Professional Development of in-Service Teachers Utilizing Mobile Technology in Classrooms: A Qualitative Case Study

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ABSTRACT

PROFESSIONAL DEVELOPMENT OF IN-SERVICE TEACHERS UTILIZING MOBILE TECHNOLOGY IN CLASSROOMS: A QUALITATIVE CASE STUDY

Ryan C. Read, Ed.D.
Department of Educational Technology, Research and Assessment
Northern Illinois University, 2020
Cindy York, Director

If an in-service teacher does not receive professional development either formally or informally, it can be baneful to the use and adaption of mobile technology in the classroom. While Professional Development (PD) has shown positive results in schools and classrooms, it could be beneficial in helping in-service teachers adapt and utilize mobile technology into their student-centered teaching. In this qualitative case study, five in-service K-12 teachers were given PD for their classroom mobile technology and six in-service K-12 teachers were not. Over their schools’ fall semester (18 weeks), these eleven in-service teachers used mobile technology with their classroom lessons and school curriculum for their Student Learning Objectives (SLO). All were studied through three sets of interviews during the first five weeks of the spring semester to understand the relevance of PD with the use of their classroom mobile technology and semester learning goals. Each teacher was independently studied and cross-analyzed to find themes that helped or hampered their use of mobile technology in their classrooms. The use of school PD, collaboration, and student use played into this study as major factors in these teachers’ successes.
or failures. Professional Development is a value that provides more context and support for mobile technology for not only in-service teachers, but for students and school curricula as well.
NORTHERN ILLINOIS UNIVERSITY
DEKLAB, ILLINOIS

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PROFESSIONAL DEVELOPMENT OF IN-SERVICE TEACHERS UTILIZING MOBILE TECHNOLOGY IN CLASSROOMS: A QUALITATIVE CASE STUDY

BY
RYAN C. READ

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A DISSERTATION SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE DOCTOR OF EDUCATION

DEPARTMENT OF EDUCATIONAL TECHNOLOGY, RESEARCH AND ASSESSMENT

Doctoral Director:
Cindy York
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George Couros, Wesley Fryer, Tony Vincent, Felix Jacomino, Matt Miller, Alice Keeler, Jessica Twomey, Christine Pinto, Craig Badura, Dee Lanier and Barbara Gruener. As they old saying goes “it takes a village.”

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A… definition of a hero is someone who is concerned about other people’s well-being, and will go out of his or her way to help them—even if there is no chance of a reward. That person who helps others simply because it should or must be done, and because it is the right thing to do, is indeed without a doubt, a real superhero.
DEDICATION

I dedicate this dissertation to my son, my nieces and nephews and to all my students I have had the honor of having in my classes. When my time comes, I hope this will continue to inspire you to always seek your dreams and find your passions in what you love to do. This dissertation is an extension of my love and passion for education, instructional technology and teaching. Remember to always find your unconditional passion for something and never let someone deter you from your dreams.
## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>LIST OF CONTENTS</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>x</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xi</td>
</tr>
<tr>
<td>LIST OF APPENDICES</td>
<td>xii</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Background</td>
<td>2</td>
</tr>
<tr>
<td>1.2 Purpose of the Study</td>
<td>4</td>
</tr>
<tr>
<td>1.3 Research Questions</td>
<td>5</td>
</tr>
<tr>
<td>1.4 Significance of the Study</td>
<td>6</td>
</tr>
<tr>
<td>1.5 Theoretical Constructs</td>
<td>6</td>
</tr>
<tr>
<td>1.5.1 Social Cognitive Theory</td>
<td>7</td>
</tr>
<tr>
<td>1.5.2 Self-Efficacy</td>
<td>7</td>
</tr>
<tr>
<td>1.5.3 TPACK</td>
<td>8</td>
</tr>
<tr>
<td>1.6 Definitions</td>
<td>10</td>
</tr>
<tr>
<td>1.7 Limits</td>
<td>11</td>
</tr>
<tr>
<td>1.8 Delimitations</td>
<td>12</td>
</tr>
<tr>
<td>1.9 Summary</td>
<td>12</td>
</tr>
<tr>
<td>2. REVIEW OF LITERATURE</td>
<td>14</td>
</tr>
<tr>
<td>Chapter</td>
<td>Page</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>The Use of Technology in the Classroom</td>
<td>14</td>
</tr>
<tr>
<td>Technology Integrated Education Theory</td>
<td>15</td>
</tr>
<tr>
<td>Theory of Social Cognition</td>
<td>16</td>
</tr>
<tr>
<td>Self-Efficacy Beliefs</td>
<td>17</td>
</tr>
<tr>
<td>Student-Centered Teaching</td>
<td>19</td>
</tr>
<tr>
<td>Professional Development</td>
<td>20</td>
</tr>
<tr>
<td>TPACK and Professional Development</td>
<td>23</td>
</tr>
<tr>
<td>TPACK and Self-Efficacy</td>
<td>28</td>
</tr>
<tr>
<td>Summary and Conclusions</td>
<td>30</td>
</tr>
<tr>
<td>3. METHODOLOGY</td>
<td>32</td>
</tr>
<tr>
<td>Selection of Research Method</td>
<td>32</td>
</tr>
<tr>
<td>Research Paradigm</td>
<td>32</td>
</tr>
<tr>
<td>Research Design Selection</td>
<td>33</td>
</tr>
<tr>
<td>Case Study Approach</td>
<td>34</td>
</tr>
<tr>
<td>Benefits of Proposed Methodology</td>
<td>35</td>
</tr>
<tr>
<td>Research Design</td>
<td>37</td>
</tr>
<tr>
<td>Researcher’s Role</td>
<td>37</td>
</tr>
<tr>
<td>Research Questions</td>
<td>39</td>
</tr>
<tr>
<td>Role of the Researcher</td>
<td>39</td>
</tr>
<tr>
<td>Researcher’s Assumption</td>
<td>42</td>
</tr>
<tr>
<td>Setting</td>
<td>42</td>
</tr>
<tr>
<td>Procedure</td>
<td>43</td>
</tr>
<tr>
<td>Chapter</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Ethical Issues</td>
<td>45</td>
</tr>
<tr>
<td>Data Collection</td>
<td>46</td>
</tr>
<tr>
<td>Instruments</td>
<td>50</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>53</td>
</tr>
<tr>
<td>Case Study Database</td>
<td>55</td>
</tr>
<tr>
<td>Best Practices</td>
<td>56</td>
</tr>
<tr>
<td>Cross-Case Analysis</td>
<td>57</td>
</tr>
<tr>
<td>Concepts and Assertions</td>
<td>57</td>
</tr>
<tr>
<td>Generalizability</td>
<td>58</td>
</tr>
<tr>
<td>Criteria for Evaluating Case Studies</td>
<td>59</td>
</tr>
<tr>
<td>Rigor</td>
<td>59</td>
</tr>
<tr>
<td>Construct Validity</td>
<td>59</td>
</tr>
<tr>
<td>External Validity</td>
<td>60</td>
</tr>
<tr>
<td>Internal Validity</td>
<td>60</td>
</tr>
<tr>
<td>Reliability</td>
<td>61</td>
</tr>
<tr>
<td>Threats to Research</td>
<td>61</td>
</tr>
<tr>
<td>Trustworthiness</td>
<td>61</td>
</tr>
<tr>
<td>Narrative</td>
<td>62</td>
</tr>
<tr>
<td>Cases with Formal PD</td>
<td>63</td>
</tr>
<tr>
<td>Case 1</td>
<td>63</td>
</tr>
<tr>
<td>Case 2</td>
<td>64</td>
</tr>
<tr>
<td>Case 3</td>
<td>64</td>
</tr>
<tr>
<td>Chapter</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
</tr>
<tr>
<td>Case 4</td>
<td>64</td>
</tr>
<tr>
<td>Case 5</td>
<td>65</td>
</tr>
<tr>
<td>Cases with No Formal PD</td>
<td>65</td>
</tr>
<tr>
<td>Case 6</td>
<td>66</td>
</tr>
<tr>
<td>Case 7</td>
<td>66</td>
</tr>
<tr>
<td>Case 8</td>
<td>66</td>
</tr>
<tr>
<td>Case 9</td>
<td>67</td>
</tr>
<tr>
<td>Case 10</td>
<td>67</td>
</tr>
<tr>
<td>Case 11</td>
<td>68</td>
</tr>
<tr>
<td>Member Checking</td>
<td>68</td>
</tr>
<tr>
<td>Limitations</td>
<td>69</td>
</tr>
<tr>
<td>4. RESULTS</td>
<td>71</td>
</tr>
<tr>
<td>Cases</td>
<td>73</td>
</tr>
<tr>
<td>Case 1: Hakuna Matata</td>
<td>73</td>
</tr>
<tr>
<td>Case 2: The Joker</td>
<td>75</td>
</tr>
<tr>
<td>Case 3: Sally Patches</td>
<td>76</td>
</tr>
<tr>
<td>Case 4: Power School</td>
<td>77</td>
</tr>
<tr>
<td>Case 5: Five Points</td>
<td>79</td>
</tr>
<tr>
<td>Case 6: Tool Box</td>
<td>80</td>
</tr>
<tr>
<td>Case 7: K-9</td>
<td>81</td>
</tr>
<tr>
<td>Case 8: Bitmap</td>
<td>83</td>
</tr>
<tr>
<td>Case 9: Query</td>
<td>84</td>
</tr>
<tr>
<td>Chapter</td>
<td>Page</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Case 10: Tackle Box</td>
<td>86</td>
</tr>
<tr>
<td>Case 11: Voluntary</td>
<td>87</td>
</tr>
<tr>
<td>Common Themes</td>
<td>88</td>
</tr>
<tr>
<td>Subtheme A: In-Service Teachers Perceive Their Ability to Apply M-Learning Strategies Obtained in Professional Development</td>
<td>92</td>
</tr>
<tr>
<td>Subtheme B: Use Mobile Technologies with Learning and Teaching</td>
<td>94</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>119</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>126</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>No Formal PD Interview Schedule</td>
<td>50</td>
</tr>
<tr>
<td>2.</td>
<td>Formal PD Interview Schedule</td>
<td>72</td>
</tr>
<tr>
<td>3.</td>
<td>Teachers Selected for Case Study</td>
<td>72</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Professional Development Influence on Self-Efficacy</td>
<td>38</td>
</tr>
<tr>
<td>2.</td>
<td>PD was Given in the Classroom</td>
<td>73</td>
</tr>
</tbody>
</table>
LIST OF APPENDICES

<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. SCHOOL GRANTING PERMISSIONS OF RESEARCH STUDY</td>
<td>126</td>
</tr>
<tr>
<td>B. COVER LETTER AND DEMOGRAPHIC SURVEY</td>
<td>128</td>
</tr>
<tr>
<td>C. INFORMATIONAL SURVEY</td>
<td>132</td>
</tr>
<tr>
<td>D. INTERVIEW GUIDE AND QUESTIONS</td>
<td>134</td>
</tr>
<tr>
<td>E. INFORMED CONSENT FORM</td>
<td>137</td>
</tr>
<tr>
<td>F. EMAIL TO PARTICIPANTS ABOUT INTERVIEWS</td>
<td>139</td>
</tr>
<tr>
<td>G. EXIT LETTER</td>
<td>141</td>
</tr>
<tr>
<td>H. FIELD NOTES TEMPLATE</td>
<td>143</td>
</tr>
<tr>
<td>I. LETTER OF APPROVAL FROM INSTITUTIONAL REVIEW BOARD</td>
<td>145</td>
</tr>
<tr>
<td>J. MEMBER CHECKING EMAIL</td>
<td>147</td>
</tr>
<tr>
<td>K. INTERVIEW SCHEDULE</td>
<td>149</td>
</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION

An extensive amount of research on professional development has grown in tandem with the emerging and expanded use of technology in K-12 classrooms over the past two decades, yet professional development (PD), particularly in the area of instructional technology, remains a challenge (Coleman, Gibson, Cotten, Howell-Moroney, & Stringer, 2015; Delgado, Wardlow, McKnight, & O'Malley, 2015; Hew & Brush, 2007). This dissertation outlines how in-service teachers' experiences and attitudes toward professional development are affected in mobile technology integration in the classroom. This research was of eleven in-service teachers, half of whom who received formal or informal professional development with their available school mobile technology and half of whom did not use professional development with integration in the classroom.

The increased use of technology in K-12 classrooms has left many in-service teachers struggling to integrate technology into the curriculum (Niess, 2011). Effective integration requires teachers to have either prior technology knowledge or professional development (PD) within their classroom that is in accord with their teaching styles (Yildirim, 2012). The lack of PD in instructional technology stems from all avenues of the educational curriculum from student counseling, teaching skills, instructional education, etc. (Bayrakci, 2009). Professional development can directly affect teachers’ self-efficacy regarding how they instruct with and use technology in the classroom (Brusco, Peregrin, Ahearne, Taylor, Boone, & Coppett, 2007;
Finger, 2009), in turn affecting their willingness to try something new (Jones, 2010). One area of instructional technology that continues to pose potential barriers to K-12 teachers is mobile learning, or m-learning. M-learning, for the purposes of this study, is defined as having “the characteristics of mobility in physical, conceptual, and social spaces” (Schmidt, Baran, Thompson, Mishra, Koehler, & Shin, 2009). Since the beginning of the 21st century, mobile technology has expanded into the classroom and has garnered the interest of educators. The ubiquitous nature of mobile devices has earned m-learning attention as a necessary feature of 21st century learning spaces (Freeman, Becker, Cummins, Davis, & Giesinger, 2017), yet m-learning remains one of the least emphasized areas in teacher PD (Baran, 2014).

Background

Social Cognitive Theory has suggested that people are not influenced solely by their environments, but that they are actively engage in their learning and the consequences of that learning and behavior, and then remember the sequence of events and use this information to guide subsequent behaviors in understanding. People “function as contributors to their own motivation, behavior, and development within a network of reciprocally interacting influences” (Bandura, 1999, p. 169). Bandura’s 2005 work on social cognitive theory proposed that people are agents who actively seek change, learning, and adaptation. Bandura defined an agent as a person who intentionally influences one’s functioning and life circumstances: “In this view, people are self-organizing, proactive, self-regulating, and self-reflecting. They are contributors to their life circumstances not just products of them” (p. 1). As part of social cognitive theory, the principle of self-efficacy became recognized as an important aspect of learning (Ashford & LeCroy, 2013). Self-efficacy can be defined as what a person believes he or she can accomplish
with his or her skills under certain circumstances (Snyder & Lopez, 2007). Self-efficacy is similar to self-esteem in that task-focused and particular to a specific task of understanding and learning (Lunenburg, 2011). People are much more certain to participate in activities in which they have high self-efficacy, thus self-efficacy can determine a person’s success in motivation, learning, and ultimately his or her performance (Lunenburg, 2011).

