, somebody in another direction, and then I learned something, and then we brought it all together, which is how we tried to combat the time thing" (Interview, Nov. 21, 2014). In sum, the PT worked collaboratively to use their time efficiently. PT3 offered a concluding statement that captured the essence of the change in the time issue when she declared, "It [time] almost doesn't seem like a barrier in a lot of ways because… you see the end result it's so exciting that you don't mind giving that time" (Interview, Nov. 21, 2014).

PT were introduced to instructional resources. *PT were introduced to instructional resources and strategies to utilize student-owned mobile devices as instructional tools.* PT responses from the collaborative weekly reflections and semi-structured interviews indicated two theme-related components: (a) PT were introduced to instructional resources through observations, collaboration, and mentoring, and (b) PT were introduced to instructional strategies for student grouping, device management, and technology integration to effectively utilize student-owned mobile devices in the classroom.

PT were introduced to instructional resources through observations, collaboration, and mentoring. With respect to being introduced to instructional resources, participants most often mentioned observations of TL; collaborative

discussions about websites and/or apps, strategies, or experiences; and mentoring by the technology trainer or students. These instructional resources addressed the barrier of resources and they also addressed the barrier of support.

PT reported attaining resources through the observations of TL utilizing student-owned mobile devices as instructional tools. For example, PT6 maintained,

> I really learn best by being able to observe other teachers and see them in action and I pick up little things. That's kind of my learning style and so that was comfortable just being able to observe and get ideas and record them and then kind of figure out how it would fit into my curriculum. (Interview, Nov. 17, 2014)

PT3 reported the observation of "TL6's social studies class while her students were using a World Map app " (CWR, Aug. 24, 2014); whereas PT4 described how she observed TL2's class using their devices for a geography review on the site www.lizardpoint.com" (CWR, Aug. 30, 2014). PT4 concurred when she scribed,

> After visiting TL2, I stopped by TL3's class. While her kids were working, she shared with me some of the ways her class had been using their devices this week. Gathering these ideas from my colleagues will surely help me plan what I might try with my class. (CWR, Aug. 30, 2014)

The qualitative data also indicated frequent descriptions of collaborative discussions about websites and/or apps, strategies, or experiences. PT reported exchanging new knowledge with grade level teammates. For instance, PT3 suggested, "having that conversation and that dialog with other teachers to find out, how are you using technology? What are you using it for and what are your kids using it for?"

(Interview, Nov 23, 2014). PT1 agreed when she declared, "I could go to my colleague next to me and she had some information that I didn't know about, some knowledge that we could share, so it was nice to go back and forth" (Interview, Nov. 20, 2014). PT also shared newly learned resources in the collaborative weekly reflections as illustrated when PT6 scribed, "I loved hearing great ideas, challenges, and successes from colleagues each week" (CWR, Nov. 7, 2014). Finally, PT made attempts to empower others to utilize new resources through collaborative discussions. PT1 reflected on how she was "meeting with my teammates to teach them how to use the app, *30 Hands*" (CWR, Oct. 12, 2014). Specifically one group of PT, TL, and other non-participants met to introduce each other to new resources. PT3 described such an event when she affirmed,

> we did a 'Chat and Chew' to have the other grade level, third grade, come in and share their ideas, their techniques, their strategies, websites, things that they are doing in the classroom and to have that opportunity just kind of opened the door for us to learn. (Interview, Nov 23, 2014)

PT also reported receiving an introduction to instructional resources from various mentors such as PT and TL, students, and the technology trainer. "Some of them were the beginning teachers, you know, it wasn't just the teacher leaders", declared PT4 (Interview, Nov. 23, 2014). Qualitative data indicated mentors introduced new websites, apps, management techniques, and instructional strategies. For example, PT6 exclaimed, "The kids, I think, were super resources, too, and they're so willing to help each other even, that I feel like they are facilitators along with me" (Interview, Nov. 17, 2014). PT reported student mentors provided technical support and shared apps that supported

content areas. To illustrate, PT3 reported student mentors introduced "student-friendly apps to practice math facts" (CWR, Sept. 5, 2014). PT also indicated mentoring from the technology trainer provided several resources such as desktop shortcuts, QR codes, and free apps. The technology trainer provided resources and she also mentored teachers on various technology skills. For example, PT5 shared, "she was able to show me some ways to print reports on Socrative" (Interview, Nov. 24, 2014). In sum, the PT were introduced to many new instructional resources.

PT were introduced to instructional strategies for student grouping, device management, and technology integration to effectively utilize student-owned mobile devices in the classroom. Frequent descriptions about effective student grouping strategies were evident throughout the CWR and semi-structured interview data. PT shared the various ways they learned how to group students for learning activities. PT11 described the various ways she arranged students working with the student-owned mobile devices when she averred, "my children were engaged in a group of one, in a group of two, and a group of three, and it brought my children closer together, it gave them confidence" (Interview, Nov. 22, 2014). PT8 concurred when she stated, "we did SmartBoard, we did small group, and one on one" (Interview, Nov. 19, 2014). PT5 reported the student grouping strategy she learned to use when students did not bring a device when she stated,

> I tried to pair them with kids who had iPads….They sat shoulder to shoulder and then we talked about, okay, you make sure that you're following along and then you can switch off who's entering in the answer. If we used it for math, they

were both responsible for getting information out of the app or the device or whatever and showing their work separately on a sheet of paper. (Interview, Nov. 24, 2014)

Qualitative data also indicated PT were introduced to effective device management strategies. PT4 described how she asked many questions of two TL when she suggested,

> For me, I had to start with some basics like management, and so I could go to some of those people and say how do you manage? What are your rules? What about if this happens? What if kids can't get on, what do you do? (Interview, Nov. 23, 2014)

PT6 explained exploring device management with a TL on her grade level team when she wrote, "we discussed BYOT management strategies" (CWR, Aug. 21, 2014). After learning effective device management strategies, PT7 described her students' management of their devices in her classroom when she affirmed, "they have their own cubbies and they know, just go get it" (Interview, Nov. 23, 2014). PT4 even added in her final interview, "I think I'm able to manage things better and not get as flustered by it" (Interview, Nov. 23, 2014).

The introduction to instructional strategies to effectively integrate technology into daily instruction was frequently mentioned among the participating members of the iE3 Project. PT1 described how she was introduced to strategies of integration when she penned, "I also had the opportunity to meet with [the trainer] and learn new ways to incorporate technology into my daily instruction" (CWR, Sept. 21, 2014). PT5 discussed

her new learning as she wrote, "I have also learned that I am capable of using technology to create and incorporate meaningful lessons into our daily/weekly classroom routines" (CWR, Nov. 9, 2014). PT4 described her growth with effectively integrating student-owned mobile devices with her instruction when she testified, "I really was not a user of technology in terms of student devices. I didn't know how to incorporate it; I didn't know how to utilize my time wisely. I didn't know how to make it a worthwhile experience", (Interview, Nov. 23, 2014). Then she described her level of integrating technology after participating in the project when she indicated, "I'm able to incorporate, I know where to go, I can put some things together, I'm getting pretty good at a few things and now I want to go further and learn some more things" (Interview, Nov. 23, 2014). To summarize, PT were introduced to instructional strategies to effectively utilize student-owned mobile devices in the classroom.

PT participated in professional development. *Overall***,** *PT experienced both authentic professional development within a situated context, as well as some extended professional development.* PT responses from the collaborative weekly reflections and semi-structured interviews supported two theme-related components: (a) PT experienced authentic professional development within the situated context of their own classrooms, and (b) PT experienced some extended professional development on the school campus.

PT experienced authentic professional development within the situated context of their own classrooms. Qualitative data indicated that PT experienced this type of professional development from the (a) TL, (b) technology trainer, and (c) student mentors. First, PT reported TL provided on-the-spot training, which introduced new

resources within the context of the PT's room. For example, PT4 suggested, "It's helpful to have that face to face interaction because I don't always know what I don't know. This makes it difficult to ask questions. When we are in the middle of using the technology, questions just naturally arise" (CWR, Sept. 7, 2014). Second, PT reported receiving authentic training from the technology trainer as she guided each PT through a learning activity utilizing student-owned mobile devices. PT7 commented, "I was actually working, applying it within a lesson with [the trainer], so it made a big difference." (Interview, Nov. 19, 2014). PT6 concurred when she indicated, "Even though I had done it a year ago, it meant so much more this time because I was actually on the site, doing it rather than watching it done" (Interview, Nov. 17, 2014). Finally, PT reported developing as learners while student mentors taught both the other students and the teacher. For instance, PT4 described authentic professional development from student mentors when she maintained, "a lot of times I would have a question and I might go to a middle school student and they would help us all out. So I was definitely learning during those times" (Interview, Nov. 20, 2014). PT7 also described a former student who provided training for her and her class when she claimed, "She came in alone, and I was so proud of her, and she gave me a list of the apps and she did a presentation to the children" (Interview, Nov. 19, 2014). Thus, TL, the technology trainer, and student mentors provided authentic professional development within a situated context utilizing the actual mobile devices owned by the students of each PT.

PT participated in some extended professional development on the school campus. The qualitative data indicated that most PT participated in two types of

professional development, which extended beyond the classroom environment: (a) workshops on campus and (b) communities of practice. Although only 73%, 8 of 11 PT participated in workshops on campus during the iE3 Project, 100% of the PT participated in some form of community of practice beyond regular instructional time. Each type of extended professional development will be described briefly.

Qualitative data indicated at least three opportunities to attend workshops on campus pertaining to the utilization of student-owned mobile devices were available to each PT. Two of the workshops developed naturally from the needs of the PT and were instructed by volunteer TLs and their students. These workshops were *Socrative* and *Introduction to Google Sites*. PT8 described how she took advantage of these opportunities when she penned, "went to TL7 and TL11's Socrative class this morning and learned a little more, too. It doesn't seem so intimidating to me now and I really like what the app can do. Still practicing though" (CWR, Sept. 23, 2014); similarly PT3 shared that she enjoyed the Socrative training when she indicated, "I really loved it because they brought the students in and had them show us, which again, was much more powerful" (Interview, Nov. 20, 2014). PT8 also described the value the *Introduction to Google Sites* training when she penned, "I took the training on Google Sites with TL4 and TL3 today. I was able to create a Google site for my students and parents to use" (CWR, Sept. 4, 2014). Finally, one extended professional development opportunity, *Google for Beginners,* was offered on-campus by a district instructional technology trainer. PT2 reported attending; however, she did not find the workshop to meet her ability level as indicated in the following statement,

> It was presented much too quickly, much, much, much too quickly. I'm at the point where I need, okay, this is what we do first, and then now do this, and now do this…but for me I did not get anything out of it. (Interview, Nov. 19, 2014)

Overall, the majority of the PT participated in some extended professional development.

A second form of extended professional development emerged naturally from the iE3 Project: communities of practice (CoP). Recall, a community of practice is a group of people with a common interest who engage in discussions, share experiences, and communicate about resources and problem solving (Wenger, 2006). Two types of communities of practice emerged, (a) TL and PT CoP, and (b) grade-level CoP. First, TL and PT met during the collaborative planning meetings and shared experiences and resources. PT9 commented, "that's when I sat with somebody and talked more about Edmodo or talked to somebody about Kahoot more, Socrative more." (Interview, Nov. 17, 2014). In addition, several TL and PT CoP met to empower each other. PT6 described how the TL and PT shared stories when she maintained,

> I really liked that, too, because of the informal format and then being able to meet with second grade and third grade and kind of hearing what they were doing so that next year I kind of know what the kids have had and what they're doing and it was interesting to hear some of their challenges cause I had those challenges the year before. (Interview, Nov. 17, 2014)

Second, PT met with grade-level teammates in CoP that included both participating members of the iE3 Project and non-participating members. For example, PT9 asserted, "My grade level, we met together to share the apps that we utilized"

(Interview, Nov. 17, 2014). PT10 also wrote about her CoP when she reflected, "I look forward to exchanging tech lessons with my teammates" (CWR, Nov 2, 2014). Together, CoP were emerging across the school campus with the same common domain: use of student-owned mobile devices as instructional tools. PT3 said it best when she described the professional development during the iE3 Project, "so it's not only learning from other professionals, but learning from other students, student to student, student to teacher, teacher to student, teacher to teacher, there's so many ways" (Interview, Nov. 20, 2014).

PT developed an innovative mindset. *PT developed characteristics that empowered a new innovative mindset to utilize student-owned mobile devices as instructional tools.* According to George Couros (2014), an "innovative mindset" can be defined as a, "belief that abilities, intelligence, and talents are developed leading to the creation of new and better ideas." PT responses from the collaborative weekly reflections and semi-structured interviews supported three theme-related components that embodied the development of an innovative mindset: (a) PT developed determination, (b) PT developed patience, and (c) PT developed courage to take risks.

PT developed determination. Qualitative data indicated frequent descriptions of determination when PT began to employ student-owned mobile devices as instructional tools. PT3 discussed her determination in overcoming little obstacles she encountered when she declared,

> and you know what, not everything is going to be perfect the first time, we're going to have little obstacles and that's okay. As a teacher you work through it and, like I said, you monitor and adjust. If something didn't work for you, you

> can share that idea with your colleagues. This didn't work but I may want to try it this way. (Interview, Nov. 23, 2014)

This was also evident in her reflection when she wrote, "My students had trouble getting on Wifi on Friday and we will try it again tomorrow. Let's hope the second time is a charm!" (PT3, CWR, Sept. 21, 2014). PT9 also developed determination and shared a personal strategy of her success when she claimed, "if you just give yourself a little time to learn it then all of a sudden you have it" (Interview, Nov. 19, 2014). PT6 demonstrated her determination by allowing room for failure when she suggested, "I know to expect difficulties so it's not so devastating to me and I know that I can surpass some of them and surmount it and get over it and either pair someone up for the day or maybe we just stop that day and then we try again, and that's okay, there's nothing wrong with that" (Interview, Nov. 17, 2014). In sum, PT developed the determination to overcome the many obstacles to effectively utilize the student-owned mobile devices as instructional tools in their classrooms.

PT developed patience. Qualitative data frequently indicated the need for and demonstration of patience when utilizing the student-owned mobile devices. Several PT wrote about this characteristic in their collaborative weekly reflections. PT9 shared, "It takes time to learn the new resources, which is frustrating, but in the end I know once I feel secure using them, my time developing lessons will be reduced" (CWR, Nov. 7, 2014). PT6 described her efforts to practice patience as she developed the skills necessary for effective implementation when she recorded, "I have an attitude of 'one step at a time.' I am not letting myself get overwhelmed by all the technology there is to

learn. I will learn a little at a time and use it appropriately" (CWR, Nov. 7, 2014). Additionally, PT3 described the need for patience rather than wanting to learn it all at once when she aptly maintained,

> and it's not about the quantity, it's the quality, and I have to remind myself often even, at this point in my teaching career, we don't need to race through something and do 500 things. Let's do one thing and let's do it really well. (PT3, Interview, Nov. 23, 2014)

PT developed the courage to take risks. This characteristic was prevalent throughout the qualitative data. PT described the courage to take risks with new resources, new instructional strategies, and allowing others to provide support within their own classrooms. For instance, PT6 said,

> I don't think I'm as concerned to fail, I just suck it up and just go with it. I think I'm just more willing to look for things and not shy away from them as much, so I'm more open to resources even if I haven't tried them, it's like, oh, let's try it and see what happens. (Interview, Nov. 17, 2014)

PT2 described her initial fears with the iE3 Project and how, at the end, she was more willing to take risks when she offered, "Personally, I feel more comfortable using mobile devices and would be more likely to try new things. My attitude is more accepting than it was previously." (CWR, Nov. 9, 2014). All in all, PT developed the courage to take many risks to integrate the student-owned mobile devices with their instructional practices.

Summary of data analysis and results for research question #2. Quantitative and qualitative data were collected and analyzed to answer RQ2: How and to what extent does participation in the iE3 Project help teachers to overcome the perceived barriers of support, time, resources, and professional development, which may inhibit the implementation of instruction utilizing student-owned mobile devices? Quantitative data evaluated from the Innovation Configuration Maps indicated 100% of PT engaged in the attempt to address the perceived barriers: support, time, resources, and professional development through various phases of the iE3 Project. Qualitative data from the CWT and semi-structured interviews indicated PT (a) received support, (b) needed time for effective implementation, (c) were introduced to instructional resources, (d) experienced professional development, and (e) demonstrated leadership skills that empowered them to use student-owned, mobile devices as instructional tools. Taken together, participation in the iE3 Project helped teachers overcome perceived barriers to the implementation of instruction utilizing student-owned, mobile devices.

Research Question #3: What concerns do teachers have about student-owned mobile device throughout the participation in the iE3 Project?

Quantitative and qualitative data were collected and analyzed to answer RQ3. Quantitative data sources included 11 Stages of Concern Questionnaires. Qualitative data sources from the PT included 107 CWR and 11 semi-structured interviews. The quantitative data results will be presented first and the qualitative data results will be presented subsequently.

Introduction to quantitative findings related to concerns. The quantitative data for RQ3 included the Stages of Concern Questionnaire (SoCQ). PT completed the pre-SoCQ on August 1, 2014 and completed the post-SoCQ on November 7, 2014. The SoCQ was used to determine participants' stages of adopting student-owned mobile devices as instructional tools. According to George et al. (2006), participants should experience a developmental emergence and resolution of concerns through the seven stages. Typically, individuals resolve or decrease intensity for their earlier concerns prior to the emergence of later concerns. Using a Likert scale from 0 to 6, PT indicated which statement most accurately reflected what was true of them on each of the 35 questions.

A group analysis was conducted on the quantitative data from the SoCQ. As a whole, the PT participants in the iE3 Project indicated an overall decrease in intensity for the first five stages: (a) Unconcerned, (b) Informational, (c) Personal, (d) Management, and, (e) Consequences, as well as the seventh stage, (f) Refocusing. A slight increase in intensity was indicated on Stage 5- Collaboration. The following are the analysis and results for each of the stages of concern. Figure 4 provides a graphical representation of the quantitative findings related to concerns.

Stage 0: Unconcerned. Items related to Stage 0 reflect a lack of concern for the use of student-owned mobile devices as instructional tools. Combined, PT scored a peak score in Stage 0 (94%) on the pre-SoCQ. The pre-SoCQ results indicated that, prior to participation in the iE3 Project, PT acknowledged preoccupation with other things/innovations and spent little time thinking about the use of student-owned mobile devices. However, scores on the post-SoCQ indicated an overall decrease in intensity (-

19%) in this stage. The post-SoCQ score in Stage 0 was 75%. The post-SoCQ results showed that after participating in the iE3 Project, PT maintained preoccupation with other innovations, yet now spent more time thinking about the use of student-owned mobile devices.

Stage 1: Informational. Items related to Stage 1 reflect the general awareness and interest in learning about student-owned mobile devices as instructional tools. On the pre-SoCQ, PT scored the second highest peak in Stage 1(90%). Results indicated that, prior to participation in the iE3 Project, PT were interested in discussion regarding the use of student-owned mobile devices, what resources were available, and what the use of the devices would require of them in the immediate future. PT also acknowledged they were somewhat concerned about their very limited knowledge about the use of student-owned mobile devices as instructional tools. Again, the post-SoCQ indicated an overall concern decreased in intensity for Stage 1 by 24%. Post-SoCQ results showed a score of 66%. Specifically, after participation in the iE3 Project, PT continued to want to know what resources were available, but were no longer as concerned about their limitation of knowledge about the utilization of student-owned mobile devices as instructional tools.

Stage 2: Personal. Items related to Stage 2 reflect the participant's concerns about how the use of student-owned mobile devices affects her personally. On the pre-SoCQ, PT scored 57% in Stage 2. Results indicated that, prior to participation in the iE3 Project, PT were concerned how their instruction would change, what the time and energy commitments would be, and how their roles would change while utilizing student-

owned mobile devices as instructional tools. The post-SoCQ depicted a slight decrease in intensity (-5%) for this stage. On the post-SoCQ, PT scored a 52% on this construct. Results indicated that, after participation in the iE3 Project, PT were no longer as concerned about how their instruction or roles would change, but continued to express concern about time and energy commitments required to effectively utilize the student-owned mobile devices in the classroom.

Stage 3: Management. Items related to Stage 3 reflected the participant's concerns about the processes and tasks of utilizing student-owned mobile devices as instructional tools. On the pre-SoCQ, PT scored 83% in Stage 3. Results indicated that, prior to participation in the iE3 Project, PT were concerned about not having enough time to get organized, an inability to manage the devices, and the amount of time necessary to work out non-academic issues related to the use of the student-owned mobile devices. The scores on the post-SoCQ for this stage indicated the largest decrease in intensity (-31%). The post-SoCQ scores for Stage 3 were 52%. Results indicated that PT remained concerned about the items prior to participation; however these concerns were only somewhat true after participation in the iE3 Project.

Stage 4: Consequences. Items related to Stage 4 reflect the participant's concerns regarding how the utilization of student-owned mobile devices will affect students. On the pre-SoCQ, PT obtained the lowest score, 38%, in Stage 4. Results showed that, prior to participation in the iE3 Project, PT indicated a concern about evaluating their own influence on students. They also affirmed a desire to excite their students about their part in utilizing student-owned mobile devices in the classroom. The

post-SoCQ depicted a decrease in intensity (-12%) for this stage. On the post-SoCQ, PT scored a 24%. Results suggested that, after participation in the iE3 Project, although there were decreases in intensity, PT remained concerned about their own influence on students and exciting students about the use of the devices as instructional tools.

Stage 5: Collaboration. Items related to Stage 5 reflect the participant's thoughts about coordinating and cooperating with others to effectively utilize student-owned mobile devices as instructional tools. On the pre-SoCQ, PT scored 40% in Stage 5. Results indicate that, prior to participation in the iE3 Project, PT declared a desire to coordinate efforts and develop relationships with others (within the school faculty and outside the school faculty) who were utilizing student-owned mobile devices as instructional tools. The post-SoCQ depicted a slight increase in intensity (4%) for this stage. On the post-SoCQ, PT scored a 44%. Results indicated that, after participation in the iE3 Project, PT were interested in learning what other faculty were doing the devices in their classrooms and collaborating with them.

Stage 6: Refocusing. Items related to Stage 6 reflect the participant's thoughts about the exploration of benefits from or ways to improve instructional practices with student-owned mobile devices. On the pre-SoCQ, PT scored 47%, in Stage 6. Results demonstrated that, prior to participation in the iE3 Project, PT indicated some knowledge about how other approaches work better and expressed concerns about making revisions toward the use of the student-owned mobile devices. The post-SoCQ depicted a slight decrease in intensity (-5%) for this stage. On the post-SoCQ, PT scored a 42%. Results showed that, after participation in the iE3 Project, PT maintained they still knew of other

approaches that worked better, yet increased their desire to modify their use of the devices based on the experiences with their students.

Figure 4. Relative Intensity of Pre- and Post-Stages of Concern

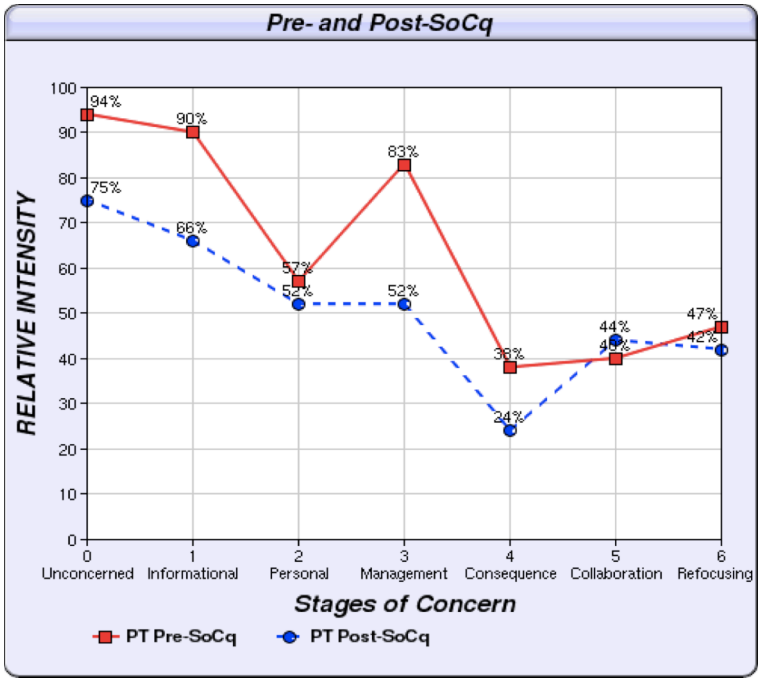


Figure 4. Relative intensity of PT concerns on pre-SoCQ and post-SoCQ. Relative intensity is determined by the cumulative raw scores of each PT translated into a percentile score for each stage. Adapted from Stages of Concern Questionnaire (SoCQ) Online at http://www.sedl.org/pubs/catalog/items/cbam21.html. Copyright 2015 by SEDL. Reprinted with permission.

Introduction to qualitative findings related to concerns. Specifically to answer RQ3, the researcher continuously revised and collapsed identified codes to arrive at 25 related codes. With further analysis, theme-related components began to merge that supported four final themes. The four themes regarding concerns about the use of student-owned mobile devices as instructional tools that emerged were: (a) PTs' limited

knowledge and comfort levels, (b) PT expressed personal concerns, (c) PT expressed management concerns, (d) PT had concerns about the consequences of utilizing student-owned devices in the classroom. For each set of theme-related components and associated themes, the researcher was able to formulate one to two assertions. Table 11 presents the theme-related components, themes, and assertions about the concerns PT expressed regarding the use of student-owned mobile devices as instructional tools.

Table 11

RQ3. Theme-Related Components, Themes and Assertions Related to Concerns

Theme-Related Component	Theme	Assertion
1. At the start of the iE3 Project, many PT expressed limited knowledge, experience, and discomfort in utilizing student-owned mobile devices as instructional tools. 2. Throughout the iE3 Project, PT reported slowly becoming more knowledgeable and comfortable with utilizing the student-owned mobile devices. 3. By the end of the iE3 Project, some PT continued to express discomfort; however, most PT were becoming more comfortable or completely comfortable with utilizing student-owned mobile devices in their classrooms.	PTs' limitation of knowledge, experience, and comfort levels.	PT expressed a range of knowledge, experience, and comfort levels with the utilization of student owned mobile devices from the beginning to the end of the iE3 Project.
1. Personal responsibility for the students' mobile devices	PT expressed personal concerns.	Kindergarten PT were concerned about the

is concerning.		personal responsibility of their students' mobile devices.
2. Most PT expressed 'time' as a continuous concern.		Time is necessary to begin the utilization of student-owned mobile devices as instructional tools.
1. Some PT had concerns for equal access and the responsibility of bringing student-owned mobile devices to school.	PT expressed management concerns.	PT were concerned about managing access of devices for all students.
2. Most PT had concerns about spending academic time on problem solving device issues, navigation of devices/sites, and inappropriate use of the devices.		PT were concerned about managing non-academic issues of the student-owned mobile devices.
1. Most PT expressed concern for the need to integrate the utilization of the student-owned mobile devices with academic content vs. utilizing as a separate learning activity.	PT had concerns about the consequences of utilizing student-owned devices in the classroom.	PT were concerned about balancing instruction with student-owned mobile devices with traditional tools of instruction to support academic growth.

PT's limitation of knowledge, experience and comfort levels. *PT expressed a range of knowledge and comfort levels with the utilization of student owned mobile devices from the beginning to the end of the iE3 Project.* PT responses from the CWR and semi-structured interviews merged to support three theme-related components: (a) at the start of the iE3 Project, many PT expressed limited knowledge, experience, and discomfort in utilizing student-owned mobile devices as instructional tools, (b)

throughout the iE3 Project, PT reported slowly becoming more knowledgeable and comfortable with using the student-owned mobile devices, (c) by the end of the iE3 Project, few PT continued to express discomfort; however, most PT were becoming more comfortable or completely comfortable with using student-owned mobile devices in their classrooms.

At the start of the iE3 Project, many PT expressed limited knowledge, experience, and discomfort in utilizing student-owned mobile devices as instructional tools. Qualitative data consisted of frequent references of PTs' limited knowledge and experience using technology in the classroom. PT3 expressed, "where we start off in the field is very different because when I started off…we really didn't have the experience or the opportunity to do much with technology" (Interview, Nov. 20, 2014). Many of the PT expressed their previous personal experience. "…you know I've never used an iPad before….I'm not even a Facebook user or anything like that", confessed PT4 (Interview, Nov. 20, 2014); and "I mean I really didn't even know how to download an app or what an app was" affirmed PT6 (Interview, Nov. 17, 2014). Several PT thanked the collaborative group for understanding of their limited knowledge. For example, "thank you for being very understanding of my non-knowledge of EVERYTHING!!!!!!!!!!" wrote PT11 on day one of the project (CWR, Aug. 1, 2014). Several PT had the realization that they were not alone in their feelings. PT2 expressed,

> When I went into it, I really was not sure what to expect and being not very technology savvy myself. I was very actually apprehensive about it and feeling like I was probably the only one in the school who was as low in knowledge or in

use as I am. What I found out was that there are other people who are pretty close to me. (Interview, Nov. 19, 2014)

Finally, several PT expressed their limited knowledge and experience caused discomfort in their ability to begin instruction with student-owned mobile devices in their classrooms. One participant offered, "It was a learning curve for me because I knew a little bit about using technology in the classroom, but not enough to feel comfortable" (PT7, Interview, Nov. 19, 2014).