Applying Bandura’s theory to the field of education makes it apparent that teachers must actively engage in learning to benefit from professional development, and self-efficacy is one important aspect (Lu & Lei, 2013). An extensive amount of PD has been developed to help teachers integrate instructional technology in the classroom, yet it is quite often not successful (Finger, 2013; Marin et al., 2013). One reason for this failure relates to self-efficacy and a misapplication of PD with either under use or over use of m-learning in a Student Center Teaching classroom. The efficiency of PD influences the adoption and integration of technology in the classroom (Franklin, 2011). At this point, clarifying the difference between training and PD would be helpful. Training has been defined as showing the learner how something works, why it works, and what it works for and toward. For example, showing the learner the features of a new software program would be considered training (Anthony, 2012; Brusco et al., 2007). PD, on the other hand, requires applying a new skill in a meaningful and effective way. PD would go a step beyond training; for example, in addition to showing the learner features of a new software, PD would also entail helping the learner to apply the new software in constructive, meaningful ways.

PD allows in-service teachers to better understand how to use instructional technology in the classroom (Marin et al., 2013). Although teachers can find value in learning content through inquiry, additional components of practice teaching and reflection may be necessary for some
participants to further negotiate the actual skills needed to teach content through mobile technology (Lotter, et. al, 2012). The more that in-service teachers participate in PD, the more likely they will become confident (increased self-efficacy) in integrating technologies into their instruction (Chen, 2012; Lu & Lei, 2012).

Professional development can be delivered in many ways, both formal and informal. PD can be as simple as an experienced learner (such as a fellow teacher) showing an inexperienced learner how to perform a simple task (Anthony, 2012), or as complex as showing someone how to turn on a device to using advanced features that better facilitate subject matter (Giraldo, 2014). A well-developed PD experience has a positive impact on teachers’ acceptance and use of instructional technology, while a negative experience has the opposite effect (Chen, 2012; Keskin et al., 2011; Lu & Lei, 2012). Technology in the classroom is not a new phenomenon, but in the past decade, mobile technologies such as iPads or Chromebooks have been increasingly integrated into K-12 classrooms (Finger, 2013; Marin et al., 2013; Vaughan & Lawrence, 2013). Mobile technology has become more widely used in classrooms than desktop computers (Keskin, Metcalf, & Florida, 2011). While many studies have focused on self-efficacy for teachers with instructional technology in K-12, few studies examined self-efficacy and mobile technology use in the classroom.

Purpose of the Study

PD can take place through either formal or informal instruction (Van Zee & Gillow-Wiles, 2010). Prior knowledge and/or in-classroom PD is important in effectively integrating technology with instruction (Varol, 2013). In fact, positive PD experience could directly affect teachers’ self-efficacy in using mobile technology (Chen, 2012; Lu & Lei, 2012). Therefore,
purpose of this case study is to explore teachers’ experiences and attitudes toward formal professional development in regards to educators’ intention to implement mobile learning pedagogy at two K-12 North American institutes.

Bandura (1977) stated that the expectations of personal efficacy determines whether their coping behavior is from the ability to cope with stressful situations or build the necessary coping skills, when it comes to learning. Teachers’ ability to “think differently” and be more knowledgeable and independent of their learning will have a better sense of comfort with their understanding ability to teach, has the motivation to embrace new concepts in a classroom (Mooney, 2011). In-service teachers find themselves in both formal and informal PD (Chen, 2012), which has caused many educators to explore creative processes through cognitive modeling (Jones, 2010; Ongun, Atlas, & Demirag, 2011; Varol, 2013). Teachers’ perception of how they utilize mobile technology with their students can directly affect their self-efficacy (Chen, 2012; Keskin et al., 2011; Lu & Lei, 2012). No matter how much effort is expended on cognitive processing or how long it will be sustained in the face of obstacles and corresponding reductions in defensive behavior, a teacher’s self-efficacy will affect their learning and teaching style (Pan & Franklin, 2011). This could not only encourage teachers to recognize the need to use mobile technology in their classrooms, but also increase students’ enthusiasm for participating in their lessons (Wyatt, 2015).

Research Questions

1. Overarching question: What are the experiences and attitudes of in-service teachers with formal m-learning PD?
a. How do in-service teachers perceive their ability to apply m-learning strategies obtained in formal PD?

b. How confident are in-service teachers in their ability to use mobile technologies with learning and teaching?

c. How ready do in-service teachers feel to use mobile technologies with learning and teaching?

d. What are the attitudes of in-service teachers towards the PD they have received for mobile technology teaching and learning?

Significance of the Study

This study focuses on in-service teachers’ experiences and attitudes toward professional development in mobile technology integration in the classroom. An increase in the frequency of teachers using classroom devices (Anthony, 2012) brings a proportionate improvement in the level of support they receive (Jones, 2010). Most previous studies focused on how self-efficacy and PD for teachers in K-12 shapes specific behavior while undermining initiated goals and how using mobile technology in PD creates professional behavior with the same group (Jones, 2010; Varol, 2013). Even though this study focuses on in-service teachers in K-12, the results would be transfer to PD practice in areas such as curriculum development, STEM (science, technology, engineering, and mathematics), classroom policy, and technology curriculum design.

Theoretical Constructs

Three theoretical constructs inform this research. They include social cognitive theory, self-efficacy, and technological pedagogical content knowledge (TPACK). This section
introduces each of these concepts and examines how they apply to PD. It concludes with an analysis of the relationship between the three concepts. PD with classroom technology requires both cognitive and self-efficacy modeling and TPACK (Lu & Lei, 2012; Niess, 2011). A teacher’s self-efficacy usually influences their basic style of teaching (Finger, 2009; Van Zee & Gillow-Wiles, 2010). A key component of self-efficacy is how a teacher’s environment directly affects their attitude toward learning and how they conduct their teaching based upon their own understanding of their students (Anthony, 2012; Finger, 2009; Niess, 2011).

Social Cognitive Theory

Social cognitive theory suggests that when people observe a model performing a behavior and the consequences of that behavior, they remember the sequence of events and use this information to guide subsequent behaviors (Chen, 2012; Niess, 2011). In social cognitive theory, people are neither driven by inner forces nor are they automatically shaped and controlled by the environment. Knowledge and thinking skills provide the substance and tools for cognitive problem-solving (Bandura, 2003). Observing a model can also prompt the viewer to engage in behavior they learned (Jones, 2010; Niess, 2011). As Bandura (1977) said, “expectations of personal efficacy determine whether coping behavior will be initiated when it comes to learning. Factors influencing the cognitive processing of efficacy information arise from enactive, vicarious, exhortative, and emotive sources” (p. 192).

Self-Efficacy

Self-efficacy is defined as “people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives” (Bandura, 1977,
Self-efficacy beliefs determine how a person feels, thinks, behaves, and motivates him or herself. Such beliefs produce these diverse effects through four major processes. These include cognitive, motivational, affective, and selection processes (Bandura, 1977). The modeling of influences does more than provide a social standard against which to judge one’s own capabilities. Through their behavior and expressed ways of thinking, competent models transmit knowledge and teach observers effective skills and strategies for managing environmental demands (Bandura, 1977, 2003).

**TPACK**

TPACK is a theory that explains that every teacher should have content knowledge of their teaching area and know how to apply several methods of teaching it (Niess, 2011). Founded by Koehler and Mishra (2009), Technological Pedagogical Content Knowledge builds on Shulman’s 1980s construct of pedagogical content knowledge (PCK) to include technology knowledge (Shing, Saat, & Loke, 2015). Teachers’ understanding of educational technologies and PCK interact with one another to produce effective teaching with technology (Lu & Lei, 2011; Koehler & Mishra, 2009). Many views of teachers’ PD offer a one-size-fits-all approach to technology integration when, in fact, teachers operate in diverse contexts of teaching and learning (Koehler & Mishra, 2009). The TPACK framework design increases student motivation and makes the content more accessible (Niess, 2011; Wang, 2014). A teacher should make connections with professional knowledge into professional practices between the PD, self-efficacy, and cognitive modeling. Remarkably little is known about the barriers that pre-service teachers encounter during this process, but even less is known for in-service teachers (Donna &
The use of TPACK draws connections between each of these components for teacher preparation and PD (Finger, 2009; Niess, 2011).

The teacher should know how to integrate technology to make teaching and learning highly effective among students (Anthony, 2012; Finger, 2009; Niess, 2011). For example, a math teacher could use a geometry lesson in which students download and print three-dimensional polygons they then assemble during class time for a finished project. The lesson is designed to teach the shape and three-dimensional design which polygon for teaching a geometry lesson, but technology has been integrated by using a web-based tool for larger learning effect. The teacher has described an action-oriented intersection of the knowledge of subject area, knowledge of students, pedagogical knowledge, and knowledge of the environmental context; furthermore, this teacher engaged in planning, teaching, and assessing activities with their students as a result (Anthony, 2012; Niess, 2011).

Teachers who use constructivist pedagogy, such as TPACK, view learning as an active, group-oriented process in which learners construct an understanding of knowledge that can be utilized in problem-solving situations (Keengwe, Pearson, Smart, 2009). Pedagogy determines what tools instructors use in the classroom, and technology adds a useful dimension to a practical approach of instructional use to in-service teachers (Chen, 2009, Keengwe et. al, 2009). In the use of PD with mobile technology, modeling strategy requires both cognitive and self-efficacy modeling. TPACK framework offers several possibilities for promoting research in teacher education, teacher professional development, and teachers’ use of technology (Finger, 2009; Koehler & Mishra, 2009; Niess, 2011). Teachers who
demonstrate positive attitudes and perceptions as well as high self-confidence in technology usage are likely to integrate mobile technology for instruction (Chen, 2012).

Pre-service teachers have used TPACK for technology integration as part of their required education studies, but once working in K-12 schools many of these same teachers find little PD when it comes to using mobile technology in the classroom (Lui & Lee, 2013). The use of cognitive modeling can be a critical component of in-service teachers’ technology preparation (Dawson, 2012; Vaughan & Lawrence, 2013). Developing technology integration for pedagogy on specific subject matter requires developing sensitivity to class dynamics, as well as the transactional relationship between these components of knowledge situated in unique context (Finger, 2009). Effective teaching with technology requires teachers to have a sound understanding of the complex and dynamic relationships among content, pedagogy, and technology (Finger, 2009; Keengwe, et al.; Niess, 2011). The use of cognitive modeling can be a critical component of in-service teachers’ technology preparation (Vaughan & Lawrence, 2013).

Definitions

Mobile Technology: Mobile technology is defined as a device, such as a tablet or smartphone, that can store, access, create, allow modifying, organizing, or otherwise manipulating data in various forms from a location without being required to be tethered to any particular spot (Anthony, 2010; Chen, 2012; Lu et al., 2012). With constant expansion of technology both professional and publicly there doesn’t seem to be enough time for any type of professional training or use of technology with in-service teachers before it is applied to the classroom (Badura, 2006; Chen, 2012). “Technology implementation research indicates that teachers’ beliefs and knowledge, as well as a host of institutional factors, can influence technology
integration” (Anthony, 2012, p. 340). The increase of technology advancements has led to increased use of classroom devices such as tablets and more in classroom used in K-12 schools (Lu et al., 2013; Kenskin et al., 2012). The use of technology is very common in the classroom and among the world in both society and academics (Chen, 2012; Swan et al., 2011). Many schools find technology integration in every classroom from K-12 schools and in higher education due to the increased use of technology in society (Anthony, 2014; Chen, 2012).

Instructional Technology: Instructional technology aims to promote the application of validated, practical procedures in the design and delivery of instruction (Keskin et al., 2011). It is often defined either in terms of media and other technology (e.g., audiovisual media and equipment and computers) or in terms of a systematic process. Which encompasses instructional design, development, delivery and evaluation (Jones, 2010). Instructional technology is used for active learning in the classroom (Dawson, 2012). Instructional technology can be used for Inquiry Based Learning, Constructivist Learning, Theory of Total Integration Education, Experiential Learning, or one of the various other labels for or sub-categories of Active Learning (Dawson, 2012; Jones, 2010).

Limits

All research has limitations, and this study was no exception. There were assertions about the factors underlying these patterns; I provided evidence to support the assertions. This research followed the provisions of qualitative research, which was stipulated that written products are the result of direct of face-to-face interviews and site visits to collect data (Bayrakci, 2009). The reader was subjected to a version and not the version of the interviewee (Bandura, 1997; Bayrakci, 2009; Wyatt, 2015). As with all case studies (Anthony, 2012; Pierson & Cozart, 2004...
Niess, 2011) and with many studies in the field of education, this study was limited by its context. The study was conducted with a small number of in-service teachers at two specific K-12 institutions in the U.S. The findings will be suggestive of patterns from both groups.

Delimitations

Participation in the study is delimited to the classroom teachers of urban K-12 schools that teach standard elementary to secondary classroom courses. The teachers who taught classroom courses were a component of the population. These experiences will be studied through their descriptions (via the interviews) and their documentation (via the transcripts) (Yin, 2003). As there were eleven research participants, each with her or his own experiences, this research was based on eleven case studies. This means that this study was primarily qualitative since there will be triangulation of data using interviews, transcripts, and survey data. Thus, the researcher examined the transcripts qualitatively using the tool for assessing self-efficacy developed by Bandura (2007). The researcher did not use quantitative tools to examine various aspects of self-efficacy nor did the researcher survey large numbers of teachers.

Summary

Formal PD for mobile technology is an issue for in-service teachers as they are uninformed about what type of PD is needed to adapt and utilize mobile technology in the classroom. Anthony (2012), Chen (2012), and Niess (2011) studied the use of mobile technology with in-service teachers who have had formal PD to use mobile technology with their pedagogy Student Center Teaching. However, Liu & Lee (2013), Kee (2014), (Van Zee & Gillow-Wiles, 2010) and Yang (2012) expressed concerned that in-service teachers were not receiving proper
PD in order to utilize and integrate mobile technology into their classrooms and were not having many opportunities for formal PD for future integration or pedagogy adaption.