The PTs' limited knowledge and experiences with mobile technology at the beginning of the iE3 Project were aligned with their comfort levels with using the devices during instruction. Many PT expressed their discomfort. "I've not had that opportunity to do much with technology, nor have I felt confident or comfortable with bringing technology into my classroom", asserted PT3 (Interview, Nov. 20, 2014). Many PT expressed similar feelings at the beginning of the project as illustrated when PT2 scribed, "I am nervous and a bit overwhelmed. I am excited, though, about gaining these skills. I feel that my lack of training and experience with computers in general might create a challenge for me" (CWR, Aug. 1, 2014). Another wrote, "I am excited about beginning in this project, but also a bit nervous. I'm looking forward to getting instructional ideas" (PT4, CWR, Aug. 1, 2014). And another offered, "I am feeling somewhat overwhelmed, but very excited. Looking forward to learning from my awesome peers and taking 1 week at a time! Breath!" (PT6, CWR, Aug. 1, 2014). After the initial collaboration meeting, PT9 even proclaimed, "Oh, my! Do I have a long way to go regarding mobile devices in the classroom" (CWR, Aug. 1, 2014). For a few, discomfort was evident, "I am holding

on, fiercely, to what I know works in engaging children in classroom lessons, yet welcome technology to enhance, but not overtake, successful strategies", PT10 claimed (CWR, Aug. 1, 2014).

Throughout the iE3 Project, PT began to express a change about their knowledge and comfort with the use of student-owned devices. PT reported slowly becoming more knowledgeable and comfortable with utilizing the student-owned mobile devices. "Slow and steady is my motto…This turtle continues to make slow baby steps in efforts to become more comfortable in using and teaching with technology" wrote PT3 (CWR, Aug. 24, 2014). PT4 asserted an increase in knowledge and comfort when she claimed, "I was able to see how this would work, how I could make it work in my classroom and I felt very comfortable" (Interview, Nov. 20, 2014). PT10 expressed her enlightenment after receiving support when she scribed,

> I am encouraged as I write this that I might have turned a corner in going forth with this project…I reached out this week and got the help that I needed in some basic moves on my iPad. To begin with, I needed to charge it as it had sat silently since our first meeting! It's up and running now, and *Oh, The Places I Shall Go!* (CWR, Aug. 30, 2014)

PT2 also shared her awaking as she engaged in the utilization use of technology in her classroom.

> Slowly, slowly I am entering this world of technology…I found that little bits and pieces just kind of open your eyes to other little bits and pieces which open your

> eyes other little bits and pieces, and it does begin to make sense. (Interview, Nov. 19, 2014)

Finally, PT1 reflected on her new understanding when she testified, "I was very hesitant having the kids participate during center time because I didn't know if they could do it, which was dumb of me because, of course, they were able to do it" (Interview, Nov. 19, 2014). In sum, many PT began to increase their knowledge and comfort levels with utilizing student-owned mobile devices throughout the iE3 Project.

By the end of the iE3 Project, some PT continued to express discomfort; however, most PT were becoming more comfortable or completely comfortable with utilizing student-owned mobile devices in their classrooms. For some, the discomfort was pervasive throughout the project, "there's still such a frustration level working with technology. It isn't black and white, well, it's always gray it seems like and so that's not comforting" penned PT10, yet she added, "ALTHOUGH I HAVE A LONG WAY TO GO, I know more now than I did at the start" (CWR, Nov. 9, 2014). For others, concerns decreased, yet still remained. "I feel a little bit more comfortable but I still have a lot of unknowns", expressed PT2 (Interview, Nov. 19, 2014), while PT11 proclaimed, "This project made me overcome a lot of fears! My concerns have lessened but I am not totally over all my fears!" (CWR, Nov. 7, 2014). One PT described what would help her eliminate her concerns about the utilization of technology in her classroom when she asserted,

> I think if I had a set of iPads in my classroom all the time and I could, you know, we could say pull out the iPads and things like that where I knew we had some of

> the same technology going on I would use it more frequently. (PT5, Interview, Nov. 21, 2014)

These PT reported gaining more knowledge and experience by engaging in the use of mobile devices in their classrooms, yet their concerns remained about their comfort levels.

Nevertheless, most PT reported becoming more knowledgeable and comfortable, or completely comfortable, with the use of student-owned mobile devices as instructional tools in their classrooms. PT7 asserted, "I don't have a problem with using the devices, I'm very comfortable with them now" (Interview, Nov. 19, 2014). PT4 declared, "I mean I really think it's been a big turnaround for me because I kind of thought we really don't need to bring devices in K-2" (Interview, Nov. 20, 2014). PT6 offered the following comment,

> My participation in the iE3 project helped me become more comfortable with online resources and apps. I use these ideas to plan lessons, evaluate student's work and enhance the overall learning objectives...I am getting to the point where I am thinking of ideas to replace the way I have done things before. (CWR, Nov 7, 2014)

In addition, PT reported the desire to continue learning more about the use of devices with their instruction. For instance, one participant suggested,

> I am more comfortable with using student devices and hope to continue learning more for the remainder of the year. I want to continue observing the teacher

leaders, spend more time designing lessons to incorporate devices, and empower my students to use them more for enrichment. (PT8, CWR, Nov. 7, 2014)

Results indicated that overall, PT expressed a variety of changes of concerns regarding their knowledge, experiences, and comfort levels with the utilization of student-owned mobile devices in their classrooms.

PT expressed personal concerns. PT responses from the CWR and semi-structured interviews supported two theme-related components: (a) personal responsibility for the students' mobile devices and (b) most PT expressed 'time' as a continuous concern. These theme-related components led to two assertions. The results that prompted these assertions are described below.

Kindergarten PT were concerned about the personal responsibility of their students' mobile devices. Results indicated PT, specifically those who taught at the Kindergarten grade level, felt a personal responsibility if their students were to bring their own mobile devices to school. PT2 testified, "I don't want to be responsible, I guess, for having something happen to these expensive devices while they're on my watch…I would feel terrible if something happened, if they got broken or whatever." (Interview, Nov. 19, 2014). PT2 concurred and explained her concerns when she testified,

> Yeah, it makes me a little nervous. We have a lot of kids that lose their covers to their glue sticks, their sweaters, or their water bottles and I think it was more my fear that, oh, my goodness, what if they bring their device and even though we have a responsible place to keep them, what if they drop them and then their

> parents will get upset even though they signed their agreement? It's still in the back of my mind. (Interview, Nov. 19, 2014)

Moreover, PT11 concluded,

> I just hope that everybody involved understands…what if I leave the mobile devices maybe in their cubby and I missed one that was left out on a countertop…I would just feel terrible. The first thing I would do when I was done with my day's work would be go and replace that mobile device for that student. (Interview, Nov. 18, 2014)

The concern for PTs' personal responsibility of the student's devices was unique to the Kindergarten teachers. No other PT reported in the CWR or semi-structured interviews about this concern.

Time is necessary to begin the utilization of student-owned mobile devices as instructional tools. Most PT expressed 'time' as a continuous concern throughout the iE3 Project. "Support, resources, and professional development no longer seem like obstacles. However, time still seems to be a bit of a barrier for me", claimed PT4 at the end of the project (CWR, Nov. 9, 2014). Nevertheless, in her final interview, she added, "I know that initial investment of trying to figure it out myself and maybe initially with the kids will be time, but I think after once I know it, I think it's going to come pretty easily" (Interview, Nov. 20, 2014). For PT8, time remained a concern through the end of the iE3 Project. "Time is still a big factor for me, just me checking out the site ahead of time and really feeling like I know enough about this to teach it or to show it. That's still a concern" (Interview, Nov. 18, 2014). Other PT began to develop an understanding about

their concern for time related to their ability to integrate the student-owned mobile devices with their instruction. PT9 acknowledged, "in the realm of things, any kind of training that you go to you do need to take the time to figure it out, whether it's a district training or this, you know, so it was a considerable amount of time" (Interview, Nov. 17, 2014). PT3 concurred, "but like anything, it does take time, I mean there's no two ways about it" (Interview, Nov. 20, 2014). Finally, several PT demonstrated a change in their concerns about time. For example, PT6 described this change when she stated, "My concerns changed from not feeling like I had time to implement devices in the classroom to excitement over which app or program I could use next" (CWR, Nov. 7, 2014). Overall, time was still a barrier, yet a necessary investment to begin the use of the student-owned mobile devices as instructional tools.

PT expressed management concerns. PT responses from the CWR and semi-structured interviews about management emerged as two theme-related components: (a) PT had concerns for equal access and the responsibility of bringing student-owned mobile devices to school, and (b) PT had concerns about spending academic time on problem solving device issues, navigation of devices/sites, and the appropriate use of the devices. These theme-related components led to two assertions. The two assertions and supporting results are described below.

PT were concerned about managing access of devices for all students. Results indicated many PT were concerned about having equal access to mobile devices for all students, whereas some PT were concerned about managing whether the students actually

brought their mobile devices to school at all. In addition, PT developed solutions to these concerns as they began to learn how to manage these issues.

Qualitative data indicated that many PT were concerned about managing equal access to mobile devices in their classrooms. Responses from several PT exemplified this concern as PT proclaimed, "I still wish we had more devices" (PT5, Interview, Nov. 21, 2014); "I mean I wish I had five of them that I could hand out to these kids that don't have any;" (PT8, Interview, Nov. 18, 2014), and "worrying about not having enough devices was a major one for me" (PT7, Interview, Nov. 19, 2014). Other PT concurred about the concern for access to the mobile devices, yet developed solutions to manage the issue. An example was when PT11 described the support she received from student mentors when she claimed,

> Well when these 7th graders came in, they actually brought their devices. They actually brought more. There were four or five girls, but they would bring in more so no one had to wait…So they were able to bring in a lot of mobile devices and therefore there wasn't any, 'When is it my turn? When is it my turn? Everybody was engaged. (Interview, Nov. 18, 2014)

In addition, PT3 described utilizing the school-owned mobile devices as a substitute for those students who did not have their own. She stated,

> not every child brings in technology and so that is a concern. But it's a minor concern just because we are lucky that we have the library who has five iPads that I can check out and I never had a problem with that. (PT3, Interview, Nov. 20, 2014)

PT3 also shared the student grouping strategy she employed to address the issue, "they can pair up with someone" (Interview, Nov. 20, 2014). Although many PT mentioned equal access to mobile devices as a concern, several PT found solutions to managing this issue during the iE3 Project.

Some PT also reported the concern for managing whether the students, who owned mobile devices, actually brought them to school. Qualitative data indicated PT had to work with both students and parents, alike, to find solutions to this issue. PT8 maintained, "they don't bring them every day" (Interview, Nov. 18, 2014). In addition, PT7 reported the limitations to her instruction requiring the use of the student-owned mobile devices. "I still have the issue of parents…using it as a punishment." She asserted, "They take it away" (Interview, Nov. 19, 2014). However, as in the concern for equal access shared above, several PT discovered solutions to managing whether or not their students would actually bring their own devices to school. One successful solution was shared by PT3 when she averred, "I think the big thing is as long as parents know what you're using the iPad for I've had no problems whatsoever" (Interview, Nov. 20, 2014). Taken together, PT expressed concerns about students actually bringing their own mobile devices to school and developed solutions to address this concern.

Most PT were concerned about managing non-academic issues of the student-owned mobile devices. Results indicated PT reported concerns about managing non-academic issues such as (a) connecting to Wi-Fi and the relationship to older mobile devices, (c) navigation of various devices and sites, and (d) the students' appropriate use

of their mobile devices in the classroom. Time spent on each of these issues reduced the amount of instructional time for learning grade level material.

PT, whose classrooms were located on the upper level of the elementary building of the school, expressed their concerns with the inability to consistently connect to the school's Wi-Fi. PT made comments such as, "The only glitch was getting all students on to the Wi-Fi" (PT6, CWR, Sept. 19, 2014); "I had about 6 students who could not get on the Wi-fi server" (PT3, CWR, Sept. 26, 2014); and "some of the devices they were bringing weren't connecting as fast or, 'oh, I got kicked off I don't know why.' I spent a lot of time dealing with that" (PT5, Interview, Nov. 21, 2014). It was determined by the district's Networking department, however, that their concerns lay not with the school's Wi-Fi, but with the actual devices students were bringing to school. "It was the devices which was still a concern" acknowledged PT3 (Interview, Nov. 20, 2014). PT4 discovered, "sometimes it was their devices that were the problem…I have some kids that because they're only second graders, they're bringing in older devices" (Interview, Nov. 20, 2014). PT3 concurred, "the big concern which I think we still have, that I still see, is some of them have not been updated" (Interview, Nov. 20, 2014). The concern for the inability to connect to the school's Wi-Fi, in turn, affected the student's success in navigating their devices and/or sites.

Qualitative results showed many PT were concerned with their students' ability to navigate his/her own device and/or sites on the Internet. PT4 described her experience; "We talked about getting onto the guest network which was big for some of us, figuring out how to get on the Internet with their particular device." (Interview, Nov. 20, 2014).

PT6 added that websites looked different on various devices when she wrote, for example, “a challenge I had was the quest site looked different on the school's Think Pads than the students’ iPads. It was a challenge getting everyone on the site” (CWR, Oct.3, 2014). In addition, several PT described their concerns about students’ ability to effectively conduct an online search. “I don’t think students know how to narrow their search…I mean they’ll ask a question and maybe 10 sites come up, maybe 20, 30, 40 and they’ll always go to that first one,” exclaimed PT10 (Interview, Nov. 21, 2014). PT8 also expressed this concern when she testified,

> So that was frustrating in that you’re running around and trying to help them and saying, ‘did you try this? Put this in’ or I would put up websites on the board and they’d say, ‘well, I still can’t find it here’. They’re not search savvy in other words, they don’t know you need to just keep clicking, you know? (PT8, Interview, Nov. 18, 2014)

Taken together, many PT still had concerns about the students’ ability to navigate utilizing their own mobile device.

Finally, the results demonstrated some PT were concerned about spending time on managing students’ appropriate use of their mobile devices in the classroom. PT2 commented about this issue when she described, “…I find that I walk away for a while and they’re now taking pictures or they’re going to some place that they’re not supposed to be” (Interview, Nov. 19, 2014). PT8 agreed that one of her concerns was, “students using their devices appropriately” (Interview, Nov. 18, 2014). For example, PT9 shared

an incident that occurred as the class was working on www.Edmodo.com when she stated,

> two of my students sent inappropriate messages to one another (as a joke). The whole class quickly found out their teacher can read everything they write. It was nice having TL7 speak to them as well as me. I think it hit home they need to be appropriate online. (CWR, Sept. 11, 2014)

Nevertheless, overall PT9 acknowledged, "I know there's still the occasional behavior issue now and again of somebody that was texting and they shouldn't have…but that's very few and far between when that happens" (Interview, Nov. 17, 2014). Overall, some PT were still concerned about managing the appropriate use of the student-owned mobile devices in the classroom.

PT had concerns about the consequences of utilizing student-owned devices in the classroom. PT responses from the CWR and semi-structured interviews supported one theme-related component: Most PT expressed concern for the need to integrate the utilization of the student-owned mobile devices with academic content vs. utilizing as a separate learning activity. The results from this theme supported one assertion.

PT were concerned about balancing instruction with student-owned mobile devices with traditional tools of instruction to support academic growth. Qualitative results suggested most PT were concerned about developing their ability to effectively integrate the student-owned mobile devices with academic standards. PT8 averred, "with this high stakes testing, knowing that it's so heavy related to reading, math, and writing, and knowing where my kids are with that, there is barely enough time to practice all of

that" (Interview, Nov. 18, 2014). PT4 concurred when she maintained, "I really want it to fit in with [all the other material]. I don't want it to be an extra, necessarily. I want it to be integrated with what we're learning." (Interview, Nov. 20, 2014). Some PT described how they were thinking about how they might integrate the devices as instructional tools. PT1 noted, "I'm thinking about the future, how am I going to integrate it?" (Interview, Nov. 19, 2014). Some PT shared their belief that technology does not need to be the only tool for instruction. PT10 suggested ths when she maintained,

> I find their small motor skills weak, their vocabulary lacking, and their bodily-kinesthetic style of learning strong. These characteristics cry out for hands-on learning. Technology can be a tool to assist, but not the only one that I would use. (CWR, Nov. 9, 2014)

Another PT described the necessity of balance of technology and traditional tools of instruction, when she asserted,

> I am now more comfortable integrating technology to support my student's learning, however; my concerns lie in teaching academic standards with rigor and using technology to support these standards…It is imperative that future generations be able to "balance" this technology spectrum. (PT3, CWR, Nov. 9, 2014)

Taken together, most PT agreed that a healthy balance of the use of technology and other instructional tools was necessary to ensure academic success.

Summary of data analysis and results for research question #3. Quantitative and qualitative data were collected and analyzed to answer RQ3: What concerns do

teachers have about the utilization of student-owned mobile device throughout their participation in the iE3 Project? Initial quantitative data from the SoCQ indicated a high number of concerns in the stages of 0-Unconcerned, 1-Information, 2-Personal, and 3-Management; with a decrease in intensity in the same stages after participation in the iE3 Project. Qualitative data explored from the CWT and semi-structured interviews revealed (a) PTs' limitation of knowledge, experience, and comfort levels, (b) PT expressed personal concerns, (c), PT expressed management concerns, and (d) PT had concerns about the consequences of utilizing student-owned devices in the classroom. The quantitative data along with the qualitative data indicated PT expressed changes in concerns about their knowledge and comfort levels, personal responsibility for, management of, and consequences of utilizing student-owned mobile devices as instructional tools in the classroom.

Summary of Results

Quantitative and qualitative data were collected and analyzed to answer the three research questions.

With respect to RQ1, quantitative data showed substantial increases in the use of student-owned devices in the classroom. Moreover, qualitative results demonstrated PT used student-owned devices across content areas and to develop digital citizenship skills. In addition, student-owned devices were used for teaching and learning. Specifically, they were most frequently employed to develop skills in basic operation of mobile technology, 21st century skills, and collaboration skills. Finally, results indicated student-owned mobile devices were applied to inform instruction through formative assessment.

For RQ2, quantitative data demonstrated strong growth in the use of student-owned devices according to ICM data. Further, qualitative data indicated PT participants received support and resources, as they attended authentic professional development in a situated context or extended professional development throughout the iE3 Project. Results indicated time was still a barrier, although PT began to develop an innovative mindset that allowed them employ student-owned mobile devices in the classroom.

For RQ 3, quantitative results showed that although a decrease in intensity in 6 out of 7 stages after participating in the iE3 Project, PT participants continued to have informational, personal, and management concerns. Qualitative data complemented these concerns, with additional concerns noted in the consequences of utilizing student-owned mobile devices in the classroom. Taken together, results indicated the iE3 Project was an effective innovation to address most of the perceived barriers of implementation and to empower teachers to initiate the use of student-owned mobile devices as instructional tools.

Chapter 5

Discussion

The purpose of iE3 Project study was to examine the empowerment of teachers to use student-owned mobile devices as instructional tools and to help teachers overcome the perceived barriers that inhibit implementation of BYOT. Glazer et al.'s (2005) collaborative apprenticeship model served as the overall professional development framework for this action research study. In the next section, complementary of data will be explored by triangulating the quantitative and qualitative data collected for each of the three research questions (Greene, 2007). Following this section, outcomes from this study will be discussed in relation to theoretical frameworks and previous research. In addition, lessons learned, limitations, implications for practice, implications for future research, and final conclusions will be presented.

Integration of Quantitative and Qualitative Data

The iE3 Project employed mixed methods to allow for examination of the complementarity of quantitative and qualitative data. According to Greene (2007), complementarity can be described as the extent to which quantitative and qualitative data 'point to the same conclusions.' Specifically for the iE3 Project, the researcher will describe how the rich, descriptive data collected from the qualitative tools, CWR, DE, and semi-structured interviews, augmented the pre- and post-intervention numerical data from the quantitative tools, PUL, ICM, and SoCQ. Taken together, this process should provide a broad, well-rounded interpretative discussion about the data (Greene, 2007).

For RQ1, regarding the utilization of student-owned mobile devices, the weekly reflections, digital images, and discussions about the various ways student-owned mobile devices provide a more comprehensive understanding of the quantitative data indicating growth in use of student-owned devices (Greene, 2007). Overall, the results from the PUL showed 10 of 11 PT, 91%, indicate increased use of student-owned mobile devices throughout the iE3 Project. Importantly, qualitative data resulted in two assertions, which augmented the quantitative data and that explained both the increased use of student-owned devices and how they were used. Recall, the assertions are: (a) student-owned mobile devices were utilized to support the development of digital citizenship skills, as well as content knowledge across core content areas in English language arts, social studies, science, and mathematics, and (b) student-owned mobile devices were utilized to support the development of student academic skills, 21st century skills, and collaboration skills; and to gather formative assessment information to inform instruction. Thus, not only did teachers indicate quantitatively they used mobile devices to a greater extent in their teaching, but through the qualitative data they were able to provide important details about their use of student-owned devices in their teaching. Taken together, results from the quantitative and qualitative data pertaining to RQ1 are complementary and demonstrate rich descriptions of how student-owned mobile devices are utilized as perceived frequency of usage increased.

For RQ2 about perceived barriers, qualitative data from the CWR and semi-structured interviews provided descriptive evidence to support the quantitative data collected from the ICM. Overall, the results from the ICM showed 11 out of 11 PT,

100%, reported engagement in the collaborative apprenticeship model entailing increased support, collaborative planning time, shared resources, and participation in authentic professional development within situated contexts or extended professional development throughout the iE3 Project. Thus, the quantitative data suggest high levels of engagement and participation with accompanying increases in skills related to using student mobile devices for instruction. This quantitative data points to the same conclusions as the three assertions that emerged from the qualitative data. Specifically, the assertions from the qualitative data were that PT (a) received support from TL, a technology trainer, and student mentors, (b) were introduced to instructional resources and strategies, (c) and experienced authentic and extended professional development. In general, the quantitative and qualitative data suggested the same outcomes, i.e., they were complementary. However, there was some disconfirming evidence. Although PT report participating in collaborative planning meetings on the ICM, these planning times did not address the perception of time as a barrier to the utilization of the student-owned mobile devices in the classroom. Qualitative data regarding this barrier is discussed further as a continuous concern in the next section. Thus, the quantitative and qualitative data pertaining to RQ2 are complementary with the exception of the barrier of time.

For RQ3, regarding the concerns about utilizing student-owned mobile devices as instructional tools, the qualitative data from the CWR and semi-structured interviews provide more comprehensive, rich, descriptive evidence to support the quantitative data collected from the SoCQ. Group results indicate the stages of concern with the highest relative intensity on the pre-intervention SoCQ: (a) Unconcerned, (b) Informational, (c)

Personal, and (d) Management continued to be the stages of concern with the highest relative intensity on the post-intervention SoCQ; however, relative intensity decreased on 6 of the 7 stages from pre- to post-intervention assessment. Overall, the group results from the SoCQ found a decrease in the relative intensity of concerns for the first five stages: (a) Unconcerned, (b) Informational, (c) Personal, (d) Management, and, (e) Consequences, as well as the seventh stage, (f) Refocusing. Results indicate a slight increase in intensity of concerns regarding "collaboration" in Stage 5. This quantitative data is supplemented by the six assertions made from the qualitative data regarding concerns related to use of student-owned mobile devices.

The quantitative and qualitative data pertaining to RQ3 appeared to be complementary in several ways. First, PT reported high relative intensity on Stage 1: Information, which examines information and awareness about the utilization of student-owned mobile devices as instructional tools. This aligns directly with thick qualitative descriptions of concerns pertaining to their range of knowledge, experience, and comfort levels with these devices in the classroom. The decreased intensity for Stage 1 on the post-SoCQ also is associated with PTs' increased knowledge, experiences, and comfort levels reported after participating in the iE3 Project. Second, PT reported high relative intensity on Stage 2: Personal, which examines personal concerns with utilizing student-owned mobile devices as instructional tools. This aligns directly with the Kindergarten PT's concern for personal responsibility for the devices, as well as concerns from the entire group of PT for the time necessary to begin use of the devices as instructional tools. The slight decrease in intensity for Stage 2: Personal on the post-intervention

SoCq is related to descriptions of new understandings of time needed to implement any new initiative, as well as collaborative strategies developed to continually address the barrier of time, yet aligns with continued concerns in this area. Third, PT reported high relative intensity on Stage 3: Management, which pertains to concerns about overseeing processes of utilizing student-owned mobile devices as instructional tools. This outcome is aligned with rich descriptions of concerns pertaining to managing access to student-owned mobile devices, as well as reflections about managing non-academic issues related to the devices. The decrease in intensity for Stage 3: Management on the post-SoCQ is associated with descriptions of the employment of collaborative instructional strategies and reduced issues with devices at later phases of the project. Finally, although the Stage 4 has the lowest relative intensity for both pre- and post-intervention SoCQ data, PT indicated a decrease in intensity for Stage 4: Consequences, which pertains to concerns regarding how the use of student-owned mobile device will affect students. This outcome aligns with descriptive data regarding the balance of instruction utilizing student-owned mobile devices versus instruction utilizing other traditional tools. Taken together, results from the quantitative and qualitative data pertaining to RQ3 exhibit strong complementary.

Outcomes Related to Theoretical Perspectives and Previous Research

In this section, the outcomes of this study are connected to theoretical perspectives and previous research that provided a framework for the iE3 Project. First, the outcomes related to the theoretical perspectives of situated cognition and situated learning theory, as well as social cultural theory are discussed. Next, the outcomes

related to previous research on support, time, resources, and professional development are discussed.

Outcomes related to theoretical perspectives. Recall, advocates of situated cognition theory (SCT) contend that learning and cognition are directly linked to *activity and situation*. Proponents of SCT suggest that teachers should participate in authentic, real-world learning activities that are naturally tied to the culture of the school community and lie within the context of their own classrooms. Thus, with respect to empowering teachers to utilize student-owned mobile devices, SCT tenets suggest teachers must build a rich and robust understanding of the instructional practices for using student-owned devices within the culture of their classroom (Brown et al., 1989).

Consistent with these SCT principles, PT participated in authentic professional development provided by other PT, TL, a technology trainer, as well as student mentors. Results indicate PT felt like learners as they participated in authentic activities with mobile devices, within the situated contexts of their own classrooms. They also reported feeling more comfortable asking questions, sharing small wins, as well as war stories while working with other PT and TL going through similar experiences on our campus. As PT began to understand effective management, resources, and instructional strategies associated with using student-owned mobile devices, the intensity of their concerns began to decrease.

The outcomes of the iE3 Project are also closely related to situated learning theory (SLT). Advocates of SLT contend that learning is social in nature and that individuals learn through social interaction in dyads or groups. For example, apprentices

and others new to a group move from peripheral participation to being an active member of a community of practice (Lave & Wenger, 1991). In this study, PT reported engagement in many social practices such as collaborative planning meetings, grade level planning, authentic professional development with the support of other PT, TL or the technology trainer, buddy class activities, training from student mentors, and attendance in extended professional development sessions. PT reported learning through informal discussion with other participants, conducting observations of TL, and co-teaching with others. As PT became more comfortable with applications of student-owned mobile devices, they began to develop small communities of practice (Wenger, 1998). Groups of participants began to meet regularly, share a strong commitment to the exploration of instruction with the student-owned mobile devices, and engage in conversation about experiences, resources, and solutions to common issues.

Vygotsky's social cultural theory (SoCT) is also helpful in understanding the outcomes of the iE3 Project. SoCT includes three theoretical components that promote cognitive growth: (a) social learning precedes development, (b) a more knowledgeable other (MKO) fosters growth, and (c) the zone of proximal development (ZPD) influences development (Vygotsky, 1978). Thus, development is enhanced through social learning and support from someone who has more expertise, i.e., is more knowledgeable, in the area. The outcomes of the iE3 Project are supported by the tenets of SoCT. In this study, PT reported engaging in social interactions, as outlined above, as well as receiving support from multiple persons with more knowledge and experience with student-owned mobile devices. Interestingly, the results indicate that the MKO were not necessarily

limited to the more knowledgeable TL participants. Other individuals, such as the technology trainer, student mentors, and eventually other PT, who became confident in their practices, provided collaborative support as MKO throughout the iE3 Project. In addition, it was interesting to note that PT, who reported the perception of low technology skills, remained dependent on MKO to foster their growth. In contrast, PT who began to develop an innovative mindset quickly moved from a learner to a MKO to provide collaborative support for those still uncomfortable with the integration of such devices in their classroom. Taken together, the outcomes of the iE3 Project indicate that TL, the technology trainer, and student mentors with more experience and knowledge supported PT in the acquisition of skills and information with respect to using student-owned mobile devices in their classrooms.

Outcomes related to previous research. As mentioned earlier, the researcher gathered data from teachers regarding the perceived barriers to the implementation of BYOT. The barriers identified were (a) support, (b) time, (c) resources, and (d) professional development. Previous research about these perceived barriers was presented in Chapter 2 and is explored in the next section in relation to the outcomes of the current study.

Outcomes related to previous research results on perceived barrier: Support. Outcomes associated with "support" from the current study relate to results of previous research and an assertion made from the previous cycle of action research in several ways. First, results of previous research show mentoring was an effective way to provide support to teachers. For example, previous research results indicate mentoring in

technology integration provides many benefits such as just-in time support (Bullock, 2004; Lai et al., 2002), provides individualized assistance (Swan et al., 2002), offers different models of teaching (Ertmer, 1999; Glazer et al., 2005), and show teachers who are mentored demonstrate effective problem-solving with technology (Boulay & Folford, 2009). These previous research results about mentoring are related to the outcomes of the iE3 Project. In the current study, outcomes from the iE3 Project demonstrate PT reported mentors provided just in-time emotional support, individualized assistance from co-teaching, and offered observation opportunities for various instructional strategies. In addition, PT demonstrate problem solving with respect to management, access, instructional practices, and technical issues with student-owned mobile devices.