To address this problem, schools arranged PD for in-service teachers or in-service teachers using informal PD to enable teachers in order to adapt and utilize mobile technology that is available to them to meet enhanced Student Learning Objectives (SLO). Dawson (2012), Pan & Franklin (2011), Giraldo (2014), Koehler (2006) and Wyatt (2015) emphasized the success of administration and leadership using weekly PD to pique in-service teachers’ interests in adapting mobile technology in their curriculum. The goal of this case study was to see if the use of PD either formally or informally would encourage in-service teachers to integrate mobile technology into their classrooms for full utilization of mobile technology.
CHAPTER 2

REVIEW OF LITERATURE

The Use of Mobile Technology in the Classroom

This qualitative case study is of in-service teachers’ experiences and attitudes toward professional development in mobile technology integration in a student-oriented learning classroom in a K-12 setting. Professional Development with teachers can be essential to using mobile learning in their classrooms. Teachers commonly use both formal and informal PD in classroom teaching. Informal PD practices include consultation and mentoring while formal practices include lesson study, reflective supervision, and technical assistance (Chen, 2012). Some teachers prefer to use cognitive modeling during teaching to explore the creative process. For instance, giving narrations during the lesson study and asking students to give their personal views on the subject (Jones, 2010; Ongun et al., 2011; Varol, 2013).

The self-efficacy of students is dependent on the way the teacher utilizes mobile technology in the classroom (Chen, 2012; Keskin et al., 2011; Lu & Lei, 2012). On the same note, Bandura (1977) stipulated the way coping behavior is initiated at a personal level in the learning process impacts the outcomes of personal efficacy. Factors arising from enactive, vicarious, exhortative, and emotive sources could hinder learning (Finger, 2009; Vaughan & Lawrence 2013). Specialists in the field of education note that the self-efficacy of teachers determines their teaching style and affects learning among students despite the expended efforts.
and constraints to the learning process (Chen, 2012; Keengwe, 2009). The view is attributable to self-efficacy’s status as an independent factor in classroom learning. The independence of self-efficacy requires teachers to embrace mobile technology in the classroom to promote effective learning by enhancing students’ enthusiasm for the lessons. For instance, implementing mobile technology in teaching would enhance participation because students like to interact with mobile technology. Notably, pre- and in-service teachers implement mobile technology in varying ways because they serve different groups of learners and practitioners.

Technology Integrated Education Theory

Integrating technology and m-learning into a classroom needs structure and aligning teachers’ practices and beliefs. Technology Integrated Education (TIE) theory predicts that mental structures formed by learners are stronger when “knowing what,” “knowing how,” and “knowing that” are integrated with learner emotions and intentions (Frick, 2011). TIE is the notion of combining student cognition, intention, and emotion with authentic learning tasks (Chen, 2012; Frick, 2011). It is recommended that strategy for improving curriculum is used, based on sequencing authentic, whole learning tasks from simple to complex, related to teachers’ intrinsic beliefs and practices (Dawson, 2012). Understanding the use of mobile technology in a student-centered classroom and PD need consideration so that teachers can integrate technology to promote student-centered learning (Chen, 2012; Choy, Wong, & Gao, 2009).

Remarkably, these learning tasks are expected to help students integrate nine kinds of cognition with emotions and intentions: precognitive, acquisitive, appreciative, protocoled, adaptive, creative, instinctual, relational, and criterial (Frick, 2016; Niess, 2011). In-service teachers’ attitudes can be used to predict behaviors (Varol, 2013). Previous studies focus on
ways to provide technology-related knowledge and skills to pre-service teachers that change their attitudes toward technology integration (Anthony, 2012; Chen, 2012; Choy et al., 2009).

However, I found few studies that track the changes in pre-service teachers’ attitudes, beliefs, and practices in technology integration from the beginning of coursework until the transition into full-time in-service classroom experience or related PD with mobile technology integration (Chen, 2012; Choy et al., 2009; Keengwe et al., 2009; Niess, 2011).

**Theory of Social Cognition**

Social Cognitive Theory holds that when people observe a model performing a behavior and the consequences of that behavior, they tend to remember the sequence of events even after a period of time. People use the information obtained through their observations as a guideline for future behavior (Chen, 2012; Niess, 2011). People do not learn new behaviors only by trying them and either succeeding or failing, but by evaluating teachers’ success in promoting the replication of the actions of others. General self-efficacy can be identified to be at a moderate level, but higher than computer self-efficacy. General self-efficacy can indeed be regarded as situation-free, but the correlation between the two psychological constructs such as m-learning and PD suggests that it might be difficult to raise an individual’s domain specific self-efficacy perception without increasing the global sense initially. (Anthony, 2012; Liu & Lee, 2013; Topkaya, 2010)

According to Bandura (1977), “expectation for personal efficacy is determining whether coping behavior will be initiated when it comes to learning and understanding” (192). The statement implies that the factors influencing the cognitive processing of efficacy information result from enactive, vicarious, exhortative, and emotive sources, despite the effort it takes to
endure obstacles and corresponding reductions in defensive behavior (Bandura, 1977).
According to Bandura (1997), some individuals give up when they encounter obstacles, while others push through the difficulty and succeed against the odds. The former tends to have lower self-efficacy beliefs while the latter serves to strengthen them. People with higher self-efficacy learn to maintain their patience amidst challenges and end up setting higher performance goals (Lin, Hsiao, Tseng et al., 2014). Varol (2013) notes that the introduction of new technologies minimizes the time in-service teachers would use for professional training and skill practice. This implies that policymakers should seek to implement measures that reduce the negative impact of emerging technologies in education professional training and classroom teaching practice.
Anthony (2012) stated, “Technology implementation research indicates that teachers’ beliefs and knowledge, as well as a host of institutional factors, can influence technology integration” (p. 340).

Self-Efficacy Beliefs

Self-efficacy is defined as “a theory of self-regulation” (Bandura, 1977), which means a person’s beliefs produce an expected outcome that affects how they teach (Lummis, Morris, & Paolino, 2014). Bandura (1986) said success is not solely dependent on the skills to do a specific job, but also requires the teacher to apply an already familiar skill to his or her daily practice. Bandura’s Four Stages of self-efficacy are: Mastery Experiences, Vicarious Experiences, Verbal Persuasion, and Emotional and Physiological States (Badura, 1977). Stage 2, known as Vicarious Experiences, comes with when a person observes people around them. Seeing people similar to ourselves succeed by their own sustained efforts raise our beliefs that we will also possess the capabilities to master activities needed for success in a specific area. Stage 3, Verbal Persuasion,
Stage 4, Emotion and Physiological States of Being, describes how one’s state influences the ability to judge one’s self-efficacy. Having stressful reactions or tensions can show vulnerability and lead to poor performance, where positive emotions can lead to success in an area being attempted to master (Badura, 1977, 1997).

This study focused on Stage 1 experience: Mastery. Badura (1977) describes how having success in mastering a task or controlling an environment will build self-belief in that particular area where failure will undermine that efficacy belief. This is part student-centered social cognitive theory, which establishes specific, short-term goals that are viewed as challenging yet attainable. Social cognitive theory helps students understand specific learning strategies applied in the classroom (Schunk & Pajres, 2002). Social cognitive theory entails drawing a contrast between a student’s performance and goals, rather than comparing one student against another or comparing one student to the rest of their class (Bandura, 1977). Is it these same beliefs that lead in-service teachers to succeed or fail at mobile technology integration? Individuals might have a negative or fearful attitude toward classroom technology use (Wang, 2014), affecting his or her self-efficacy and PD (Bayrakci, 2009; Wang, 2014). Improvement in classroom self-efficacy because of positive attitudes toward technology can also increase classroom technology use for both the teacher and the students (Lu & Lei, 2012; Varol, 2013). To have effective technology integration in the classroom, most teachers need to have prior technology knowledge that works with their basic style of teaching (Varol, 2013).
While there is much hype surrounding new technologies, the core challenge for education practitioners is how to employ them in a manner that is engaging and results in measurably successful learning outcomes for students (Varol, Trevathan, & Myers, 2013; Yang, 2013). M-learning has the potential to bring the instructor, peers, and resources together, especially when indirect supervision models are used, to support the students' creativity and practice (Kenny et. al, 2009). The use of mobile devices creates a significant access to educational materials and contributes to student learning with the help of mobile devices that facilitate students’ learning and understanding (Churchill et al., 2016). Student-centered teaching research consistently shows the benefits of moving toward a more inclusive, student-centered classroom (Swackhamer et al., 2009). Teacher self-efficacy beliefs regarding the use of assorted student-centered teaching methods within complex classroom environments directly affects the use of instruction toward social cognitive theory pedagogy (Fishback et al., 2015).

Bandura as cited in (Huh et al., 2014) emphasized that self-efficacy beliefs are not static; they can change depending on the difficulty of the task, environmental changes, individual encounters with failure, or other reasons. The ways an individual respond to failure or setbacks are important. According to Bandura (1997), most individuals give up when they cannot overcome learning obstacles while some will push through. The former tends to have lower self-efficacy beliefs while the latter serves to strengthen them through those failures. Those with higher self-efficacy persist longer and set higher performance goals (Finger, 2009; Fishback et al., 2015). Many in-service teachers become frustrated when little PD has been introduced to
ensure students with basic technology skills will be able to learn with mobile technology (Banister & Ross, 2006; Finger, 2009; Niess, 2011).

**Professional Development**

Teachers in K-12 schools have attended PD seminars with the intent of increasing self-efficacy (Swan, Wolf, & Cano, 2011). Multiple studies found that in education, professional learning and development is created using knowledge, practice, commitment, and reflection (Jones, 2010; Kee & Samsudin, 2014; Keskin, 2011). Factors influencing the cognitive processing of efficacy information arise from enactive, vicarious, exhortative, and emotive sources (Bandura, 1977; Kee & Samsudin, 2014; Keskin, 2011). The view implies that no matter how much effort a learner expends to learn new skills, or how long their effort must be sustained in the face of obstacles and corresponding reductions in a defensive behavior, there will always be a change in how it applies to a learner’s environment (Bandura, 1977). If a teacher is given the task of understanding a component of technology on their own and has no understanding of how to integrate it into their classroom, how does that affect an in-service teacher’s self-efficacy? Bandura’s research pointed out that the sources of teacher self-efficacy (mastery experiences, physiological and emotional states, vicarious experiences, and social persuasion) warrant further research to determine if the trends are consistent for all novice educators and pre-service teachers (Chen, 2012; Swan et al., 2011).

However, a problem develops when an in-service teacher is charged with integrating technology into their classroom and is provided no PD on how to do so (Jones, 2010; Ongun et al., 2011; Varol, 2013). Mobile technology integration in education is still undergoing continuous improvement. It is unknown if in-service teachers have had any PD with the use of
mobile technology in their classroom activities and lessons (Giraldo, 2014). Teachers want PD that is relevant to their students and that they can use right away in their student centered teaching (Lummis et al., 2014). In-service teachers who are practical and insightful will be able to integrate technology into their classrooms (Lin, et al., 2014). There is no sign of inspiration for leadership in implementing a shared vision and the effective integration of technology for PD with in-service teachers that exists with pre-service teachers (Chen, 2012; Keengwe et al., 2009).

This supports the idea that active involvement by teachers in their PD and active leadership from administration should lead to a more successful collective implementation. The relationship between teachers and administration creates a clearer picture of how to integrate mobile technology into both the classroom and the curriculum (Anthony, 2012; Chen, 2012; Varol, 2013). Instructional leadership affects collective efficacy indirectly through teachers’ self-efficacy in the PD process. In other words, when school principals demonstrate instructional leadership behaviors, teachers perceive themselves as more capable of teaching their students, and they make a great effort for technology integration (Chen, 2012; Keengwe et al., 2009; Varol, 2013). The more administration embraces not only mobile technology, but new types of technology within the classroom, there should a better understanding and acceptance of changes (Wyatt, 2015).

Both leadership and administration play key roles in technology integration within a K-12 classroom and can directly affect a teacher’s self-efficacy (Anthony, 2012; Chen, 2012; Varol, 2013). Most in-service teachers have established self-efficacy based on their own self-guided learning in the K-12 classroom (Chen, 2012; Wyatt, 2015). Research in this field has shown the appearance of “computer phobia” (Chen, 2012; Liu & Lee, 2013; Niess, 2005). This fear of not being able to understand their mobile device or feeling they will never understand how to use it
in an educational setting can lead to high levels of anxiety (Chen, 2012). This can have a negative impact on a teacher’s self-efficacy and affect students’ learning (Chen, 2012; Jones, 2010). If there is a lack of using either a tool or type of PD strategy, in-service teachers are less likely to successfully integrate mobile technology in their classroom (Keengwe et al., 2009; Liu & Lee, 2013; Swan et al., 2011). This fear of using technological tools can be from a lack of PD or TPACK in new classroom technology integration (Niess, 2005).

The more in-service teachers participate in PD, the more likely they will become confident integrating technologies into their classroom use (Öz, 2014). With constant expansion of technology, in-service teachers don’t seem to have enough time for professional training or practice with technology before it is applied to the classroom (Ertmer & Ottenbreit-Leftwich, 2010; Topkaya, 2010). According to Anthony (2012), “Technology implementation research indicates that teachers’ beliefs and knowledge, as well as a host of institutional factors, can influence technology integration” (p. 340). The more teachers and students use technology the more both will want to participate in lessons using it (Chen, 2012; Liu & Lee, 2013). Classrooms embracing technology in their daily studies and homework assignments were found to stimulate student learning (Tsai et al., 2005). This is not to say that making classrooms completely student led is the true way for better teacher PD. Many in-service teachers find it difficult to abandon their traditional sense of teaching (Brusco et al., 2007; Liu & Lee, 2013). It is when both students and teachers are able to understand and absorb the ways they use technology in a school setting that they are best able to develop through the use of classroom technology tools (Anthony, 2014; Swan et al., 2011).

PD modeling is used not only to encourage teachers to want to use more mobile technology in their classrooms, but also to increase students’ enthusiasm for their lessons and
studies (Liu & Lee, 2013). However, there is not much research regarding how in-service teachers established self-efficacy affects the integration of mobile technology in their classrooms (Chen, 2012; Keengwe et al., 2009; Liu & Lee, 2013). A modeling strategy that requires either cognitive and self-efficacy modeling or technological pedagogical content knowledge (TPACK) is needed to maintain TPACK for the PD status of educational technology use (Finger, 2009). While pre-service teachers use TPACK and other technology integration as part of their concluding studies, they find there is little PD when it comes to using mobile technology in their classroom activities (Liu & Lee, 2013; Niess, 2011).