Second, previous research results indicate communities of practice are an effective way to provide support to teachers (Lave & Wenger, 1991; Wenger, 1998). For example, previous research results reveal communities of practice provide teachers with opportunities to meet regularly, share ideas and solutions, and receive peer support (Glazer et al., 2005), share war stories and narratives (Brown et al., 1989), and socially construct a vision, insights, and shared strategies (Glazer et al., 2009). Similarly, outcomes from the iE3 Project show this same pattern because PT began to meet regularly as communities of practice, grade level teams, and during collaborative planning meetings to celebrate small wins and share war stories of challenges with utilizing student-owned mobile devices. PT report working with other participants informally and formally to receive peer support, exchange resources, and set up observation and co-teaching opportunities to attain further insights. In addition, this

sense of community is strengthened by PT collaborative reflective work when they write online about support, experiences, new resources, new learnings, and concerns related to instruction with the devices.

Third, an assertion made from the previous action research cycle indicates support for teachers integrating student-owned devices could be addressed through the collaborative apprenticeship model. For example, during the previous cycle of action research, PT report receiving support from TL and other PT through observations, co-teaching, and during collaborative planning time. Correspondingly, outcomes from the current study show the collaborative apprenticeship model is an effective approach for professional development. Specifically, PT feel they received support from not only TL and other PT, but also from the technology trainer, as well as student mentors. In the iE3 Project, the collaborative apprenticeship model provides three phases of scaffolded support including observations, co-teaching, and teaching with student-owned devices on their own. In addition, PT report feeling supported through the online collaborative weekly reflections because they observe others are also experiencing fears and struggles.

Outcomes related to previous research results on perceived barrier: Time.

Outcomes associated with "time" from the current study relate to previous research and an assertion made from the previous cycle of action research in several ways. First, previous research results indicate teachers often perceive the training, planning, and integration of technology as burdensome (Lim & Khine, 2006; Swan & Dixon, 2006) and teachers need time to learn the new technologies, as well as time to prepare for instruction using the technologies (Bauer & Kenton, 2005; Cuban et al., 2001; Feist,

2003). Nevertheless, Glazer et al. (2009) suggest a shared planning time used to collaborate, develop, and exchange learning materials positively influences interactions among members of a community of practice. Consistent with these research results, outcomes from the iE3 Project indicate that PT often consider the amount of time it takes to learn how to personally use a mobile device, time to plan instructional activities utilizing the students' devices, and the actual time it took to conduct the lessons with the devices. PT report the collaborative planning meetings and their own organic communities of practice did provide time to collaborate, share resources, and discuss management and instructional practices. However, PT indicate the implementation of any new initiative requires time to effectively integrate the student-owned devices into instructional practices.

Second, an assertion made from the previous cycle of action research states time, as a perceived barrier, could to some extent, be addressed through the collaborative apprenticeship model. For example, during the previous cycle of action research, PT report participating in collaborative planning time to share experiences and resources; however, they express concern for finding time to schedule observations and supporting other participants' lessons. Correspondingly, outcomes from the iE3 Project show that using the collaborative apprenticeship model provides PT with time to meet collectively to share experiences and resources during the collaborative planning meetings. However PT report much time is spent finding resources online, planning the lessons, and extending instructional time to implement the learning activity utilizing the devices. Overall, it is apparent that previous and current research show time continues to be a

perceived barrier to the implementation of student-owned mobile devices as instructional tools.

Outcomes related to previous research results on perceived barrier: Resources. Outcomes associated with "resources" from the current study relate to previous research results and an assertion made from the previous cycle of action research in several ways. First, previous research results reveal principals must identify key players and resources to support an effective instructional technology plan (Chang et al., 2008). These previous research results relate to the current study with respect to the organization and set-up of the iE3 Project. Acting as both the researcher and school principal allowed me to arrange appropriate components of the project including designating the key participants, as well as, establishing key resources so they are available for the participants at the iE3 Project site .

Second, previous research results indicate that although resources may be provided, many teachers do not have the skills to employ the resources effectively during instruction (Shapley et al., 2002; Smerdon et al., 2000). This outcome is evident in the results of the iE3 Project as well. For example, several PT received the iPad incentive yet had no idea how to use the mobile device themselves.

Third, an assertion made from the previous cycle of action research states resources could be addressed through the collaborative apprenticeship model. For example, during the previous action research cycle, PT report discussing resources during collaborative planning time and sharing resources on a Google doc. Results from this current project are consistent with that assertion. Through observations, co-teaching, and

mentoring, PT are introduced to resources; participate in collaborative discussions about websites and/or apps, strategies, or experiences; and receive new ideas from the TL, other PT, technology trainer and/or student mentors throughout the iE3 Project. In addition, PT provide shared resources online through collaborative weekly reflections and descriptions of lessons depicted on digital images. The collaborative apprenticeship model employed in the previous action research cycle, as well as the current study, provides multiple avenues for PT to attain BYOT resources to be used in their classrooms.

Outcomes related to previous research results on perceived barrier:

Professional development. Outcomes associated with "professional development" from the current study relate to previous research results and an assertion made from the previous cycle of action research in several ways. First, previous research results indicate professional development must address the specific needs of each individual (Ball & Cohen, 1999), must include the attainment of basic technology skills (Hew & Bruch, 2007; Zhao et al., 2002), and consist of exposure to pedagogy consistent with the design of meaningful learning experiences with technology (Bauer & Kenton, 2005; Koehler & Mishra, 2005). Consistent with those outcomes, several PT in the iE3 Project indicate gaining the most knowledge from the authentic professional development situated in his/her own classrooms. This type of professional development is not only tailored to meet the needs of the individual PT at the given moment, it also provides hands-on experiences with the actual technology in the classroom. In addition, PT report exposure to a variety of management and instructional strategies, as well as resources during both observations of others and co-teaching within their own classrooms.

Second, an assertion made from the previous cycle of action research states professional development could be addressed through the collaborative apprenticeship model. For example, during the previous cycle of action research, PT report discussing professional development opportunities during the collaborative planning time, as well as participating in authentic, situated learning. Similarly, throughout the iE3 Project, most PT are engaging in authentic and extended professional development. For example, in the current project, PT share situated learning experiences on the collaborative weekly reflections and attend various extended professional development opportunities on the school's campus both before and after school. In addition, the collaborative apprenticeship model empowers certain teachers to provide professional development to others as they become confident in their newfound skills, strategies, and resources related to the use of student-owned devices as instructional tools. Taken together, the outcomes related to professional development of previous research and the current study are very similar.

Lessons Learned

The process of conducting an action research study and writing a dissertation which is built on theoretical frameworks, related literature, data analysis, and findings from the study is a life-changing experience. Several studies demonstrate that performing action research at the doctoral level can be a transformative experience leading to the development of leadership capabilities (Furman, 2011; 2012) and a bridge between theory and practice (Grogan & Andrews, 2002). As I reflect on the lessons learned through the implementation of the iE3 Project, I find my experiences are

consistent with the claims from these studies. In the next section, I will discuss the lessons I learned related to conducting a mixed methods action research study, the value of a theoretical framework for guiding the project, and the development of my philosophy of educational leadership.

Mixed methods action research. Entering the doctoral program in 2012, I had a vague understanding of what action research entailed and the advantages of employing mixed methods. In time, I learned to "trust the process," as my professors preached, and came to understand that problems of practice may be improved by conducting action research. Through the process, I learned the value of collecting rich, descriptive qualitative data to support quantitative data. In the iE3 Project, although the quantitative outcomes explained changes in the frequency of utilization, participation in the phases of the collaborative apprenticeship model, and the changes in concern, it was the complementarity of the qualitative data that provided rich details about PTs' stories of overcoming fears, taking risks, working collaboratively, and the development of an innovative mindset as a result of participating in the project. Overall, I learned employing a mixed methods design provides a comprehensive, deeper understanding of the complex variables intertwined in working toward resolution of a problem of practice.

Theoretical framework guiding the project. If you had asked me three years ago what the value of a theoretical framework would be on implementing systemic change, I would have been unable to respond in any sort of meaningful way. Throughout this process, I have learned that the purpose of theory is to help make sense of a problem of practice, make predictions about influences on behavior (LeCompte & Preissle,1993),

and provide guidance in the design of effective innovations to enhance practice. The iE3 Project was an innovation grounded in several theoretical frameworks including SCT, SLT, and SoCT. Understanding and applying these frameworks helped me design a model of professional development that empowered teachers to use student-owned mobile devices for instructional purposes. Without these theories guiding the project, I could not have fully addressed the needs of the teachers at my school. Together, the value of the theoretical frameworks has brought about not only new student learning with technology, but an entire change in culture on my campus as it relates to instructional use of student-owned, technology devices.

Philosophy of educational leadership. Through the facilitation of the iE3 Project as a researcher/practitioner, I have developed and advanced a new, more elaborate guiding philosophy of educational leadership. I have learned to embrace the celebration of small wins and foster an environment of failing forward. First, the celebration of small wins has helped me take time to recognize the baby steps, little risks, and ventures out of one's comfort zone that people take each day. Specifically with regard to the utilization of student-owned mobile devices in the school setting, my most memorable moments were the celebration of small wins such as learning how to turn an iPad on or how to charge a device. The celebration of small wins opened my eyes to participants' many different ability and comfort levels with technology, as well as the struggles and agony many teachers go through to keep up with ever-changing technology.

Second, I learned the value of fostering an environment in which individuals feel comfortable failing forward (Maxwell, 2000). To encourage my staff as they

implemented use of student-owned technology, I frequently said to my teachers, "it's okay that the lesson failed, just fail forward." As an educational leader, I learned that establishing a rapport with teachers so they feel comfortable to demonstrate determination, patience, and the courage to take risks, outweighs the perfection sought on any teacher evaluation. I learned that once teachers were not afraid to fail and understood that I supported their endeavors, they felt safe to fail forward. This was critical in assisting teachers to become empowered to use student-owned mobile devices as instructional tools. Taken together, my philosophy of educational leadership has developed to celebrate the small wins, foster an attitude of learning from mistakes, and failing forward.

Limitations

Limitations can be defined as features of the study that decrease confidence in the findings because of concerns about validity/credibility and reliability. The limitations of this study include (a) sample size and sampling process, (b) brevity of the project, (c) Hawthorne effect, and (d) experimenter effect. Each of these limitations will be discussed in the following section.

The first limitation of the iE3 Project was the sampling procedure and the small sample size. The project consisted of a purposive sample of 11 PT and 11 TL. Purposive sampling has important limitations associated with validity as outlined in more detail below. Similarly, the small sample size imposes limits on generalizability among other things. Although this type of sampling and sample size were efficient for this particular action research on this campus, they are not conducive to generalizability to other

settings. In addition, the small sample size limited the researcher to descriptive statistics for the quantitative data instead of a quantitative statistical data analysis.

The second limitation of the iE3 Project is brevity. Brevity can be defined as "shortness of time or duration" (Dictionary.com, 2015). The study was limited to 15 weeks to meet the timeline demands of the doctoral program. Participants of the study indicated a desire for additional time in each phase of the project and the continuation of the collaborative apprenticeship model into the second semester of the school year. The outcomes of the project may have been different if participants had more time to explore the utilization of student-owned mobile devices as instructional tools in their classrooms for a longer period of time.

The third limitation of the iE3 Project is the Hawthorne Effect. The Hawthorne Effect was first observed in the 1920s during experimental studies conducted at the Hawthorne plant of Western Electric. In the Hawthorne Effect, the essential argument is that workers increased productivity merely because of the attention the participants received, not due to the training they received (Roethlisberger, Dickson, Wright, Pforzheimer, & Western Electric Company, 1939). This limitation of research can be related to the iE3 Project as well. As the researcher of the project, I was also the participants' school principal. Teachers in the study met more frequently with me during collaborative planning meetings, received weekly observations, had digital images recorded, and were aware that collaborative weekly reflections were viewed and analyzed by me as a researcher/practitioner. My celebration of small wins and providing additional resources to address challenges that arose may have influenced the increased

levels of engagement and utilization of the student-owned mobile devices in the classrooms.

Finally, a limitation of this study might be the experimenter effect. The experimenter effect can be described as "the influence of the experimenter's behavior, personality traits, or expectations on the results of his or her own research" (The American Heritage® Stedman's Medical Dictionary, 2015). As the school principal leading this intervention on my campus, I had a vested interest in the success and empowerment of the teachers utilizing student-owned mobile devices as instructional tools. This role, in conjunction with my role as the researcher, may have caused bias in the study. Teachers participating in the study may have been eager to increase their user level of the mobile devices and engagement in collaborative practices because I was their supervisor. To mitigate this limitation, I ensured that all participating members of the iE3 Project were assigned to an alternative evaluator for the school year, conducted member checks on the qualitative data, and reflected on personal field notes throughout the project.

Implications for Practice

Outcomes from the iE3 Project suggest several implications for practice. The next section will connect the outcomes of the iE3 Project with current issues in educational practices: (a) the need to develop students' information skills and content knowledge utilizing extensive platforms of written and digital media, (b) the need to provide teacher training, not only in the standards themselves, but also in the effective utilization and integration of various technologies as instructional tools, and (c) the need

for the development of innovative programs that support and provide resources for teacher training to address the demands for effective technology integration.

The first implication of practice is that teachers are able to engage students in developing content knowledge and building information skills by using various digital media capabilities. For example, students had opportunities to learn content in social studies, English language arts, science, and mathematics using their own devices. Their abilities to conduct research and gather information, share information with one another, and provide information about their learning were amply demonstrated in the iE3 Project. For example, the use of Socrative to immediately assess students' learning and understanding of material may prove to be a particularly valuable tool that will allow teachers to adjust their instruction to better meet students' needs. Moreover, using digital media on student-owned devices will allow students to work at their own pace and enhance their learning. For instance, students who need additional time to work on mathematics or science can do quite easily.

A second implication of practice is that school leaders must recognize that teachers need training in the effective utilization and integration of various technologies as instructional tools. Often decisions are made to provide new technologies to classroom teachers; however the professional development associated with the technologies is not authentic or personalized. The iE3 Project demonstrated that teachers vary in their knowledge, skills, and comfort levels, which in turn, is reflected in their actual use level of digital instructional tools. Teachers should have opportunities for both authentic professional development and extended professional develop to match their

individual knowledge, skills, and comfort levels. Importantly, the iE3 Project offers a professional development structure that embraces the preparation of teachers to integrate technology with content. School leaders may wish to consider the key components of the collaborative apprenticeship model (mentoring and support, collaborative planning time, shared resources, and authentic professional development in situated contexts) when considering how to initiate a shift toward technology-integrated instructional practices.

Finally, a third implication of practice is that school leaders not be afraid to develop and implement innovative programs that address the demands for effective technology integration. As Hall and Hord (2001) have stated, "change is a process, not an event." We are living in a time where instructional practices *must* shift to include the integration of technology. It will not happen overnight. Thus, school leaders must embrace innovative ways to facilitate the change. The iE3 Project serves as an innovative attempt to address the perceived barriers and empower teachers to use student-owned mobile devices for instructional purposes. School leaders must identify, develop, and implement the innovative programs that will foster change on their own campuses to meet the demands of 21st century learning.

Implications for Future Research

Upon completion of the iE3 Project study, there are several areas of interest that I would recommend for future cycles of action research. These areas include (a) the development of the TLs, (b) students as mentors, and (c) principal leadership. Each of these areas will be discussed in terms of recommendations for future cycles of action research.

One recommendation for a future cycle of action research would be to focus on the participants in the project who were in the role of TL. The current cycle explored the development of the PT as new users of student-owned mobile devices. The conduct of the project again with a focus on the growth of the experienced users, TL, may provide rich, descriptive data from which new insights about employing student-owned devices for instruction may be garnered. An example research question may be: How and to what extent do TL foster empowerment of PT to use student-owned mobile devices as instructional tools? Another might be: How and to what extent do TL change in their own use of student-owned devices for instruction as they mentor PT?

A second recommendation for a future cycle of action research would be to study the student mentors. During the iE3 Project, students emerged organically as mentors to the PT. Implementing the study again with a focus on the growth of students as mentors may provide data from the students' perspectives about student interests, engagement, and learning. An example research question may be: How and to what extent do student mentors foster empowerment of PT to use student-owned mobile devices?

My last recommendation for a future cycle of action research pertaining to the empowerment of teachers using student-owned mobile devices would be to study principal leadership. In my role as the school principal, I know that my interest in professional growth of my teachers has an influence on their personal success. However, to what extent does a principal's leadership foster the empowerment of teachers? Implementing the study again with a focus on principal leadership may provide data on additional factors that influence the successful integration of student-owned mobile

devices with instruction. An example research question may be: How and to what extent does principal leadership foster empowerment of PT and TL to utilize student-owned mobile devices as instructional tools?

Conclusion

Our nation is struggling to grasp how to adequately prepare our students to compete in the global society of the twenty-first century. Given the national focus on the standardization of knowledge, skills, and the absolute need for integration of technology in our classrooms, educators must engage in the development of innovative programs to prepare our teachers to make these monumental instructional changes. The iE3 Project offers one approach that may be helpful in moving in that direction.

The purpose of the iE3 Project study was to determine whether a collaborative apprenticeship model would provide a framework for effective teacher training to initiate the use of student-owned mobile devices as instructional tools. To assess the usefulness of the collaborative apprenticeship model, the researcher gathered quantitative and qualitative data to understand the influence of the model on the use of student-owned mobile devices, address perceived barriers, and understand teachers' concerns related to instruction with these devices.

The participants of this project have begun the journey to prepare their students for college, careers, and life in a technological society. The outcomes of this study indicate that a collaborative apprenticeship model that embraced support, resources, and professional development that teachers need was beneficial for those teachers initiating the use of student-owned mobile devices for teaching and learning across various content

areas. In addition, generally, concerns of teachers decreased as teachers became more comfortable with new instructional practices with the devices. Taken together, the iE3 Project provided teachers who are new to integrating student-owned devices into classroom instruction a sound jumpstart in terms of meeting the demands with respect to effective technology integration.

References

Arizona Department of Education (ADE). (2013). *Arizona's Common Core Standards*. Retrieved from http://www.azed.gov/azcommoncore/.er

Arizona Department of Education (ADE). (2012). *Common Logon*. Retrieved from http://www.azed.gov/

Bauer, J., & Kenton, J. (2005). Toward technology integration in the schools: Why it isn't happening. *Journal of Technology and Teacher Education*, *13*, 519-546.

Ball, D. L., & Cohen, D. K. (1999). Developing practice, developing practitioners: Toward a practice-based theory of professional development. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning professional: Handbook of policy and practice* (pp. 3-30). San Francisco, CA: Jossey-Bass.

Boulay, R., & Fulford, C. (2009). Technology mentoring: Research results across seven campuses. In A. Tatnall & A. Jones (Eds.) *WCCE 2009, International Federation for Information Processing* (pp. 273-281). Boston, MA: Kluwer Academic Publishers.

brevity. (n.d.). *Dictionary.com Unabridged*. Retrieved from Dictionary.com website: http://dictionary.reference.com/browse/loyalty

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational* Researcher*, 18*(1), 32–42.

Bullock, D. (2004). Moving from theory to practice: An examination of the factors that preservice teachers encounter as they attempt to gain experience teaching with technology during field placement experiences. *Journal of Technology and Teacher Education, 12*, 211–237.

Campbell, D. T., & Stanley, J. C. (1963). Experimental and quasi-experimental designs for research on teaching. In N. L. Gage (Ed.), *Handbook of research on teaching* (pp. 171–246). Chicago, IL: Rand McNally.

Chang, I. H., Chin, J. M., & Hsu, C. M. (2008). Teachers' perceptions of the dimensions and implementation of technology leadership of principals in Taiwanese elementary schools. *Educational Technology & Society, 11*, 229–245.

Colby, V., & Cool, T. (2004). Assisting performance in teaching and learning. *Teaching Education, 15*, 351-362.

Collinson, V., & Cook, T. (2004). Learning to share, sharing to learn: Fostering organizational learning through teachers' dissemination of knowledge. *Journal of Educational Administration, 42*, 312-332.

Common Core State Standards Initiative. (2012). *Implementing the Common Core State Standard.* Retrieved from http://www.corestandards.org.

Creswell, J. W. (2014). *Research design*. Thousand, Oaks, CA: Sage.

Common Sense Media (2015*). Digital literacy and citizenship classroom curriculum*. Retrieved at https://www.commonsensemedia.org/educators/curriculum.

Courous, G. (2014). *8 Characteristics of an innovator's mindset.* Retrieved from http://connectedprincipals.com/archives/11040.

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal, 38*, 813–836.

Dang, T. K. A. (2013). Identity in activity: Examining teacher professional identity formation in the paired-placement of student teachers. *Teaching and Teacher Education, 30*, 47-59.

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.

experimenter effect. (n.d.). *The American Heritage® Stedman's Medical Dictionary*. Retrieved from Dictionary.com website: http://dictionary.reference.com/browse/experimenter effect

Feist, L. (2003). Removing barriers to professional development. *T.H.E. Journal, 30*(11), 30–36.

Franklin, T., Turner, S., Kariuki, M., & Duran, M. (2001). Mentoring overcomes barriers to technology integration. *Journal of Computing in Teacher Education, 18*(1), 26–31.

Forsyth County Schools. (2012). *BYOT.* Retrieved from http://www.forsyth.k12.ga.us/page/824

Furman, G. (2011, November). School leadership, social justice, and action research. Paper presented at the annual meeting of the University Council for Educational

Administration, Pittsburgh, PA.

Furman, G. (2012). Social justice leadership as praxis: Developing capacities through preparation programs. *Educational Administration Quarterly, 48* (2), 191-229.

George, A. A., Hall, G. E., & Stiegelbauer, S. M. (2006). *Measuring implementation in schools. The stages of concern questionnaire.* Austin, TX: SEDL.

Glazer, E., Hannafin, M. J., & Song, L. (2005). Promoting technology integration through collaborative apprenticeships. *Educational Technology Research and Development, 53*(4), 57–67.

Glazer, E., & Hannafin, M. J. (2006). The collaborative apprenticeship model: Situated professional development within school settings. *Teaching and Teacher Education, 22*, 179–193.

Glazer, E., & Hannafin, M. J. (2008). Factors that influence mentor and teacher interactions during technology integration collaborative apprenticeships. *Journal of Technology and Teacher Education 16*, 35-61.

Glazer, E., Hannafin, M. J., Polly, D., & Rich, P. (2009): Factors and interactions influencing technology integration during situated professional development in an elementary school. *Computers in the Schools, 26*(1), 21-39.

Giordano, M. (2011). *Williamson students can bring their own technology to school: High school boosts electronic use*. Retrieved at www.tennessean.com.

Greene, J. C. (2007). *Mixed methods in social inquiry*. San Francisco, CA: Jossey-Bass.

Grogan, M., & Andrews, R. (2002). Defining preparation and professional development for the future. *Educational Administration Quarterly, 38*, 233-256.

Hall, G. E., & Hord, S. M. (1987). *Change in schools: Facilitating the proc*ess. New York, NY: State University of New York Press.

Hall, Gene E. & Hord, Shirley, M. (2001). *Implementing change: Patterns, principles, and potholes.* Boston, MA: Allyn and Bacon.

Hall, G., & Hord, S. (2006). *Implementing change: Patterns, principles, and potholes* (2nd ed.). Boston, MA: Allyn and Bacon.

Hermans, R., Tondeur, J., Van Braak, J., & Valcke, M. (2008) The impact of primary

school teachers' educational beliefs on the classroom use of computers. *Computer Education 51*, 1499–1509.

Herrington, J., & Oliver, R. (2000) An instructional design framework for authentic learning environments. *Educational Technology Research and Development, 48*, 23-48.

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development, 55*, 223–252.

Hord, S. M., Stiegelbauer, A. M., Hall, G. E., & George, A. A. (2006). *Measuring implementation in schools: Innovation configurations.* Austin, TX: SEDL.

Hurt, A. C. (2007, March). *Exploring the process of adult computer software training using andragogy, situated cognition, and a minimalist approach*. Paper presented at the International Research Conference of the Americas of the Academy of Human Resource Development, Indianapolis, IN.

Knight, P., Pennant, J., & Piggott, J. (2005). The power of the interactive whiteboard. *Micromath, Summer*, 11-15.

Kopcha, T. (2010). A systems-based approach to technology integration using mentoring and communities of practice. *Educational Technology Research and Development 58*, 175–190.

Koehler, M. J., & Mishra, P. (2005). Teachers learning technology by design. *Journal of Computing in Teacher Education, 21*(3), 94–102.

Kotter, J.P. (1996). *Leading change.* Boston, MA: Harvard Business School Press.

Lai, K. W., Trewen, A., & Pratt, K. (2002). Computer coordinators as change agents: Some New Zealand observations. *Journal of Technology and Teacher Education, 10*, 539–551.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York, NY: Cambridge University Press.

LeCompte, M. D., & Preissle, J. (1993). *Ethnography and qualitative design in educational research*. (2nd ed.). San Diego, CA: Academic Press.

Lee, M., & Levins, M. (2012). *Bring your own technology*. Victoria, Australia: AcerPress.

Levin, T., & Wadmany, R. (2008). Teachers' views on factors affecting effective integration of information technology in the classroom: Developmental scenery. *Journal of Technology and Teacher Education, 16*, 233-263.

Lim, C. P., & Khine, M. (2006). Managing teachers' barriers to ICT integration in Singapore schools. *Journal of Technology and Teacher Education, 14*, 97–125.

Lowther, D. L., Inan, F. A., Strahl, J. D., & Ross, S. M. (2008). Does technology integration "work" when key barriers are removed? *Educational Media International, 45*, 195-213.

Maxwell, J, (2000). *Failing forward.* Nashville, TN: Thomas Nelson, Inc.

New Media Consortium (NMC). (2013). *The new horizon report: 2013 K-13 edition.* Retrieved from http://www.nmc.org/publications/2013-horizon-report-k12.

Nilssen, V. (2003). *Mentoring teaching of mathematics in teacher education.* Paper presented at the 27th International Group for the Psychology of Mathematics Education Conference, Honolulu, HI.

Paradise Valley Unified School District. (2012). *Explorer Middle School.* Retrieved from http://www.pvschools.net/ems/Technology.html.

Project Tomorrow. (2012). *Enabled, engaged, empowered: The student vision for personalized learning and stem education.* Retrieved from http://www.tomorrow.org/speakup/EnabledEngagedEmposered_pres.html

Roethlisberger, F. J., Dickson, W. J., Wright, H. A., Pforzheimer, C. H., & Western Electric Company. (1939). *Management and the worker: An account of a research program conducted by the Western Electric Company, Hawthorne Works, Chicago*. Cambridge, MA: Harvard University Press.

Roy, P., & Hord, S. M. (2003). *Moving NSDC's staff development standards into practice: Innovation Configurations.* Oxford, OH: National Staff Development Council.

Scottsdale Unified School District. (2012). *Instructional Technology*. Retrieved from http://instructionaltechnology.susd.curriculum.schoolfusion.us/modules/locker/files/group_files.phtml?parent=15213575&gid=1067602&sessionid=1e98fa273e2776ace3f24a5a34ea105b.

Shapley, K. S., Benner, A. D., Heikes, E. J., & Pieper, A. M. (2002). *Technology*

Integration in Education (TIE) initiative: Statewide survey report, executive summary. Austin, TX: Texas Center for Educational Research.

Shapley, K. S., Sheehan, D., Maloney, C., & Caranikas-Walker, F. (2010). Effects of technology immersion on teacher's growth in technology competency, ideology, and practices. *Journal of Educational Computing Research, 42*(1), 1-33.

Smerdon, B., Cronen, S., Lanahan, L., Anderson, J., Iannotti, N., & Angeles, J. (2000). *Teachers' tools for the 21st century: A report on teachers' use of technology (NCES 2000-102).* U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Stanley, C. (2012). *At one school district, the motto is BYOT - bring your own technology.* Retrieved from http://dailynightly.msnbc.msn.com/_news/2012/05/06/11567170-at-one-school-district-the-motto-is-byot-bring-yourown-technology.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Thousand Oaks, CA: Sage.

Stringer, E. (2013). *Action research* (4th ed.). Thousand Oaks, CA: Sage.

Swan, K., Holmes, A., Vargas, J. D., Jennings, S., Meier, E., & Rubenfeld, L. (2002). Situated professional development and technology integration: The capital area technology and inquiry in education (CATIE) mentoring program. *Journal of Technology and Teacher Education, 10*, 169–190.

Swan, B., & Dixon, J. (2006). The effects of mentor-supported technology professional development on middle school mathematics teachers' attitudes and practice. *Contemporary Issues in Technology and Teacher Education, 6*(1), 67–86.

Szymanski, M., & Morrell, P. (2009). Situated cognition and technology. *The International Journal of Learning, 15*(12), 55-58.

U.S. Department of Education. (2010). *Transforming American education: Learning powered by technology.* Retrieved from http://www2.ed.gov/about/offices/list/os/technology/netp.pdf

Vygotsky, L. S. (1978). *Mind and society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Wenger, E. (1998). *Communities of practice*: *Learning, meaning, and identity*. New York, NY: Cambridge University Press.

Wenger, E. (2006). *Communities of practice: A brief introduction*. Retrieved from http://www.ewenger.com/theory/

William County Schools. (2012). *Bring your own technology pilot.* Retrieved from http://www.wcs.edu/instructionaltech/byot.htm.

Zhao, Y., Pugh, K., Sheldon, S., & Byers, J. L. (2002). Conditions for classroom technology innovations. *Teachers College Record, 104*, 482–515.

APPENDIX A

iE3 PROJECT INVITATION EMAIL

Are you an innovative teacher who utilizes student-owned mobile devices as instructional tools in your classroom?

-or-

Are you a teacher who is interested in learning how to utilize student-owned mobile devices as instructional tools in your classroom?

Whether you are an expert or a beginner, we want you to participate in the iE3 Project at Copper Ridge School!!