As the frequency of teachers’ mobile technology use increases (Anthony, 2014), so does their support of its use in classroom teaching. This also increases students’ enthusiasm to participate in their lessons and studies (Anthony, 2012; Giraldo, 2014). When new and established mobile technology is not embraced on both a professional and student level, integration fails (Chen, 2012; Wang, 2014). It is essential that there is proper implementation of mobile technology in promoting a teacher’s self-efficacy (Lie & Lu, 2012; Varol, 2013). In-service teachers should have a shared vision of their learning style to effectively integrate technology in their PD (Bjekic et al., 2010; Cakir, 2012; Katz, et al., 2015).

TPACK and Professional Development

The TPACK framework design increases student motivation and makes the content more accessible (Niess, 2011). A teacher cannot simply be given a tool and expect to know how to build with it. He or she must make connections between the PD, self-efficacy, and cognitive modeling. The use of TPACK is a key between each of these components for teacher preparation and PD (Finger, 2009; Niess, 2011). Teacher TPACK knowledge guides the use of particular
technologies to teach concepts using pedagogies. The barriers relate to other technologies used in K-12 education (Donna & Miller, 2013). Pre-service teachers using TPACK have it integrated in their course studies while still completing school (Donna & Miller, 2013; Lui & Lee, 2013; Niess, 2011). In-service teachers who have their own established classrooms have no existing form of TPACK (Wang, 2014). In-service teachers are usually given the task of creating their own TPACK when classroom technology is introduced (Finger, 2009; Zee & Gillow-Wiles, 2010).

TPACK might be measured to ensure the effectiveness of PD and teacher preparation programs intended to enhance TPACK and in turn directly affect in-service teachers’ self-efficacy in using mobile technology (Chen, 2012; Liu & Lee, 2013; Niess, 2005). As pre- and in-service teachers begin to integrate technology into the classroom, both the teacher and the student, adapt to different learning within their environments (Chen, 2012; Zee & Gillow-wiles, 2010). One student can pick up a mobile device and see the applications of using it during a lesson or activity. The same can be said about a teacher as they find themselves not only a user but also a student – they need PD when it comes to integrating technology with classroom lessons (Chen, 2012; Liu & Lee, 2013).

Technology is very common in both society and academia around the world (Chen, 2012; Swan et al., 2011). Although adults are likely to be interested in exercising some degree of autonomy in learning, teaching and staff who facilitate adult learning should expect diversity not only among learners but across situations for the same individual and be prepared to adjust expectations (Topkaya, 2011). If TPACK is to be a key outcome of teacher preparation and professional development it is highly desirable to have a reliable and valid means to assess its development (Finger, 2009; Hayes, 2014). Many K-12 schools find technology integration in
every classroom easy due to the increased use of technology in society (Anthony, 2014; Chen, 2012). For effective integration, teachers need to have technology knowledge, which is one of the basic skills of teaching (Cakir, 2012; Topkaya, 2010; Varol, 2013). However, such knowledge is not enough for effective teaching with technology. Teachers have to know about hardware as well as software and how to integrate them into instruction (Cakir, 2012; Öz, 2014).

Advancements in technology have led to increased use of devices such as tablets in K-12 classrooms (Öz, 2014). There seems to be a disconnect between learning and understanding when it comes to how educators align technology with their curriculum (Anthony, 2012; Donna & Miller, 2013). Their ability to perform must be developed by nurturing not only their knowledge but also their resources (Öz, 2014; Varol, 2009). To improve retention, teachers must believe that they are competent in the tasks they are required to perform (Anthony, 2012; Swan et al., 2011).

The lack of PD regarding classroom technology seems to be directly affecting in-service teachers’ self-efficacy (Dawson, 2012). It would be significant to undertake research in developing such PD using TPACK. Creating PD in mobile technology informs instructional designers and contributes to mobile technology instruction. In this way, the willingness of teachers and students to learn with mobile technology brings success in the classroom. While teacher self-efficacy is considered situation specific (Bandura, 1997), the level of specificity required of PD is less clear (Garvis, 2005). Research suggests that personal teaching efficacy tends to increase during teacher education and pre-service training (Finger, 2009; Garvis, 2005).

Perceived self-efficacy should also be distinguished from other constructs such as self-esteem and outcome expectancies (Bandura, 1997; Swan et al., 2011). High focus of control does not necessarily create a significant feeling of control, as pointed out by Anthony (2012). Self-
efficacy beliefs can differ based on how in-service teachers judge themselves across a wide range of active and functioning classroom domains (Bandura, 1997; Niess, 2005). The PD of mobile technology should always be based on the user, but the environment will always be a factor. Just like when teachers first create their classroom based on their students, they must also use their environment for the basis of their teaching with technology. As stated by Swan et al. (2011), “Teachers’ effectiveness is, in part, determined also by their efficacy beliefs (teacher self–efficacy) in maintaining classroom discipline that establishes an environment of learning, in using resources, and in supporting parental efforts to help their children learn” (p. 676). This belief was echoed by Anthony (2012): “Technology implementation research indicates that teachers’ beliefs and knowledge, as well as a host of institutional factors, can influence technology integration” (p. 340).

The use of both pedagogical changes and new ways of learning with TPACK can open up information, learning tools, and progress in the implementation of teaching schema (Dawson, 2012; Wang, 2014). Teachers who become more aware of their students' cognitive skills, attitudes, and misconceptions could enhance their own self-efficacy in the classroom using mobile technology. The literature supports the need for more research on how to create and maintain PD for classroom mobile technology integration (Anthony, 2012; Chen, 2012). There is also evidence (Chen, 2012; Katz et al., 2015; Zee & Gillow-Wiles, 2010) of a gap in research on identifying the need for PD among in-service teachers, how their self-efficacy is affecting any barriers in PD, or whether they are creating any new barriers (Anthony, 2012; Tsai et al., 2005). Finally, there is a lack of research using either a tool or strategy that could aid in the use of PD to better integrate mobile technology in the classroom. It is essential that there is a true collaboration between teachers’ integration self-efficacy and use of mobile technology as a tool.
There must be a model of TPACK in-service teacher PD that can affect a teacher’s self-efficacy in a positive way.

In order to practice better PD, teachers should be constantly active in their classrooms (Liu & Lee, 2013). Leadership leads to a more collective involvement with teachers as studies support (Cakir, 2012; Jones, 2010). Teachers’ support of mobile technology increases depending on the frequency of teachers using mobile technology resources (Anthony, 2012). The more in-service teachers use mobile technology with their students, the better they will integrate mobile technology into their classrooms (Chen, 2012; Jones, 2010). Classrooms starting to embrace or utilize mobile technology more frequently in their daily studies and homework assignments saw students who were more attentive, engaged, and supportive of each other since they find the lessons more interesting (Liu & Lee, 2013; Öz, 2014). Teachers who are able to develop through the use of mobile technology tools find their classroom activities more coherent and teaching experiences more productive (Anthony, 2012; Giraldo, 2014; Swan et al., 2011).

In the 21st century, where lifestyles, attitudes, and skills are challenged daily through technology, students must remain active in their learning just like their teachers (Wang, 2014). When thinking about teaching and instruction one should focus on using mobile technology to deliver educational materials efficiently and provide a greater flexibility in student learning. When mobile technology is integrated into the curriculum, it effectively enhances teaching and promotes student learning (Keengwe et al., 2009; Swan et al., 2011). My research is to determine if the trends identified are consistent for all teachers.
TPACK and Self-Efficacy

Many in-service teachers find it difficult to abandon their traditional sense of teaching to maintain a well-orchestrated classroom (Liu & Lee, 2013; Swan et al., 2011). However, as teacher self-efficacy is a significant factor in teacher retention (Swan et al., 2011), teachers usually rely on transmitting their lessons directly, affecting student self-efficacy (Anthony, 2014; Bandura, 1997; Swan et al., 2011). When both students and teachers can understand their use of mobile technology in a school setting, both are able to utilize mobile devices. This development allows their content knowledge with TPACK to directly affect their classroom self-efficacy in mobile technology integration. These studies all point to the need for further research in creating a type of PD that focuses directly on mobile technology integration (Niess, 2005; Swan et al., 2011).

Self-efficacy motivates one to complete tasks one knows how to do (Bandura, 1997). Efficacy differs by both the learner and the environment (Anthony, 2012; Swan et al., 2011). Cognitive modeling can directly affect a pre-service teachers’ self-efficacy with their classroom lessons (Liu & Lee, 2013). An in-service teacher must rely on their TPACK development when it comes to mobile technology (Lu & Lei, 2012; Zee & Gillow-Wiles, 2010). Traditionalists cannot fall back on common practices when it comes to teaching in technology-integrated classrooms. Teachers must develop and assess their teaching skills with mobile technology in the classroom. The continuing rapid development of technology is leaving learners out of their controlled learning environment (Niess, 2011). It is well-known (Anthony, 2012; Keengwe et al., 2009; Liu & Lee, 2013; Swan et al., 2011) that the skill and experience of teachers is key to
integrating technology into the classroom. Each learner must be able to use technology with ease and comfort in his or her own learning environment.

It is important that learners engage with meaningful real-world challenges that make a difference in their learning environment (Niess, 2011; Wang, 2014). Much like their students, teachers need PD when it comes to integrating technology (Anthony, 2012; Liu & Lee, 2013). In-service teachers are limited in their access to PD opportunities to develop their TPACK (Van Zee & Gillow-Wiles, 2010). In-service teachers must shift from their traditional summative assessment of driven education to a more learning-centered, collaborative, and self-regulated model or use real-world practices to effectively integrate technology in the classroom (Cakir, 2012; Wang, 2014). Teachers should not just rely on these learning or project models, but use their classroom management skills and student-centered learning environments to develop new skills and enhance teaching and learning (Chen, 2012; Niess, 2005; Varol 2013).

Many previous studies focus on the self-efficacy of professional development for teachers in K-12 (Cakir, 2012; Chen, 2012; Niess, 2005). There were few studies found on PD for self-efficacy with mobile technology in K-12, as mobile technology is a very practical application (Anthony, 2012; Wang, 2014; Varol, 2013). As the frequency of teachers using mobile technology increases, their support of it in the classroom also increases (Anthony, 2014). The lack of PD with mobile technology seems to be directly affecting in-service teachers’ mobile technology self-efficacy. Further research in the creation of such PD using TPACK is needed. When both teachers and students are enthusiastic to learn with mobile technology then integration in the classroom should succeed.

The transfer of technology integration ideas from modeling in a real-world situation to a classroom environment, although superficial and rigid, can allow teachers to understand a
decision-making process (Öz, 2014). Thus, teachers should be aware of and sensitive to the major factors that influence their decision to integrate technology for teaching (Anthony, 2014; Liu & Lee, 2013; Swan et al., 2011). The use of mobile technology should be based on how teachers teach (Cakir, 2012; Niess, 2011). As teachers become more knowledgeable and comfortable in the use of innovative classroom technologies instructional practices will also improve, change, or be transformed (Topkaya, 2010). The integration of technology into classroom instruction will have a significant effect on teachers’ self-efficacy (Keengwe et al., 2009; Liu & Lee, 2013). For this successful integration to occur, in-service teachers must feel a strong sense of control over their PD to be more efficient and effective with the use of mobile classroom technology tools (Liu & Lee, 2013; Öz, 2014).

Summary and Conclusion

The lack of PD with mobile technology is part of every section in the educational curriculum. Just like every student is a different type of learner, practitioners point out that leadership and administration play a key role with integrating technology into a K-12 classroom and with teacher self-efficacy. However, there is not much research on how in-service teachers established self-efficacy affects their integration and utilization of mobile technology in their classrooms. Failure of both teachers and students to embrace mobile technology is bound to cause integration to fail. A true collaboration between administration, teacher, and students is essential when it comes to integration. With mobile technology integration into education still emerging, previous studies fail to examine whether in-service teachers have had any professional development with using mobile technology in their classroom activities and lessons, either from administration or from their own TPACK (Niess, 2011).
However, PD is only one piece of the puzzle in creating effective technology teacher training. Teachers must also be able to align their curriculum and their own learning goals with those of their students. Teachers need to take into consideration the most appropriate means of engaging learners in a quest for meaningful academic development and implementation. The teacher must shift from traditional summative assessment of driven education to a more learning-centered, collaborative and self-regulated model or use real world practices when it comes to effectively integrating technology into the classroom (Marin, 2011). Teachers should integrate knowledge of the technology they use in their daily lives into the classroom. Better understanding in-service teachers’ experiences and attitudes toward professional development in mobile technology integration in the classroom should help further this discussion.
CHAPTER 3

METHODOLOGY

The purpose of this case study of in-service teachers’ experiences and attitudes toward professional development in mobile technology integration in the classroom was to examine how formal PD affects in-service teachers’ intention to utilize and integrate mobile technology in their classrooms. The changing nature of how teachers receive and distribute information suggests that educators need new strategies and tools for teaching and enhancing learning (Hayes, 2014). This chapter examines the process of selecting a research approach and explains the theory underlying the methodology. A description is provided on the research setting, participants, data collection procedures, and analytical techniques for this study. The chapter ends with the criteria for evaluating the proposed study and an overview of later chapters.

Selection of the Research Method

Research Paradigm

The rapid growth of technology in education continues to have a profound impact on the teaching profession (Hayes, 2014). The varying nature of the way people receive and distribute information suggests that educators need new strategies and tools for teaching and learning (Chen, 2012; Hayes, 2014). Advancement of computing and communication technologies is moving the learning paradigms from conventional learning to electronic learning (e-learning), from electronic learning to mobile learning (m-learning), and now to ubiquitous learning (u-
Emergent mobile technology is promoting a paradigm shift within the classroom (Keskin et al., 2011). This recognizes the need for a broader perspective that having greater self-efficacy beliefs leads to more personalized learning that a number of researchers have proposed examining the integration of technology, content, and pedagogy in the field of classroom self-efficacy (Chen, 2012; Niess, 2011; Varol, 2013). This theoretical position of m-learning and u-learning requires constant reflexivity, questions the impact on all aspects of the research, and builds on quality procedures through the process of PD (Varol, 2013; Wyatt, 2015). Synthesis of early research efforts on the design of teacher education programs directed toward knowledge development highlights current and emerging questions and challenges (Niess, 2011). Qualitative research methods can help identify and explain any apparent lack of fit between teachers reported self-efficacy beliefs and their practical knowledge. This analysis may be able to facilitate subsequent intervention to support teacher development. Qualitative findings often have an insightful and straightforward framework that represents a creative synthesis and personal inquiry (Yin, 2003).