INCENTIVES

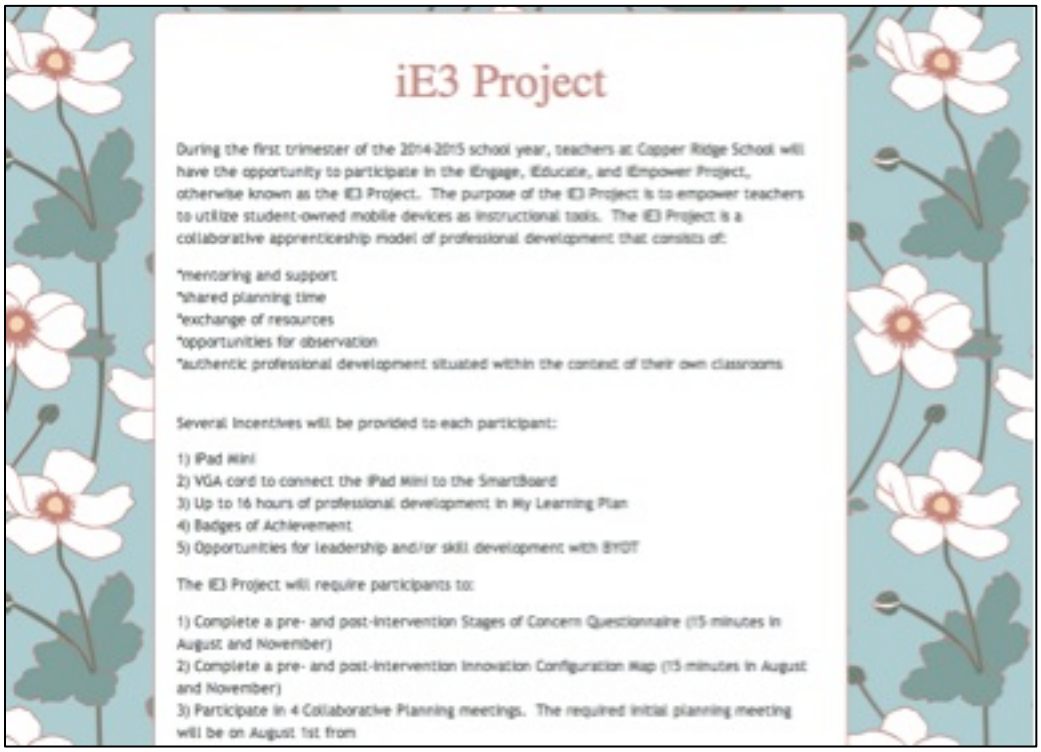
Each participant will receive:

- an iPad Mini
- Funds to add apps of your choice
- VGA Cord to connect iPad Mini to SmartBoard
- Up to 16 hours of professional development
- Badges of Achievement
- Opportunities for leadership and skill development

Click here for more information and participation

APPENDIX B

iE3 PARTICIPANT INTEREST SURVEY



iE3 Project

During the first trimester of the 2014-2015 school year, teachers at Copper Ridge School will have the opportunity to participate in the iEngage, iEducate, and iEmpower Project, otherwise known as the iE3 Project. The purpose of the iE3 Project is to empower teachers to utilize student-owned mobile devices as instructional tools. The iE3 Project is a collaborative apprenticeship model of professional development that consists of:

*mentoring and support
*shared planning time
*exchange of resources
*opportunities for observation
*authentic professional development situated within the context of their own classrooms

Several incentives will be provided to each participant:

1) iPad Mini
2) VGA cord to connect the iPad Mini to the SmartBoard
3) Up to 16 hours of professional development in My Learning Plan
4) Badges of Achievement
5) Opportunities for leadership and/or skill development with BYOT

The iE3 Project will require participants to:

1) Complete a pre- and post-intervention Stages of Concern Questionnaire (15 minutes in August and November)
2) Complete a pre- and post-intervention Innovation Configuration Map (15 minutes in August and November)
3) Participate in 4 Collaborative Planning meetings. The required initial planning meeting will be on August 1st from

APPENDIX C

BADGES OF ACHIEVEMENT


iE3 PROJECT
iEngage


iE3 PROJECT
iEducate


iE3 PROJECT
iEmpower

APPENDIX D

iE3 PROJECT SITE


iE3 Project!
Participants
Background
Consent
Incentives
CA Model
Data Collection
Support
Planning Time
Resources
Professional Development
52
days since End of iEmpower Phase
Field Notes
Action Plans
Collaborative Weekly Reflection
Collaborative Weekly Reflection Redacted
Digital Ethnography
Digital Ethnography (Redacted)
Welcome to the iE3 Project!
iE3 Project
iEngage, iEducate, and iEmpower
Key features:
collaborative apprenticeship model
mentoring and support
shared planning time
exchange of resources
opportunities for observation
authentic professional development within situated contexts

APPENDIX E

SEDL LICENSE AGREEMENT

ADVANCING RESEARCH
SEDL
IMPROVING EDUCATION

SEDL License Agreement

To: Michelle Otstot (Licensee)
6034 E. Coyote Wash Dr.
Scottsdale, AZ 85266

From: Nancy Reynolds
Information Associate
SEDL
Information Resource Center-Copyright Permissions
4700 Mueller Blvd.
Austin, TX 78723

Subject: License Agreement to reprint and distribute SEDL materials

Date: February 21, 2013; revised January 5, 2015

Thank you for your interest in using excerpts from the publication *Measuring Implementation in Schools: Stages of Concern Questionnaire,* written by Archie A. George, Gene E. Hall, and Suzanne M. Stiegelbauer, and published by SEDL in 2006. You have asked to use **Figure 2.1, The Stages of Concern About an Innovation**, page 8, and the **Stages of Concern Questionnaire** (SoCQ 075), published as Appendix A, pages 79-82. The SoCQ is also available in electronic format as SEDL's *Stages of Concern Questionnaire (SoCQ) Online* and in the book *Taking Charge of Change*, revised ed., pages 48-49, also published by SEDL in 2006, and written by Shirley M. Hord, William L. Rutherford, Leslie Huling, and Gene E. Hall.

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Voice: 800-476-6861
Fax: 512-476-2286
www.sedl.org
4700 MUELLER BLVD., AUSTIN, TX 78723

SEDL License Agreement, p.2

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Thank you, again, for your interest in using excerpts from the SEDL publication ***Measuring Implementation in Schools: Stages of Concern Questionnaire***. If you have any questions, please contact me at 800-476-6861, ext. 6548 or 512-391-6548, or by e-mail at nancy.reynolds@sedl.org.

Sincerely,

Nancy Reynolds — Nancy Reynolds for SEDL

January 9, 2015 — Date signed

Agreed and accepted:

Signature: M Otstot

1/5/15 — Date signed

Printed Name: Michelle Otstot

APPENDIX F

STAGES OF CONCERN QUESTIONNAIRE

SEDL ADVANCING RESEARCH, IMPROVING EDUCATION

Stages of Concern Questionnaire

Please respond to the items in terms of **your present concerns**, or how you feel about your involvement with **student-owned mobile devices as instructional tools**. We do not hold to any one definition of the innovation so please think of it in terms of your own perception of what it involves. Phrases such as "this approach" and "the new system" all refer to the same innovation. Remember to respond to each item in terms of your present concerns about your involvement or potential involvement with the innovation.

Thank you for taking time to complete this task.

Please answer the following question:

Please type ID#

Select one response for each question below.

		Irrel-evant	Not true of me now	Somewhat true of me now			Very true of me now		
#		0	1	2	3	4	5	6	7

Select one response for each question below.

Please respond to the items in terms of **your present concerns**, or how you feel about your involvement with **student-owned mobile devices as instructional tools**. We do not hold to any one definition of the innovation so please think of it in terms of your own perception of what it involves. Phrases such as "this approach" and "the new system" all refer to the same innovation. Remember to respond to each item in terms of your present concerns about your involvement or potential involvement with the innovation.

		Irrel-evant	Not true of me now	Somewhat true of me now			Very true of me now		
#		0	1	2	3	4	5	6	7
1.	I am concerned about students' attitudes toward student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
2.	I now know of some other approaches that might work better than student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
3.	I am more concerned about another innovation.	○	○	○	○	○	○	○	○
4.	I am concerned about not having enough time to organize myself each day (in relation to student-owned mobile devices as instructional tools).	○	○	○	○	○	○	○	○
5.	I would like to help other faculty in their use of student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
6.	I have a very limited knowledge about student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
7.	I would like to know the effect of reorganization on my professional status.	○	○	○	○	○	○	○	○
8.	I am concerned about conflict between my interests and my responsibilities.	○	○	○	○	○	○	○	○
9.	I am concerned about revising my use of student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
10.	I would like to develop working relationships with both our faculty and outside faculty using student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
11.	I am concerned about how student-owned mobile devices as instructional tools affects students.	○	○	○	○	○	○	○	○
12.	I am not concerned about student-owned mobile devices as instructional tools at this time.	○	○	○	○	○	○	○	○
13.	I would like to know who will make the decisions in the new system.	○	○	○	○	○	○	○	○
14.	I would like to discuss the possibility of using student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
		Irrel-evant	Not true of me now	Somewhat true of me now			Very true of me now		
#		0	1	2	3	4	5	6	7

		Irrel-evant	Not true of me now	Somewhat true of me now			Very true of me now		
#		0	1	2	3	4	5	6	7
15.	I would like to know what resources are available if we decide to adopt student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
16.	I am concerned about my inability to manage all that student-owned mobile devices as instructional tools requires.	○	○	○	○	○	○	○	○
17.	I would like to know how my teaching or administration is supposed to change.	○	○	○	○	○	○	○	○
18.	I would like to familiarize other departments or persons with the progress of this new approach.	○	○	○	○	○	○	○	○
19.	I am concerned about evaluating my impact on students (in relation to student-owned mobile devices as instructional tools).	○	○	○	○	○	○	○	○
20.	I would like to revise the student-owned mobile devices as instructional tools approach.	○	○	○	○	○	○	○	○
21.	I am completely occupied with things other than student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
22.	I would like to modify our use of student-owned mobile devices as instructional tools based on the experiences of our students.	○	○	○	○	○	○	○	○
23.	I spend little time thinking about student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
24.	I would like to excite my students about their part in student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
25.	I am concerned about time spent working with nonacademic problems related to student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
26.	I would like to know what the use of student-owned mobile devices as instructional tools will require in the immediate future.	○	○	○	○	○	○	○	○
27.	I would like to coordinate my efforts with others to maximize the effects of student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
28.	I would like to have more information on time and energy commitments required by student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
		Irrel-evant	Not true of me now	Somewhat true of me now			Very true of me now		
#		0	1	2	3	4	5	6	7

		Irrel-evant	Not true of me now	Somewhat true of me now			Very true of me now		
#		0	1	2	3	4	5	6	7
29.	I would like to know what other faculty are doing in this area.	○	○	○	○	○	○	○	○
30.	Currently, other priorities prevent me from focusing my time on student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
31.	I would like to determine how to supplement, enhance, or replace student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
32.	I would like to use feedback from students to change the program.	○	○	○	○	○	○	○	○
33.	I would like to know how my role will change when I am using student-owned mobile devices as instructional tools.	○	○	○	○	○	○	○	○
34.	Coordination of tasks and people (in relation to student-owned mobile devices as instructional tools) is taking too much of my time.	○	○	○	○	○	○	○	○
35.	I would like to know how student-owned mobile devices as instructional tools is better than what we have now.	○	○	○	○	○	○	○	○

Submit Survey Responses

SoCQ 075

APPENDIX G

INNOVATION CONFIGURATION MAP

Participant's ID #		Pre-Intervention Date	Post-Intervention Date
iE3 Project **Innovation Configuration Map**			
Objective: To empower teachers to utilize student-owned mobile devices as instructional tools through the participation in the iE3 Project.			
iEmpower	**iEducate**	**iEngage**	**Non-User**
The PT is empowered to promote and model instructional strategies and resources to effectively integrate student-owned mobile devices with classroom instruction.	The PT acquires skills and strategies to effectively educate students utilizing student-owned mobile devices as instructional tools.	The PT engages in reciprocal interactions with other teachers and students as they are introduced to effective practices of instruction utilizing student-owned mobile devices.	The PT is not utilizing student-owned mobile devices as instructional tools in the classroom.
Support: The PT receives and promotes support from other PT and TL to effectively utilize student-owned mobile devices as instructional tools.			
3	**2**	**1**	**0**
✔PT provides instructional strategy and resource support to another staff member.	✔PT co-teaches a lesson with a TL utilizing student-owned mobile devices as instructional tools.	✔PT is supported by a TL in the introduction of student-owned mobile devices as instructional tools in PT's classroom.	✔PT has not been provided support by other PT and TL to initiate the utilization of student-owned mobile devices as instructional tools.
Resources: The PT receives and promotes resources from other PT and TL to effectively utilize student-owned mobile devices as instructional tools.			
3	**2**	**1**	**0**
✔PT empowers students to utilize resources learned from other PT and TL to support academic achievement.	✔PT utilizes resources learned from other PT and TL in instructional practices with student-owned mobile devices.	✔PT engages in the observation of TL's instructional practices utilizing student-owned mobile devices as instructional tools.	✔PT has not been provided resources by other PT and TL to initiate the utilization of student-owned mobile devices as instructional tools.
Time: The PT participates in collaborative planning time to effectively utilize student-owned mobile devices as instructional tools.			
3	**2**	**1**	**0**
✔PT participates in 4 or more collaborative planning times with other iE3 PT and TL.	✔PT participates in a minimum of 3 collaborative planning times with other iE3 PT and TL.	✔PT participates in 1-2 collaborative planning times with other iE3 PT and TL.	✔PT has not met with other PT and TL to collaborate and plan for the utilization of student-owned mobile devices as instructional tools.
Professional Development: The PT participates in and models skills and strategies through situated learning and/or extended professional development.			
3	**2**	**1**	**0**
✔PT promotes and models instructional strategies and/or resources to effectively integrate student-owned mobile devices with classroom instruction by facilitating situated learning or extended professional development for other staff members.	✔PT obtains skils and strategies to effectively educate students through the participation in situated learning or extended professional development opportunity.	✔PT is introduced to the utilization of student-owned mobile devices as instructional tools through situated learning or an extended professional development opportunity.	✔PT has not participated in situated learning or professional development to initiate the utilization of student-owned mobile devices as instructional tools.

APPENDIX H

PERCEIVED USER LEVEL RETROSPECTIVE SURVEY

iE3 Project Retrospective Survey
Perceived User Level

Unique ID: _____

Definitions:

1- Non-User

A Non-User **does not utilize** student-owned mobile devices as instructional tools in his/her classroom.

2- Rare User

A Rare User utilizes student-owned mobile devices as instructional tools in his/her classroom **scarcely**. (i.e. special event such as Show n' Tell, class reward, class buddies, exploration)

3- Occasional User

An Occasional User utilizes student-owned mobile devices as instructional tools in his/her classroom **a couple times throughout the week** (i.e. centers, enrichment projects, independent reading, assessment, exploration)

4- Frequent User

A Frequent User utilizes student-owned mobile devices as instructional tools in his/her classroom **many times throughout the week** (i.e. research, assessment, project-based learning, presentations, supplement to text, demonstration of learning)

5- Daily User

A Daily User utilizes student-owned mobile devices as instructional tools in her classroom **every day** in a variety of ways.