Research Design Selection

There is a need for qualitative research in teachers’ self-efficacy beliefs so that educators of pre- and in-service teachers can gain a deeper understanding of the relationship between those beliefs and other cognitions possessed by teachers, including their practical knowledge. Teachers’ self-efficacy beliefs may need support if they seem too low for understanding PD or challenging if standards seem too high, people are generally guided by their perceptions instead of their actual capabilities (Anthony, 2012; Liu & Lee, 2013; Wyatt, 2015). A high perception of self-efficacy plays a major role in how in-service teachers approach goals, undertake tasks, and
face challenges (Topkaya, 2011). Qualitative research that centers on teachers’ classroom perspective and teachers’ concerns for outcomes, and how these are achieved, is the focus for self-efficacy case studies (Jones, 2009; Wyatt, 2015). The case study approach provides a means to capture all the complexities of the study. The method of case study is defined as the study of a particular area by coming to an understanding of its activity within important circumstances that affect the participants (Patton, 2000; Yin, 2003).

**Case Study Approach**

With a theoretical framework grounded in social cognitive theory and classroom self-efficacy in an educational context, this study was influenced by research in both fields. Through fostering a supportive and equitable environment for teachers’ classroom technology, the case study has important implications for how technology utilization and integration is understood and practiced in school settings (Anthony, 2012; Chen, 2012; Niess, 2011). This work can be seen as an interpretive case study on how teachers’ PD affects their classroom self-efficacy and how limited support can have an impact on in-service teachers utilizing and integrating mobile technology (Bandura, 2006; Wyatt, 2015). Teacher efficacy can affect both the environment that teachers create and the instructional practices they use in the classroom (Bandura, 1997; Yildirim, 2012). Framed by principles of social cognitive theory and TPACK, this inquiry explores the role of mobile technology, collaboration, and experience-centered learning in a PD setting (Niess, 2011). Qualitative inquiry methods enable an in-depth investigation of influences on teachers’ technology integration practices in an authentic setting (Anthony, 2012; Ghanbari, 2015). To assess the beliefs elicited about professional development for mobile technology use in the classroom, there is a need for rigorous qualitative procedures (Wyatt, 2015).
Franklin (2011) made a suggestion of a theoretical framework that enhances predicting the integration of mobile technology in K-12 schools with a requirement that in-service teachers using Social Cognitive Theory must have a level of PD to ensure a higher level of classroom self-efficacy. Self-efficacy has been used successfully by prior studies as a reliable measurement for predicting the integration or implementation of technology in education (Franklin, 2011; Varol, 2009). Bandura (1997) stipulated, “People’s level of motivation, affective states, and actions are based more on what they believe than on what is objectively true” (p. 2). Both Patton (2000) and Wyatt (2015) also argued that an individual’s behavioral choices are dominated by the judgment of efficacy beliefs. In other words, their research assumed an individual possesses the proper skills, knowledge, and incentives within their classroom. People with high self-efficacy are able to accomplish tasks far beyond their capabilities; people with low efficacy might underestimate their ability to cope with difficult tasks and fail to finish the work (Bandura, 1997). The use of a qualitative case study offers a data analysis focus for piecing together when identifying factors affecting the trustworthiness of data collection and the presentation of the results of content so findings can be analyzed for consistency and assessed for their similarities, differences, or unique characteristics (Patton, 2000; Varol, 2009).

Benefits of Proposed Methodology

In-service teachers express the need to observe and participate in best-practice models, which demonstrate technology in teaching as part of their PD for technology integration (Hayes, 2014). PD is recommended to provide additional opportunities for pre-service and in-service teachers to observe exemplary practices of effective technology integration paradigms (Hayes, 2014; Niess, 2011; Varol, 2013). There is a focus on how qualitative case study research
methodology is used to assess the degree of fit of teachers’ reported self-efficacy beliefs and their practical knowledge in support of PD (Wyatt, 2015). Persuasive arguments have been put forth for the use of interpretive qualitative case study research methodology to provide broader and deeper understandings of the use of PD and mobile technology integration in a K-12 classroom (Niess, 2011; Varol, 2012; Wyatt, 2015). Case study research is an ideal methodology to assess the beliefs elicited for degree of fit. Therefore, there is a need for qualitative procedures. This research approach should result in some practical outcome related to the lives or work of the participants, which in this case is the effective integration of mobile devices in future K-12 teaching practice (Vaughn & Lawrence, 2013; Wyatt, 2015).

Research conducted for PD often relies on qualitative methods (Patton, 2000; Yin, 2003). However, Van Zee & Gillow-Wiles (2010) stated, “With newer technologies, [teachers] need programs that engage them in envisioning the use of those technologies for learning the content and that challenge the curricula, given the power of the technologies” (p. 48). There is need for a “well-designed professional development … to increase self-efficacy in operating these tools” (Franklin, 2011, p. 36). A qualitative study, such as the one proposed, will meet the need for this research. Qualitative research into teachers’ self-efficacy beliefs provides a deeper understanding within the field of the relationship between these beliefs, the relationship with their students and other cognitions possessed by in-service teachers (Wyatt, 2015). In the words of Anderson (2010): “Qualitative research involves the collection, analysis, and interpretation of data that are not easily reduced to numbers. This data relates to the social world and the concepts and behaviors of people within it.” Skills like problem solving, literacy, creativity, and motivation are positively influenced when teachers have access to technology in their learning environments. The use of technology as an instructional tool enhances students’ learning and
educational outcomes. This in detail affects an in-service teachers’ classroom self-efficacy about their beliefs and knowledge of integrating technology (Zee & Gillow-Wiles, 2010).

**Research Design**

The case study approach was selected because it is the one most fitting to the topic and research questions. A collective case study of two K-12 institutions that integrate mobile technology in classrooms using qualitative inquiry methods enabled an in-depth investigation of influences on teachers’ technology integration practices in an authentic K-12 setting (Anthony, 2012; Ghanbari, 2015). The integral role of mobile technology in the classroom that serves this case study has important implications for how technology leadership is understood and practiced in school settings (Anthony, 2012; Niess, 2011). Participants were interviewed and transcripts from these interviews were examined. In this section, I present my research questions and discuss how the methods best fit these questions.

**Researcher’s Role**

It is useful with qualitative research to keep a research journal explicating personal reactions and reflections, insights into one’s self and past (Simon, 2003). The process of collecting, abstracting, and organizing data can be recognized by researchers as an effective way for finding and analyzing visual data (Hung et al., 2012). The qualitative researcher should also explain if their role is as an insider who is a full participant in activity, program and their role is more centric that is from a more outside view, and more of an objective viewer (Simon, 2003). There should be a lot of variation between them and sometimes a researcher starts out as a n outsider and then becomes a member of the group that they are studying (Anthony, 2012; Simo
A researcher needs to describe relevant aspects of self, including any biases and assumptions, any expectations, and experiences to qualify his or her ability to conduct the research (Bayrakci, 2009; Simon, 2003; Van Zee & Gillow-Wiles, 2010).

Figure 1. Professional Development Influence on Self-Efficacy

In the study, each case consisted of the experiences and attitudes of the in-service teacher in how he or she had experienced PD with classroom mobile technology during his or her career. These experiences and attitudes were studied both through his or her descriptions (via the interviews) and his or her documentation (via the transcripts) (Yin, 2003). Five to eleven cases were studied as there were eleven in-service research participants, each with her or his own experiences.
Research Questions

1. Overarching question: What were the experiences and attitudes of in-service teachers with formal m-learning professional development?
   a. How do in-service teachers perceive their ability to apply m-learning strategies obtained in formal professional development?
   b. How confident were in-service teachers with their ability to use mobile technologies with learning and teaching?
   c. How ready do in-service teachers feel they are to use mobile technologies with learning and teaching?
   d. What were the attitudes of in-service teachers towards the professional development they have received for mobile technology teaching and learning?

Role of the Researcher

In using a qualitative paradigm, the research is considered a process the use of interviews, observations, artifact collections that can be used as instruments in data collection. The researcher needs to describe relevant aspects of self, including any biases and assumptions, any expectations, and experiences to qualify his or her ability to conduct the research (Patton, 2000; Simon, 2003). A qualitative researcher asks probing questions, listens, thinks, and then asks more probing questions to get to deeper levels of the conversation. An effective qualitative researcher seeks to build a picture using ideas and theories from a wide variety of sources (Simon, 2003; Varol, 2009). This case study followed the method of Patton and Simon’s qualitative approach to case study. Developing the use of interviewees’ point of view and the
interpretation is reflective on both the researchers and interviewees (Patton, 2000) or Niess’ (2011) assertion that developing TPACK through one’s own experiences will also be directly affective on classroom self-efficacy. Case analysis involves organizing the data by specific case for in-depth study and comparison. Cases are units of analysis. What will constitute a case, or unit of analysis, is usually determined during the designing stage and becomes the basis for purposeful sampling in qualitative study (Patton, 200).

Researchers must think about content knowledge from the learners’ perspective, which may indicate that in-service teachers are developing the initial sense of pedagogical content knowledge (Lu & Lei, 2012). When a teacher is introduced to a new type of curriculum, there is training associated with that curriculum. This is usually known as Professional Development, but PD does not always come in the form of a professional instructor. It may be presented through tools like digital media (YouTube, webinars), teaching resources (Learn 360, Edu clipper, Pinterest), and the use of play or information PD. Previous studies that evaluated the influence of self-efficacy on users’ technology acceptance did not assess whether users’ self-efficacy of a particular technology may play a part in users’ acceptance of that technology. (Anthony, 2012; Holden & Rada 2011).

The researcher believes the use of information PD through self-teaching with mobile technology has been shown to have profound effects on an in-service teacher’s social cognitive theory and classroom self-efficacy. In-service teachers need to develop their own learning as they construct meaning from experiences for their classrooms. Careful attention must be paid to what is learned and what is questioned from the studies about TPACK to clarify and develop a more robust and mature understanding of what it means to prepare teachers to guide student learning with mobile technology (Niess, 2011).
The use of PD and TPACK in a social environment might lead to a better utilization of mobile technology by teachers that will lead to a better focus on social cognitive theory and thus to a better practice of technology integration, but there has to be dedication to it. As Niess (2011) and Pan and Franklin (2011) pointed out, the efficiency of PD influences the adoption and integration of technology. PD opportunities might be framed such that teachers are expected to implement their ideas for integrating the technologies with TPACK that considers the knowledge for teaching with technology in a more integrative manner. (Van Zee & Gillow-Wiles, 2010). It is no longer a matter of whether technology should be used for education, but rather, if the learner is willing to create new opportunities to understand technology and use it in an educational environment with what they have previously learned and are willing to change (Chen, 2012; Liu & Lee, 2013; Niess, 2005). I see a need for the creation of PD using TPACK to directly affect an in-service teacher’s self-efficacy in mobile technology.

Creation of PD in mobile technology informs instructional designers and contributes to mobile technology instruction. This way both teachers and students are enthusiastic about learning with mobile technology. I first became interested in using PD with TPACK because I heard and saw so much negativity regarding the use of mobile technology in the classroom. Many teachers said they could not rely on the classroom technology because they did not really understand how to use it. Yet, the researcher saw the complete opposite from teachers who refused to let lack of PD stop them from finding a way to use mobile technology for their social cognitive theory. They found a way to experience PD enough to utilize their mobile technology. Since completing my graduate research projects, and having been part of PD sessions as part of national conferences and campaigns, I have seen likes and dislikes, as well as suggestions and complaints, regarding PD and the use of TPACK. The researcher enters this project with ideas
from teachers’ perspectives as well as my own experience with the use of PD with mobile technology.

**Researcher’s Assumptions**

The study would be limited if the sample were not representative of the K-12 classroom in-service teachers and if the responses were not provided honestly or with bias due to the researcher’s relationship to the institution as a technology coordinator. It is believed that the use of PD, both formal and informal, will have a direct impact on a teacher utilizing and integrating mobile technology in their classroom. The constructs that are being measured may be difficult to define and as such, results may be impacted by the participants’ individual definitions of self-reported data. A limitation of the study is the potential score reliability and validity derived from the survey instrument at the beginning of the study. The following parts seek to introduce the methodological procedures. The setting, procedures for recruitment, how participants were selected, how the demographic and informational survey was to be disseminated, interview procedures, and data analysis would all be described.

**Setting**

The study was on the campuses of two schools, for protection and privacy of both schools. The pseudonyms for the schools were Midtown and Sidekick Elementary based off the names of two schools from comic books. These campuses were deliberately selected due to the wide range of mobile technology present at both schools. Both schools are K-12 and K-8 campuses and are considered to be private charter schools and the experience level of teaching
administrator staff ranges from one year to more than thirty-five years. The researcher spoke to the directors and principals at both schools (see Appendix A).

Procedures

A letter of introduction was administered for an online demographic and informational survey through Qualtrics. It was administered to all school staff members through both email and written letter with the URL of the survey attached. Participants then complete a brief demographic survey (Appendix B). Participants in the study were narrowed down by classroom teaching and use of mobile technology in the classroom. An example would be if a paraprofessional answered the demographic survey saying they if a teacher only uses mobile devices for their own email or prep work, or grades, or did not teach class or use any type of mobile technology; they would be excluded from the Interview. If a teacher used mobile technology for classroom instruction, application or learning and assessments of students, they were included in the study.

Following the demographic survey, the informational survey (see Appendix C) was administered to participants who met the requirements of in-service teachers using mobile technology in their classrooms. Following the completion of the informational survey, participants were analyzed according to their answers. From those respondents there were 26 teacher responders, one administrator, one non-teacher. This lead to a sample of 23 teachers that were surveyed. Two were immediately dropped as they had expressed during the survey process they did not want to be interviewed following the completion of the survey. The remaining 21 teachers were contacted by email for the interview process of the survey. Five expressed they only used mobile technology for simple use such as: email, attendance and grading and did not
use m-learning as part of their SCT or SLOs. Four were unable to meet or conduct any type of interview schedule. A group of twelve in-service teachers were then purposefully selected to participate in the interviews, one dropped out (see Appendix D) due to several scheduling conflicts. Purposefully selected because interviews were to be done with teachers who did use mobile technologies and offered to be interviewed. First, they had to be teachers, second, they had to be using m-learning in the classroom, then half were chosen who had formal PD and half who had informal PD. With the approval of the IRB from Northern Illinois University, there was an introduction of the study to teachers during interview time. Answers to any questions and review of the informed consent document were provided (Appendix E). After the meeting teachers interested in participating, in the survey met with the researcher. Any further questions were checked to see who met the inclusion criteria, and informed consent was gained. If participants were willing and able, the researcher scheduled the first interview with each of them at a designated time on the participants’ schedule.

Participants

Eleven participants (cases) were recruited to participate in the interviews, each with her or his own experiences, based on their answers to the demographic (Appendix B) and informational survey (Appendix C) on the type of PD on m-learning they received. The age of teachers ranged from twenty-six to sixty-five years old, and experience level ranges from three years to more than thirty years of in-service teaching. There are many research studies demonstrating the use of PD with classroom technology with both pre-service and in-service teachers (Anthony, 2012; Chen, 2012; Ghanbari, 2015; Varol, 2009).
As discussed in the previous chapter, much of the research regarding the use of PD, both formal and informal, of teachers is based on social cognitive theory. Teachers from one field may not be representative of teachers in other fields, and teachers from early K-12 might not be representative of teachers in secondary levels of K-12 (Chen, 2012; Niess, 2011; Varol, 2009). A distinction is made between pedagogy and andragogy and between using PD for mobile technology integration or technology utilizations (Van Zee & Gillow-Wiles, 2010). Adults are self-directing, task-centered, and have more experience with which to connect their learning. They are often internally motivated, particularly when they see how learning can influence and improve their lives. The focus in the study was on traditional-based in-service teachers K-12 would make its findings more relevant to the case study for K-12 mobile technology use.

A total of twenty-eight teachers who were currently employed at Midtown and Sidekick School participated in this study. These in-service teachers are all employed by both schools. The survey was offered through e-mail in January 2019. Teachers were asked to fill out an online survey that was attached to their e-mail or left in their mailboxes if they had problems accessing the survey online. The survey data was collected by the researcher and scored based on the Likert Scale System (Appendix C).

Ethical Issues

Patton (2000) suggested that researchers in case studies include a section about ethics regardless of the methodology used, such as the aims of the research and the shape current technology use might also impact efficacy perceptions for technology integration (Suwaed & Rahouma, 2015; Topkaya, 2011). As previously mentioned, approval for the study was needed from the Northern Illinois University IRB. Participation would be voluntary with informed
consent necessary before the study began. Oral explanation and informed consent were
documented; participants would be fully aware of the purpose of the study and benefits to
participation. All findings were confidential, and reports would use pseudonyms to protect the
confidentially of participants in the study.

Data Collection

There are four sources of data for this study: Demographic Survey, Informational Survey,
Interviews with member checking, and Field Notes.

The following data sources were used in this proposed study:

Demographic Survey (Appendix B)

Informational Survey (Appendix C)

Interviews (Questions) (Appendix D)

Field notes template (Appendix H)

A cover letter (Appendix B) was attached to the survey to explain the purpose of this
research and its relevance and to seek their agreement to participate. It was directly e-mailed to
possible participants. Using e-mail promoted efficiency and allowed respondents to answer at
their own pace and convenience. The researcher’s contact information was provided in case a
respondent had questions. The major advantages of using this instrument was its effectiveness
and relative ease of completion. The disadvantages included possible bias based on the
researcher’s judgment for sample selection and less spontaneous response.

Interviews provide the opportunity for in-service teachers to share in detail their
experiences and data on how the outcomes of the technology planning system connected with
teachers’ technology integration activities (Anthony, 2012; Chen, 2012). For the case study, the
interview data provided a more complete understanding of the phenomenon of how PD affects in-service teachers’ classroom perceptions in how mobile technology is utilized and integrated into the K-12 classroom. “Teachers’ reflective accounts are a vehicle for understanding their shared and divergent experiences as participants in the program” (Anthony, 2012, p. 342).

Coding in qualitative inquiry is a word or short phrase that assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data (Patton, 2000). The data can consist of interview transcripts, participant observation field notes, documents, literature, artifacts, photographs, video, e-mail correspondence, and so forth. In larger and complete data sets, a researcher would find that several of the same codes will be used repeatedly throughout. This is both natural and deliberate: natural as there are mostly repetitive patterns of action and consistencies and deliberate because one of the coder’s primary goals is to find these repetitive patterns of action and consistencies in human affairs as documented in the data (Patton, 2000; Varol, 2009). The search for patterns in coded data is to categorize them and understand the patterns, grouping things together not just because they are exactly alike or very much alike, but because they might also have something in common.

After coding was completed for the central study, the codes were grouped into categories that will be determined from examining the data. These groupings were then broken into subgroups that allowed for the production of themes from the data (Swackhamer et al., 2009). A majority of qualitative researchers would code their data both during and after collection as an analytic tactic (Patton, 2000; Yin, 2003). The researcher continued this practice by coding the participants with numbers and then matching their data with the group number sets. Analysis was conducted after interviews have been completed.
The coding processes can range in magnitude from a single word to a full sentence to an entire page of text to a stream of moving images. Qualitative inquiry demands more attention to language and images, and deep reflection on patterns as they emerge from human experience (Saldana, 2016). In second-cycle coding processes, the portions coded can be the exact same units, longer passages of text, and even a reconfiguration of the codes themselves developed thus far and the processes describe from the first cycle (Saldana, 2016). Just as a title represents and captures the primary content and essence of a book, film or poem, so does a code represent and capture a datum’s primary content and essence (Patton, 2000). Coding requires that a researcher wear their analytic lens, so that they perceive and interprets what is happening in the data as the phenomenon is viewed (Saldana, 2016).

The first rounds of interviews were conducted during week five of the spring semester. Teachers were sent a reminder in the method of their choosing two days prior confirming the time and location (Appendix F). Interviews were conducted in a location preferred by the participant; both face-to-face and virtual options were made available. Virtual meetings were held via Skype, Google Hangouts, or Face Time on a secure network, and participants were reminded that a quiet environment and proper bandwidth were needed. Virtual interviews, while not identical to in-person meetings, offer many of the same benefits (Niess, 2011). Participants needed to have a webcam and microphone or a smart device in order to meet virtually. The researcher accommodated participants to the greatest degree that their schedule allowed by conducting the interviews during daytime hours, evenings, or weekends according to their availability along with audio recording if a connected web camera or service was unavailable to each participant. Each interview was thirty to sixty minutes long.
The interviews were recorded with the iOS application Notability to be transcribed verbatim. The purpose of this interview was initially to gain a broad understanding of how the in-service teacher thinks about and behaves in a K-12 classroom and how this has changed over time. Interview questions (Appendix D) then become more specific, asking the participants to talk about their own experiences using lessons with students and experiences with professional development of mobile technology. The in-service teachers would also discuss how their perspectives and attitudes have changed over the course of their teaching careers.

Although the researcher developed an interview guide (Appendix D) to assure some consistency between interviews, the interviews were open-ended and flexible, based on both the research questions and the participant’s responses (Chen, 2012). A second round of interviews was conducted to clarify any gaps in the data collection or to any follow-up questions as needed. A third round of in-person interviews was conducted with all participants to clarify any remaining gaps in research. Member checking (restating or summarizing information and then questioning a participant to determine accuracy) was used in the transcripts. The participants either affirm that the summaries reflect their views, feelings, and experiences, or that they do not reflect their experiences. Participants received an exit letter (Appendix G) when all research was completed and did not need further follow-up as shown in Table 1.

Member checks after the study were completed by sharing all of the findings with the participants involved (Patton, 2000; Yin 2003). This allowed participants to critically analyze the findings and comment on them.
Table 1

No Formal PD Interview Schedule

<table>
<thead>
<tr>
<th>In-service Teacher</th>
<th>Date of First Interview</th>
<th>Date of Follow-Up Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool Box</td>
<td>2/17/2019</td>
<td>3/18/2019</td>
</tr>
<tr>
<td>Bitmap</td>
<td>2/21/2019</td>
<td>3/17/2019</td>
</tr>
<tr>
<td>K-9</td>
<td>2/21/2019</td>
<td>3/19/2019</td>
</tr>
<tr>
<td>Query</td>
<td>2/28/2019</td>
<td>3/18/2019</td>
</tr>
<tr>
<td>Voluntary</td>
<td>3/08/2019</td>
<td>3/12/2019</td>
</tr>
<tr>
<td>Tackle Box</td>
<td>2/18/2019</td>
<td>3/03/2019</td>
</tr>
</tbody>
</table>

The term “survey” commonly applies to a research methodology designed to collect data from a specific population or a sample from that population, and typically utilizes a questionnaire or an interview as the survey instrument (Anthony, 2012; Niess, 2011). Surveys obtain data from individuals about themselves, their households, or about larger social institutions (such as school boards). Sample surveys are important tools for collecting and analyzing information from selected individuals. Teachers from both schools took an Informational Survey. Following analysis of the survey (Appendix C), a set of eleven in-service teachers (half from Sidekick and Midtown) were interviewed on their perceptions of using and integrating mobile technology into their classrooms. Qualitative research does not lend itself to eliciting generalizable findings (Niess, 2011; Patton, 2010; Yin, 2003). It is necessary to understand that the insights derived from this approach may have applicability to helping professionals.

**Instruments**

A demographic survey for possible participants (Appendix B) was created due to the characteristics of the study population and the efficiency of data collection. The survey consisted
of thirty-two questions formulated to capture more in-depth information about the participants and PD in which they had participated. The survey instrument was used to analyze the teachers’ perceptions of effectiveness and attitudes toward any PD the in-service teachers had received formally. This inquiry method enabled an in-depth investigation of influences on teachers’ m-technology integration practices in an authentic setting (Anthony, 2012). This instrument provided qualitative information about the participating teachers’ perceived benefits of PD (Swackhamer et al., 2009). The responses were analyzed to explore the characteristics of those participating teachers who score high in perceived efficacy based on the results of the survey. Perceived efficacy is a judgment of capability; self-esteem is a judgment of self-worth (Bandura, 2006). The survey questions followed a logical progression starting with simple themes and progressing to complex issues to sustain the interest of respondents and gradually stimulate question answering.

After the demographic survey, an informational survey instrument (Appendix C) was given before the interview. The informational survey was designed to measure teachers’ perceptions and attitudes toward working with m-technologies in the classroom. The goal of the informational survey instrument was to help gauge teacher perceptions toward PD for m-learning in the classroom. A total of eighteen items were developed for the informational survey.

Following the informational survey, interviews were conducted with six participants from Sidekick and Midtown. A set of six teachers were purposely selected for interviews from each school, twelve in total. One of the teachers was removed due to scheduling conflicts leading to eleven totals between both schools. These interviews were intended to elicit in-depth responses to the research questions. Guiding prompts were used (see Interview guide Appendix D). While conducting interviews and making observations, field notes template was used during the
process. Analysis of field notes occurred as they were being written. This was important for two reasons.

The Field Notes were for preliminary analysis that fostered self-reflection. This was crucial for understanding and finding the meaning for answers to in the research study. (See Appendix H). The field notes were intended to be read as evidence that gave meaning and aided in the understanding of the research. The use of the Fieldnotes template allowed the ability to access the subject and record what was being observed without being intrusive or in an abstracted manner that could cause bias to the research. They were designed to describe observations as straightforward as possible. The field notes did not contain any explanations of or comments about the case studies observations, but were presented on their own, as clearly as possible. Participants responses were clarified on their use of mobile technology using the field notes template. Patterns were marked in the field notes based on similar answers and created a process which support the creation of the reseaucher’s analytic notes and yielded insightful qualitative data to ensure a complete understanding of the case study in this qualitative research. The second use of the Field Note guide, was used for preliminary analysis, which shows emergent themes. This created a position between the research participants and the researcher that provided a means for the researcher to embrace both their explicit and implicit subjectivity about the occurrences within the research setting. This allowed for better identifying of these emergent themes, while observing allows the researcher to be able to shift their attention so that you can foster a more developed investigation of your research.
Data Analysis

The researcher analyzed the survey results and interview transcripts, which are described and shown in Chapter 4. In order to keep the quantity of data manageable, analysis focused on the professional development of the use of mobile technology over the course of the in-service teachers’ careers. As both Midtown and Sidekick are typical four-quarter K-12 and K-8 institutes, the researcher analyzed transcripts from the interviews after the end of the third quarter of the spring semester in regards to the research questions.

The transcripts of interviews were all saved as a Microsoft Word documents. The teacher pseudonym and date labeled each transcript. The researcher worked with an on-site teacher to de-identify the data. To do so, the researcher used Microsoft Word’s find and replace feature to replace participant names with pseudonyms, non-participating student names with numerical IDs, and teacher names with the word Instructor; a similar substitution strategy was used by Chen (2012) and Lu & Lei (2011). Dragon Dictate software was used to transcribe the interviews. Adjustments were made to correct any misspelling of words or point-of-view phrasing, and the entire recording listened to again to check for errors.

This de-identification process allowed for easy identification for the participants in the transcripts while maintaining their confidentiality (Niess, 2011; Chen, 2012). Once the files were de-identified, the files were password-protected and saved on the researcher’s laptop computer. The researcher also used a second recording device on an iPad Air with the use of the app Notability. Notability allows both recording and annotations during note taking and interviewing sessions. Audio recordings were then uploaded to the Google Drive Folder as a backup. Google Drive is a secure location requiring both a login and separate password. The password used to
log onto Google Drive was different than the one used to open the research files; only the researcher knows both. The original electronic file with identifiable data was deleted from the laptop computer.

Using field notes, while listening, processing and transferring what was heard. During the case study interviews I typed up the notes on my laptop, and included as many details as I could recall. I would also take visual notes on a separate notebook, these would be various pictures of common themes. This visual thinking routine would anchor the process of visualizing the research questions and language that was used to answer the interview questions. Following these interviews, I transcribed the interviews that I’d conducted within the next few days and then reviewed the transcripts slowly in order to write up a narrative about what had learned and include visual notes. When it came to writing the narrative that reported what had learned from the interview participants, the field notes were incredibly helpful to fill out and provide context for what interviewees had talked about and checked for comprehension that would go into answer the study’s research study.