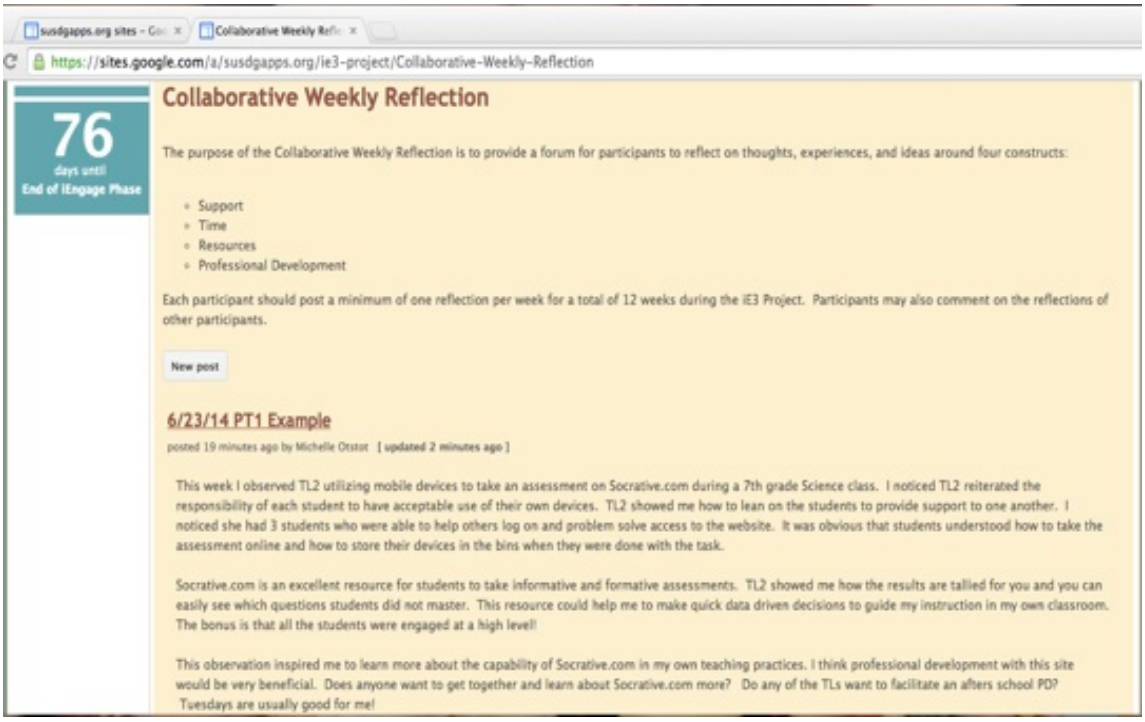
Instructions:

Mark an 'X' in the appropriate box for each question.

	Non-User	Rare User	Occasional User	Frequent User	Daily User
1. After participating in the iE3 Project, what is your user level of student-owned mobile devices as instructional tools in your classroom?					
2. Before participating in the iE3 Project, what was your user level of student-owned mobile devices as instructional tools in your classroom?					

APPENDIX I

COLLABORATIVE WEEKLY REFLECTION


https://sites.google.com/a/susdgapps.org/ie3-project/Collaborative-Weekly-Reflection
76
days until
End of iEngage Phase
Collaborative Weekly Reflection
The purpose of the Collaborative Weekly Reflection is to provide a forum for participants to reflect on thoughts, experiences, and ideas around four constructs:
Support
Time
Resources
Professional Development
Each participant should post a minimum of one reflection per week for a total of 12 weeks during the iE3 Project. Participants may also comment on the reflections of other participants.
New post
6/23/14 PT1 Example
posted 19 minutes ago by Michelle Otstot [updated 2 minutes ago]
This week I observed TL2 utilizing mobile devices to take an assessment on Socrative.com during a 7th grade Science class. I noticed TL2 reiterated the responsibility of each student to have acceptable use of their own devices. TL2 showed me how to lean on the students to provide support to one another. I noticed she had 3 students who were able to help others log on and problem solve access to the website. It was obvious that students understood how to take the assessment online and how to store their devices in the bins when they were done with the task.
Socrative.com is an excellent resource for students to take informative and formative assessments. TL2 showed me how the results are tallied for you and you can easily see which questions students did not master. This resource could help me to make quick data driven decisions to guide my instruction in my own classroom. The bonus is that all the students were engaged at a high level!
This observation inspired me to learn more about the capability of Socrative.com in my own teaching practices. I think professional development with this site would be very beneficial. Does anyone want to get together and learn about Socrative.com more? Do any of the TLs want to facilitate an afters school PD? Tuesdays are usually good for me!

APPENDIX J

DIGITAL ETHNOGRAPHY

Photo #53:

Participant: PT7
Date: 9/24/14
Subject: Mathematics
Website/App: Socrative.com
Skill/Strategy: Utilizing digital resource to support mathematics review

PT Qualitative Data:

What is happening in this photo?
Students are responding to math questions on Socrative.com that I designed. They were allowed to use their workbook as a reference if they could not answer the questions.

How are the students using the mobile devices?
Students are typing in their answers to several math questions as review that I made on Socrative.com program.

What skills are the students learning during this lesson?
Students are learning to use Socrative and to respond to specific questions. They had to think, ~~collaborate~~, use their keyboarding skills and if needed refer back to their math textbook for help.

Researcher Qualitative Data:

What is happening in this photo?
The students in the photo are participating in a mathematics review activity on Socrative.com.

How are the students using the mobile devices?
The students are utilizing their devices to access the review content and to provide formative data to the teacher.

What skills are the students learning during this lesson?
The students have logged on, found the webpage, logged into the teacher's Socrative class, demonstrated knowledge in mathematics by answering questions, and are utilizing other resources such as their textbook to support their learning.

APPENDIX K

SEMI-STRUCTURED INTERVIEW

iE3 Project

Semi-Structured Interviews

(2 pages)

Distribute materials	Question sheet
Moderator introduction, thank you and purpose (1 minute)	Hello. My name is Michelle. I'd like to start off by thanking you for taking time to speak with me today. We will be here for about 30 minutes. The purpose of this interview today is to gather your experience, opinion, and attitude about your participation in the iE3 Project. I'm going to lead the interview today. I am not here to convince you of anything or try to sway your opinion. My job is just to ask you questions and then explore the depth of your response. I will be recording the discussion on the Soundnote app and will transcribe the discussion at a later time.
Ground Rules **(1 minute)**	To allow our conversation to flow more freely, I'd like to go over some ground rules. 1. This will be an open discussion … feel free to add additional information at any point. 2. There are no "wrong answers". Say what is true for you, even if you believe you may be the only one who feels that way.
Introduction of participant **(1 minute)**	Before we start talking about the iE3 Project, I'd like you to share some information about yourself. Please tell me: • Your name • How long you have been in the field of education • Your current teaching position
General questions **(28-40 minutes)**	1-Would you please describe to me your experience with your participation in the iE3 Project?
Specific questions **(15 minutes)**	2-Would you please describe to me the support you received throughout the iE3 Project?

	3- Would you please describe to me the resources you received and/or learned about throughout the iE3 Project? 4- Would you please describe the time you invested in developing strategies and skills to effectively integrate student-owned mobile devices as instructional tools in your classroom? 5- Would you please describe the situated learning and/or professional development you experienced throughout the iE3 Project?
Closing question **(10 minutes)**	6- Would you please describe how you utilized student-owned mobile devices as instructional tools throughout the iE3 Project?
Closing **(2 minutes)**	Thanks for coming today and talking about your experience with the iE3 Project. Your comments have given me a better understanding of the utilization of student-owned mobile devices as instructional tools on our campus. I thank you for your time.

APPENDIX L

INSTITUTIONAL REVIEW BOARD APPROVAL

ASU Knowledge Enterprise Development

EXEMPTION GRANTED

Ray Buss
Division of Educational Leadership and Innovation - West
602/543-6343
RAY.BUSS@asu.edu

Dear Ray Buss:

On 7/9/2014 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	iEngage, iEducate, and iEmpower: A Collaborative Apprenticeship Project in a "Bring Your Own Technology" School
Investigator:	Ray Buss
IRB ID:	STUDY00001237
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Otstot-Informed Consent, Category: Consent Form; • OTSTOT-IRBPROTOCOLSOCIALBEHAVIORAL 6-30-14- v.3.docx, Category: IRB Protocol; • Otstot-iE3 Project Invitation, Category: Recruitment Materials; • Otstot- iE3 Project Participant Interest Survey-part 1, Category: Recruitment Materials; • Otstot- iE3 Project Participant Interest Survey- Part 2, Category: Recruitment Materials;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (1) Educational settings on 7/9/2014.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Michelle Otstot
Michelle Otstot

APPENDIX M

SCOTTSDALE UNFIED SCHOOL DISTRICT APPROVAL

Scottsdale Unified School District

Engage, Educate and Empower Every Student, Every Day

Education Center
3811 North 44th Street
Phoenix, Arizona 85018-5420

Telephone: (480) 484-6278
FAX: (480) 484-6292
Web site: www.susd.org

June 22, 2014
Michelle Otstot
10101 E. Thompson Peak Pkwy
Scottsdale, Az 85255

Re: Research Proposal "iE3 Project,"

Dear Ms. Otstot:

This letter confirms receipt of your Request to Conduct Research and grants approval of your research study, "iE3 Project." We are happy to be of service and are very interested in the outcomes. Please provide us with the results of this research when they are available.

A copy of your signature is on file with respect to the terms of collection and use of data.

Sincerely,

Dr. David McNeil
Executive Director of Elementary Schools and SIMAR

APPENDIX N

PARTICIPANT CONSENT

iE3 Project
CONSENT FORM

INTRODUCTION

The purposes of this form are to provide you (as a prospective research study participant) information that may affect your decision as to whether or not to participate in this research and to record the consent of those who agree to be involved in the study.

RESEARCHERS

Michelle Otstot, Arizona State University has invited your participation in a research study.

STUDY PURPOSE

Several studies have been conducted looking into the subject of professional development of teachers utilizing school-provided mobile devices as instructional tools. None have explored professional development of teachers utilizing student-owned mobile devices as instructional tools under a Bring Your Own Technology (BYOT) framework.

The purpose of the research is to determine the extent to which a collaborative apprenticeship model is effective in developing teacher-leaders in order to facilitate the development of a BYOT framework within a PreK-8 school. The study will document the development of teacher's awareness, concerns, and utilization of student-owned mobile devices as instructional tools.

DESCRIPTION OF RESEARCH STUDY

If you decide to participate, then you will join a study involving research of a collaborative apprenticeship model. You will be asked to provide Michelle Otstot with information that is important to the study. If you say YES, then your participation will last for 12 weeks from August 1, 2014 through November 26, 2014 at Copper Ridge School. You will be asked to

1) Complete pre-intervention Stages of Concern questionnaire on August 1, 2014 and post-intervention Stages of Concern questionnaire during the week of November 22nd at approximately 15 minutes each.
2) Complete pre-intervention Innovation Configuration Map on August 1, 2014 and post-intervention Innovation Configuration Map during the week of November 22nd at approximately 10 minutes each.
3) Participate in four collaborative planning sessions. The overview session will be two hours and the remaining three sessions will be 1 hour each, for a total of 5 hours.
4) Post reflections on a collaborative weekly journal for 12 weeks at approximately 15 minutes each.
5) Participate in a minimum of one observation, one co-taught lesson, and one independent lesson at approximately 45 minutes each during school hours of 8:45 a.m.- 3:15 p.m.
6) Participate in three additional situated learning or professional development opportunities of your choice during the 12 week period at approximately 3-6 hours total.
7) Facilitate a situated learning or professional development session with your peer community at approximately 45 minutes.
8) Provide audio data for digital ethnographies 1-2 times a week at 1 minute each.
9) Participate in an interview at approximately 30 minutes total.

Participants in this study may skip questions if deemed necessary in the questionnaire, collaborative planning sessions, and interview. Approximately 12 participants will participate in the iE3 Project and 6 subjects will be participating in this study.

RISKS

There are no known risks from taking part in this study, but in any research, there is some possibility that you may be subject to risks that have not yet been identified.

BENEFITS

There are no identifiable benefits to the participants for being in the study except for the possible benefit of reflecting on the use of student-owned mobile devices as instructional tools and the use of professional development as capacity building. Benefits to society include increased understanding and knowledge of mobile devices and instructional practices. The findings will be of interest to professional development designers, administrators, and teachers to inform their understanding of how to develop BYOT schools and how to prepare teachers to effectively utilize student-owned mobile devices as instructional tools in the classroom.

CONFIDENTIALITY

All information obtained in this study is strictly confidential. The results of this research study may be used in reports, presentations, and publications, but the researcher will not identify you. In order to maintain confidentiality of your records, Michelle Otstot will store all data and documents for two years in a password-protected computer or in a locked filing cabinet that only Michelle Otstot has access. No one besides Michelle Otstot will be able to link any responses to individual study participants. All files will be destroyed two years after the end of the project. The study participants will not be individually identified in any report or presentation of the research results; only aggregate data will be used.

WITHDRAWAL PRIVILEGE

Participation in this study is completely voluntary. It is ok for you to say no. Even if you say yes now, you are free to say no later, and withdraw from the study at any time. Your decision will not affect your relationship with the researcher or otherwise cause loss of benefits to which you may be entitled. Participation is voluntary and nonparticipation or withdrawal from the study will not affect your employment status.

COSTS AND PAYMENTS

There is no costs or payment for your participation in the study. However, the following incentives will be provided to each participant of the project:

1) use of an iPad Mini
2) 12 hours of professional development
3) additional 3-6 hours of professional development depending on choices
4) Badges of achievement

VOLUNTARY CONSENT

Any questions you have concerning the research study or your participation in the study, before or after your consent, will be answered by

Co-Investigator:
Michelle Otstot
Copper Ridge School, 10101 N. Thompson Peak Rd, Scottsdale, AZ 85255
(480) 484-1410

If you have questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk; you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at 480-965 6788.

This form explains the nature, demands, benefits and any risk of the project. By signing this form you agree knowingly to assume any risks involved. Remember, your participation is voluntary. You may choose not to participate or to withdraw your consent and discontinue participation at any time without penalty or loss of benefit. In signing this consent form, you are not waiving any legal claims, rights, or remedies. A copy of this consent form will be offered to you.

Your signature below indicates that you consent to participate in the above study. By signing below, you are granting the researcher the right to use your likeness, image, appearance and performance- whether recorded on or transferred to videotape or photographs – for presenting or publishing this work.

_____	_____	_____
Subject's Signature	Printed Name	Date
_____	_____	_____
Legal Authorized Representative (if applicable)	Printed Name	Date

INVESTIGATOR'S STATEMENT

"I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participation in this research study, have answered any questions that have been raised, and have witnessed the above signature. These elements of Informed Consent conform to the Assurance given by Arizona State University to the Office for Human Research Protections to protect the rights of human subjects. I have provided (offered) the subject/participant a copy of this signed consent document."

Signature of Investigator_____ Date_____