Content analysis. Content analysis is collecting detailed descriptive data about participation, interactions, and efforts and finding meaning (Patton, 2000). The process of analysis should be adapted to the nature of the study (Bayracci, 2009). The earlier descriptions of the qualitative process assume the researcher is engaged in an emergent study begun without a pre-structured goal. Analysis can provide rich exemplary practices within a qualitative case study (Dawson, 2012). Chapter 4 shows the analyzing the demographic information (Appendix B) and informational survey (Appendix C) explored the participants’ experiences and attitudes regarding professional development and their mobile technology use (Holden & Rada, 2011; Varol, 2009).
Content analysis allows the researcher to analyze large quantities of data and to understand and interpret the means and boundaries of the case study (Patton, 2000; Topkaya, 2010).

The combination of transcript analysis and teacher interviews has been used by several previous studies including the somewhat recent work of Anthony (2012), Chen (2012), Ghabari (2015), and Niess (2011). In those studies, the combined use of transcript analysis and teacher interview has resulted in explaining the differences between teacher experiences.

The qualitative data had a reflection sheet template (Field Notes – Appendix H) that the researcher carried and completed after each interaction so that it was standardized across all data collection points. Interviews with in-service teachers were recorded, transcribed, and coded. After identifying themes or content patterns, the researcher assembled, organized, and compressed the data into a table/matrix display that facilitated the drawing of conclusions. The data rechecked to confirm conclusions drawn.

**Case Study Database**

One of the disadvantages to a qualitative case study approach is managing the amount of data provided (Patton, 2000). A host of issues can emerge from the interpretation of data to the interviews being too personal (Varol, 2009). To procure data and security for this qualitative case study, paper-based field notes and printed transcripts (with or without coding) were kept in this file. Some materials (e.g., analytic memos, electronically organized data) were kept electronically (i.e., password-protected and saved on a laptop, and backed up to a secure Internet cloud (such as Google Drive or Dropbox), but were made available to my committee upon request. All materials with identifiable information (i.e., surveys on characteristics of the target population, completed perceptions of surveys, and consent documents) were copied and stored in
a locked file cabinet, separate from the case study database, so that they could not be used to identify participants in the de-identified data.

**Best Practices**

The researcher followed the best practices recommended by Baxter (2008), Patton (2000) and Yin (2003), during the analysis phase of the case study. The first best practice is focused analysis. The second-best practice is exploring rival propositions in an attempt to provide an alternate explanation of a phenomenon. The third best practice is engaging in this iterative process until confidence in the findings is increased. This approach has the potential to deal with simple and complex situations. It enables the researcher to answer “how” and “why” type questions while taking into consideration how a phenomenon is influenced by its context. The “how” and “why” questions also included the following list of questions to gain insights over the phenomenon under consideration (Anthony, Chen, & Lu & Lei, 2012).

The researcher ensured that the data was converged in an attempt to understand the overall case, not the various parts of the case or the contributing factors that influence the case. Qualitative research requires researchers to code their data both during and after collection as an analytic tactic. Using Microsoft Excel to organize data and corresponding codes accomplished this. The second cycle of coding further managed, filtered, highlighted, and focused the salient features of the qualitative data recorded for generating categories, themes, and concepts. There was some rearrangement and reclassification of coded data into different and even new categories during the process.
Cross-Case Analysis

In the manner of Patton (2000), Yin (2003), and Niess (2011), the researcher first conducted within-case analysis and wrote a narrative about each case in the latter rounds of the Second Cycle coding. The ability to look at sub-units within a larger case is powerful when you consider that data can be analyzed within the sub-units separately (within-case analysis), between the different sub-units (between-case analysis), or across all of the sub-units (cross-case analysis). This ability to engage in a rich analysis only serves to better illuminate the case study. The use of cross-case analysis involved a great use of memo writing, annotation to organize and conceptualize the coding, and of the cases in relation to each other.

Concepts and Assertions

During the coding process, particularly through the second or even third cycle, both concepts and assertions rise. Coding is a symbol of data and category is a collection of related coding, concepts, themes, and patterns that may even be so provocative that they become part of the title, organizational framework, or through-line of the report (Lu & Lei, 2013; Patton, 2000). Themes and/or concepts generated for each project will often vary and depend on many contextual factors. Which particular coding method is selected for analysis and how detailed it must depend on the nature of the data; in other words, more filters to consider (Chen, 2012; Patton, 2000). During second cycle coding, one might collapse the original number of First Cycle codes into a smaller number as one reanalyzes the data and finds that larger segments of text are better suited to just one key code rather than several smaller ones (Niess, 2011). In first cycle coding, there are other rich discoveries to be made with specific coding methods that
explore such phenomena as participant process and emotions. A code can emerge from data that is surprising, unusual, or conceptually interesting (Keskin, Metcalf, & Florida, 2011; Patton, 2000). In the final report, findings would be supported by data in the form of quotations from the interviews and transcripts. This will allow readers to make their own judgments regarding the validity of my assertions and provide a discussion of each case separately in Chapter 4. In Chapter 5, there will be synthesis of the findings, comparing and contrasting findings between the participants and developing a set of assertions from the case study compared to current literature (Keskin et al., 2011; Patton, 2000; Varol, 2009; Yin, 2003).

Generalizability

One danger associated with the analysis phase is that each data source would be treated independently, and the findings reported separately. This is not the purpose of a case study. Rather, the researcher must ensure that the data are converged in an attempt to understand the overall case, not the various parts of the case or the contributing factors that influence the case. First, this practice leads to a focused analysis whenever the temptation is to analyze data that are outside the scope of the research questions. Second, exploring rival propositions is an attempt to provide an alternate explanation of a phenomenon. Third, by engaging in this iterative process the confidence in the findings is increased as the number of propositions and rival propositions are addressed and accepted or rejected (Patton, 2000; Yin, 2003).

The goal of the report was to describe the study in such a comprehensive manner as to enable the reader and feel as if they had been an active participant in the research and can determine whether or not the study findings could be applied to their own situation (Baxter et al., 2008; Patton, 2000). At the same time, findings will provide new insight into mobile technology,
and thus may have tentative analytic generalizations in the manner advocated by Patton (2000) and Niess (2011), although they may not meet the standards set for generalizability.

Criteria for Evaluating Case Studies

Rigor

Numerous frameworks have been developed to evaluate the rigor or assess the trustworthiness of qualitative data (Anthony, 2012; Baxter et al., 2008; Chen, 2012; Patton, 2000; Yin, 2003). To assess the beliefs elicited for a fit, there is a need for rigorous qualitative procedures (Wyatt, 2015). Coding is only the initial step toward an even more meticulous and evocative analysis and interpretation for a report (Anthony, 2012; Patton, 2000).

Various strategies for establishing credibility, transferability, dependability, and conformability in case studies are needed (Patton, 2000; Yin, 2003). Careful preparation for entering into a case study is an important discipline. The qualitative case study affords researchers opportunities to explore or describe a phenomenon in context using a variety of data sources (Baxter et al., 2008). Once the case has been determined and the boundaries placed on the case it is important to consider the additional components required for designing and implementing (Patton, 2000; Yin, 2003).

Construct Validity

The validity, meaningfulness, and insights generated from qualitative inquiry have much to do with the information richness of the cases selected and the observational/analytical capabilities of the researcher (Patton, 2000). Concepts such as management, experience, and
subject matter have been operationalized as part of the theoretical frameworks described in Chapter 2. As related to the interviews, construct validity is present when interviewees have a similar understanding of interview questions as the researcher. Many of the questions used in the interview guide (Appendix D) were informed by research conducted as part of graduate coursework, and thus were used with in-service teachers and refined as needed.

Case studies are not a choice of methodological use, but a choice of what is to be studied (Anthony, 2012; Chen, 2012; Patton, 2000). Qualitative inquiry methods enabled an in-depth investigation of influences on teachers’ technology integration practices in an authentic K-12 setting (Anthony, 2012). The case study approach aims to share in-service professional development experiences and attitudes of m-learning and mobile technologies (Chen, 2012; Ghanbari, 2015). Case studies can be layered or nested, which recognizes that you can build larger case units out of smaller ones (Patton, 2000) Mirroring both Chen (2012) and Ghanbari’s (2015) approaches to case studies in a qualitative inquiry method also aligns with Anthony’s (2012) case study practices that will bound the research case.

**External Validity**

External validity refers to how easily the findings of the study can be generalized in other contexts (Patton, 2000). In qualitative research, external validity is enhanced through rich and well-presented data (Patton, 2000, Varol, 2009).

**Internal Validity**

Described by Patton (2000), internal validity is a criterion for case studies. He adds that it only applies to research seeking to demonstrate a causal relationship in groups; it is thus not
applicable to the proposed study. However, other researchers have suggested several strategies that were used in this study, i.e., the use of multiple data sources to triangulate findings, demographics, experience, and clarification of researcher bias (Anthony, 2012; Chen, 2012; Niess, 200).

Reliability

The statistical validation and reliability of demographic survey and use of the Likert Scale have been extensively reported in the literature and the instrument used in several well-documented large-scale studies (Finger 2009; Niess, 2011). Patton (2000) recommended that researchers develop a case study protocol and database. The database allows better content analysis to measure observational and perceptual data for in-service teachers (Burgess et al., ; Chen, 2012; 2010; Patton, 2010).

Threats to the Research

The main concern of conducting this survey research was the sampling. The sample was selected purposely through the researcher’s personal and work relationships to ensure the participation and completion of this survey. The resources from previous research and studies are very limited. There is very little information available on the subject of factors influencing educators’ choices on an overall basis and the areas dedicated to the PD used in the study.

Trustworthiness

Trustworthiness qualitative research stems from the degree to which “the material we present in written form does in fact reflect the lives of the people we met” (Yin, 2003, p. 12) and
is a key aspect of a high-quality study (Keengwe et al., 2009). Researchers who exclude data because it does not fit with their assertions are not trustworthy (Elo et al., 2014. It is impossible to provide “the truth” of a participant’s experience (Gorkin, 2000, p. 12), for the telling of the experience is shaped not just by the storyteller (in this case, the interviewee), but also by the listener (the interviewer). Gorkin (2000) said interviewers should do their best to avoid this, but storytellers will often shape their stories to the listeners. Additionally, when the researcher moves from being the listener to the writer, it is unavoidable not to consider the potential audience for the written findings, that is, the readers. Thus, the narrative that is shared cannot be “the truth,” but it can be “a truth” in which the original storytellers can see themselves (Frick, 2016, p. 12).

Narrative

The final report should consist of a narrative that gives readers the experience of the researcher and record of key incidents to explore later through interview (Wyatt, 2015). A key element is the use of relevant quotations to support the findings and reflect the voices of the participants of the case study (Anthony, 2012; Badura, 2009; Lu & Lei, 2013; Wyatt, 2015). The narrative should “honor people’s stories as data that can stand on their own as pure description of experience, worthy of documentary of experience” (Patton, 2000, p. 115–116). Research transmits cultural understandings and narratives through artistic expression, interpreting and contributing to global discussions on education (Lummis et al., 2014).
Cases with Formal PD

The first five case studies are from a school that has an administration staff of five (executive director, principal, director of special education and student support, and operations manager). It has a teaching staff of twenty-eight in-service teachers ranging from elementary to instructional coaches. Classrooms have one to one iPad carts K-2 and one to one Chromebook carts 3-8. Each classroom has a Smart Board that allows teacher and student interaction from their teacher laptop computers or student devices. There are several other STEM (science, technology, engineering, mathematic) mobile devices such as Snap Circuits, Robotics and interactive microscopes. Of the twenty-eight teaching staff, fourteen in-service teachers took the survey. Originally six were chosen based on the survey’s scoring system. One teacher who had agreed to be interviewed chose to step out of the research due to scheduling conflicts.

Case 1

The in-service teacher was a second-grade elementary teacher for the past three years who had moved to the K-2 instructional coach position for the 2018–19 school year and who received formal PD training from August to December of 2018. The teacher was identified as Hakuna Matata based on the phrase “No Worries” from The Lion King based on the teacher’s love of the movie and positive outlook on teaching. Hakuna Matata uses mobile technology such as iPad, Mac Pro and online teaching applications with students such as Lexia, ST Math and Google Classroom in conjunction with SMART boards for student lessons.
Case 2

The in-service teacher was the K-8 Special Education teacher (SpEd) who had been part of the school staff the past six years and who received formal PD training from August to December of 2018. The teacher was identified as The Joker based on a love of the Batman books and sense of humor. Joker uses mobile technology such as iPad, Mac Pro, Chromebook and STEM (Science, Technology, Engineering, Mathematics) mobile technology such as Snap Circuits and Google Classroom in conjunction with SMART boards for student lessons.

Case 3

The in-service teacher was the 5-8 Special Education teacher (SpEd) who had been part of the school staff for the past four years and who received formal PD training from August to December of 2018. The teacher was identified as Sally Patches due to a love of the Tim Burton movie, The Nightmare before Christmas. Sally Patches uses mobile technology such as iPad, Mac Pro, Chromebook and online programs such as Moby Max, Zearn, Lexia and Google Classroom in conjunction with SMART boards for student lessons.

Case 4

The in-service teacher was the 5-8 math teacher who had been part of the school staff for the past five years and who received formal PD training from August to December of 2018. The teacher was identified as Power School due to a constant use of the Student Identification System, Power School. Power School uses mobile technology such as Mac Pro, Chromebook
and online programs such as: Zearn, Lexia and Google Classroom in conjunction with SMART boards for student lessons.

Case 5

The in-service teacher who was chosen was the 5-8 science teacher who had been part of the school staff the past three years and who received formal PD training from August to December of 2018. The teacher was identified as Five Points due to checking on student work and giving five points for grammar use on their student assignments. Five Points uses mobile technology such as Mac Pro, Chromebook and online programs such as: Zearn, Lexia and the use of electronic microscopes with GSuite for education in conjunction with SMART boards for student lessons.

Cases: With No Formal PD

The second school has an education staff of forty. The teaching staff ranges from in-service teachers who have been teaching from three to more than thirty-five years. This school began a full one-to-one iPad program in 2012 for all students. All classrooms have teacher desktop computers connected to their Smart TV and the use of Apple TV to use iPad and student mobile devices to the same TV. The school has moved from the use of Edmodo (a student online classroom system) to Google Classroom with the use of Google Suite for Education (GSuite EDU). Of the thirty-teaching staff, fourteen in-service teachers took the survey. Originally six were chosen based on the survey’s scoring system.
Case 6

The in-service teacher was a 6-8 language arts, math and science teacher. The only formal PD this individual had received was a review of Renn Web, the school’s student identification system. The teacher was identified as Tool Box based on a view of mobile technology in the classroom as a tool. Tool Box uses mobile technology such as a classroom set of iPads and the use of their Apple TV to mirror programs such as Padlet, Nearpod, Class Kick and EVO document cameras. Tool Box receives PD completely through such informal ways as professional conferences, online tutorials, and collaboration with other teachers.

Case 7

The in-service teacher was the 6-8 science, history and English teacher. The only formal PD they had received was a review of Renn Web, the school’s student identification system, at the beginning of the school year. The teacher was identified as Query based on view of mobile technology in the classroom for formative and informative assessment. Query uses mobile technology such as a classroom set of iPads, Teacher Desktop Computer connected to the classroom projector, student smart devices and the use of their Apple TV to mirror the program Quizlet, which they use for classroom review, study guides and minor coding practices. Query has received no PD on mobile technology since 2015. Their informal PD has been completely student-driven.

Case 8

The in-service teacher was the 9-12 math teacher and robotics coach. The only formal PD received was a review of Renn Web, the school’s student identification system, at the beginning
of the school year. The teacher was identified as Bitmap based on the in-service teachers early programming experience in the late 1990s. Bitmap uses mobile technology such as a classroom set of iPads, Student smart devices and the use of their Apple TV and their robotic kits. Bitmap has received no PD on mobile technology since 2007 at a local community college and from professional conferences. Bitmap’s informal PD has been completely student-driven.

Case 9

The in-service teacher was the fifth-grade teacher. The only formal PD they had received was a review of Renn Web, the school’s student identification system, at the beginning of the school year. The teacher was identified as K-9 based on the in-service teacher’s love for dogs. K-9 uses mobile technology such as a classroom set of iPads, student Smart devices, teacher desktop computer connected to the classroom TV monitor and the use of their Apple TV and their students’ Smart devices. K-9 has received no PD on mobile technology outside of fellow teacher calibration and students experience. K-9’s informal PD has been completely student-driven.

Case 10

The in-service teacher was the 9-12 science teacher. The only formal PD they had received was a review of Renn Web, the school’s student identification system, at the beginning of the school year. The teacher was identified as Tackle Box based on the in-service teacher’s enjoyment of boating and fishing. Tackle Box uses mobile technology such as a classroom set of iPads, Vennir lab Quests, Smart Microscopes, student Smart devices and the use of their Apple
TV and their students’ Smart devices. Tackle Box has received no PD on mobile technology since 2015 outside of fellow teacher calibration and students’ experience.

**Case 11**

The in-service teacher was the elementary Bible teacher and youth pastor. The only formal PD they had received was a review of Renn Web, the school’s student identification system, at the beginning of the year. The teacher was identified as Voluntary based on the teacher’s youth pastor experiences. Voluntary uses mobile technology such as a classroom set of iPads, student Smart devices and the use of their Apple TV and their students’ Smart devices. Voluntary has received no formal PD on mobile technology since 2015 outside of fellow teacher calibration and students’ experience.

**Member Checking**

Patton (2000) and Yin (2003) stressed that researches should have participants receive transcripts after an interview to check that their words and meanings were recorded and interpreted correctly. In this qualitative case study, the eleven in-service teachers received a transcribed copy of their personal interview to review and check for accuracy of their words, meanings, thoughts and feelings. After the first transcript copy was given to all eleven in-service teachers, the researcher received confirmation emails that they had read the transcript. The researcher also had a set of follow up interviews with the in-service teachers to answer any remaining questions that arose during the research and to highlight any questions the researcher had highlighted during coding and interpretation of the questions that were answered during the interview.
Limitations

The limit of using a qualitative case study included the experiences and attitudes of the in-service teacher regarding how he or she has experienced PD with classroom mobile technology during his or her career and how it was applied to student oriented teaching. All data was collected by surveying, interviewing in-service teachers, field notes, and analyzing the results. After theming the data and re-organizing it into categories, Second Cycle coding methods were used to find additional patterns and insights. After coding and reviewing the survey results and transcripts, the researcher wrote analytical memos in the style of Yin (2003), leading to the development of themes and assertions from the data. While findings may not be applicable to all in-service teachers who engage in learning with mobile technology, this may include particulars that will relate to similar in-service teachers as well as analytic generalizations about the application of PD with mobile technology.

Thus, the findings may inform professional conversations about instructional practices. How we choose to apply the technology is what determines how we develop our ethical practices for it. Many have come to see that the use of technology is a tool, an extension of oneself (Niess, 2011). Technology is a tool that channels the best qualities of ourselves to build something that we can be proud of and to better others by our work (Niess, 2011; Varol, 2009).

Chapter 4 will present the results of the research. Based on guidelines from Patton (2000) and Yin (2003) regarding reporting case study research, there will be a discussion of each case individually and then an analysis of the lessons learned from the cases as a whole (Van Zee & Gillow-Wiles, 2010). Last, Chapter 5 will be a synthesis of the multiple methods of data analysis, discussion of the results, placement of these results within the larger body of literature,
an examination of the limitations of the study, and ideas for future research (Anthony, 2012; Bandura, 1997; Chen, 2012; Niess, 2011; Patton, 2000; Yin, 2003).
CHAPTER 4
RESULTS

The findings of this qualitative case study were considered based on several in-service teachers’ experiences and attitudes toward professional development in mobile technology integration in the classroom. Yin (2003) suggested that a researcher may organize a qualitative case study into separate chapters during the analysis of the data. In Chapter 4, each of the two schools were studied as an individual case, then compared to other cases to give the researcher an understanding of common themes.

In this qualitative case study, findings were analyzed using a case study approach (Yin, 2003); therefore, the two schools were in their familiar settings, Sidekick Elementary and Midtown), over both schools’ fall semester (18 weeks) and the beginning of the schools’ spring semester 3rd quarter (5 weeks). With all in-service teachers in their familiar settings, more than 24 teachers ranging from first year to over thirty-five years of experience were surveyed at Midtown and Sidekick more than twelve teachers and instructional coaches with two to over twenty years of experience were surveyed at Sidekick Elementary. A total of 12 teachers from both schools were picked for the interview portion of the case study (one of which later dropped out), their identities and the schools are protected by pseudonyms. Table 2 shows the results of the Demographic Survey as presented in Appendix B.

Of the twenty-six in-service teachers that took the demographic survey, twenty were female and the rest were male. The purposeful sample that was taken for the eleven case studies
from both Sidekick Elementary and Midtown were teachers that had at least a minimum of three years full years of teaching with the use of mobile technology in their curriculum for Student Oriented Learning. The remaining teachers were not selected for the interviews because they did not meet these requirements.

Table 2

Formal PD Interview Schedule

<table>
<thead>
<tr>
<th>In-service Teacher</th>
<th>Date of First Interview</th>
<th>Date of Follow up Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hakuna Matata</td>
<td>2/12/2019</td>
<td>3/21/2019</td>
</tr>
<tr>
<td>The Joker</td>
<td>2/13/2019</td>
<td>3/28/2019</td>
</tr>
<tr>
<td>Sally Patches</td>
<td>2/14/2019</td>
<td>3/02/2019</td>
</tr>
<tr>
<td>Five Points</td>
<td>3/11/2019</td>
<td>3/16/2019</td>
</tr>
</tbody>
</table>

Table 3 shows the intervention schedule for the study of how much PD the in-service teachers had received either formally or informally.

Table 3

Teachers Selected for Case Study

<table>
<thead>
<tr>
<th>Years of Experience Teaching</th>
<th>Formal/Informal PD</th>
<th>Years of Mobile Technology Use</th>
<th>Teacher Pseudonym Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-9</td>
<td>Yes</td>
<td>3-5</td>
<td>Hakuna Matata</td>
</tr>
<tr>
<td>10-15</td>
<td>Yes</td>
<td>5+</td>
<td>The Joker</td>
</tr>
<tr>
<td>4-9</td>
<td>Yes</td>
<td>3-5</td>
<td>Sally Patches</td>
</tr>
<tr>
<td>4-9</td>
<td>Yes</td>
<td>5+</td>
<td>Power School</td>
</tr>
<tr>
<td>4-9</td>
<td>Yes</td>
<td>3-5</td>
<td>Five Points</td>
</tr>
<tr>
<td>15+</td>
<td>No</td>
<td>5+</td>
<td>Tool Box</td>
</tr>
<tr>
<td>15+</td>
<td>No</td>
<td>5+</td>
<td>K-9</td>
</tr>
<tr>
<td>15+</td>
<td>No</td>
<td>5+</td>
<td>Bitmap</td>
</tr>
<tr>
<td>35+</td>
<td>No</td>
<td>5+</td>
<td>Query</td>
</tr>
<tr>
<td>35+</td>
<td>No</td>
<td>5+</td>
<td>Tackle Box</td>
</tr>
<tr>
<td>10-15</td>
<td>No</td>
<td>5+</td>
<td>Voluntary</td>
</tr>
</tbody>
</table>
Figure 2 shows that 46% of the sample did receive formal type of PD for their classroom mobile technology before they used it for curriculum use.

Figure 2. PD was Given in the Classroom

Cases

Case 1: Hakuna Matata

Hakuna Matata has been an elementary teacher for six years, originally starting in early elementary education and moving to instructional coaching in the past few years. Hakuna Matata has had a wide range of experience using mobile devices in education from iPad to Smart Boards. Hakuna Matata receives weekly PD every Wednesday after school. Their PD ranges from using various online platforms (used through Apps on the iPad) in class to instructional practices and student data tracking. At the beginning of the fall 2018 semester, they received PD on use of their new Smart Boards (interactive whiteboards), large 75” TV-type screens that have
a physical hook-up through teacher computers such as Apple Mac Laptops and can connect individual iPads for students or Chromebooks through an HDMI hook-up.

Hakuna Matata has actively used mobile technology with students and with teachers on a regular basis. Hakuna Matata says they enjoyed having their trainer walks them through the “ins and outs of the program”. Their PD allowed them to ask open to questions and answers in the use of the mobile technology in order for them to apply what they’ve taught the staff, allowing them to find integration methods into their lessons. “It’s helpful, but it can be a lot of information that one more natural just to have someone there and have a conversation to the television set.”

Hakuna Matata is very similar to Case 2: The Joker and Case 5: Five Points and will be compared. However, Hakuna Matata teaches early elementary while The Joker is Special Education and Five Points is upper elementary with The Joker transitioning between early, upper elementary and middle school with mobile technology. All three follow similar patterns in that their having formal PD has allowed them to be able to integrate technology better and having a “help desk” to check in when certain mobile technology isn’t working correctly for them or various problems that happen during student learning.

Hakuna Matata stated that: “Formal PD shows the potential of the program beyond what is comfortable. Once I am ready for this, then I can go ahead and start moving forward, then just a broad overview of other types of reports.” This was a similar pattern to what The Joker and Five Point stated during their interviews. Hakuna Matata also noted that they are aware of other PD conferences that are available to educators on learning new mobile technology or other ways to use them, but does not know where to look for them. In our follow up interview a few weeks later, they noted that while they do have weekly PD meetings on Wednesday after
school, there isn’t a lot of time for fellow staff members to develop or share what they have done that could be used in other classrooms with mobile technology. Hakuna Matata also said that:
“citing time, planning and how instructional coaches work with grade level teachers allows them to use more mobile technology on what they are using it for when they are developing mobile technology use in the classroom or how they are using it instead of a more teacher collaboration PD or informally.

Case 2: The Joker

The Joker demonstrated and talked about similar characteristics, themes, patterns and techniques used by Hakuna Matata during the course of the study. The Joker shared more enthusiasm with using mobile technology in the classroom with students from early elementary to middle school. The Joker also talked about more of a passion with the online platform, Moby Max for the use of student center teaching and how they have students create using mobile technology and digital tools they have access both in and out of the classroom.

The Joker stated: “There’s early numeracy. So, students are learning to count blocks and numbers and things like that. And then there's higher level math, more of like the K-8 curriculum and there's also facts fluency to help with, well, just what it sounds like phonetics and basic math facts and addition, subtraction, multiplication and division. And we use it a lot, there are students that need a supplement, like have entirely different curriculum or an entirely separate from the classroom curriculum for one reason or another.”

The Joker highlights much of what Hakuna Matata talked about during the study as neither follow the same paint-by-the-numbers that some people fall into. They wanted to inject their student passions into the use of mobile learning to create something that was substantial to
students. “Well, part of our mission statement is to create global 21st century learners. So, the
use of technology is very important to that mission statement. Even the engaging aspect of things
like vocabulary is a central focus; the more engaging content that can be presented; the more
students buy into them.”

One of the major themes during this study was student buy in and engagement. Almost
all of the case studies refer to student engagement on why many in-service teachers are willing to
find some type of PD both formally and informally when it comes to mobile technology. The
Joker showed a lot of enthusiasm and direct ways PD can influence an in-service teacher’s
willingness to integrate technology in the classroom and how that can have an effect on self-
efficacy as well for Student Oriented Learning. By the end of the study, The Joker did go on to
say that they used Moby Max (an online reading program), NWEA Map State testing. Their use
of curriculum programs such as ST Math (gaming mathematics curriculum) has been used in the
younger grades. A bit part of where we going to data collection and little less paper and pencil.
Records are kept better on the computer and plan better instruction and curriculum and IEPs.
“You are able to see where you have to take students and how they are learning.”

Case 3: Sally Patches

Case 3: Sally Patches was part of the early interview process during the study. Sally
Patches had an almost immediate follow-up interview after the emerging themes and patterns
had arrived between Hakuna Matata and The Joker. They talked more about the continuing work
between communication using mobile technology and student creation in the classroom with
their mobile technology.
Sally Patches started: “I would really like to see my teachers using the technology to have their students create more. I think right now it’s used a lot in order for them to receive information, but I think the more that they could use it to actually create or deliver information, you know, whether it’s a presentation or research project that they’re just doing in kind of a non-traditional way.” Sally Patches reiterates patterns and themes described by Hakuna Matata and The Joker, and later Five Points, on how seeing students taking control of their learning has led to in-service teachers seeking more PD to understand the full uses of mobile technology in their classrooms and to continue using “trial and error” when it comes to mobile technology. Though Sally Patches did express in both interviews that there was not a lot of available PD outside of the school or promoted by the administration staff to seek out more ways to integrate mobile technology in the classroom. “To be honest, I’m not really sure, whenever I researched PDs that are available, I don’t look into that. So, I am not, you know, it’s not very highly advertised in terms of what’s available so and I don’t go searching for it. [Okay] I just want to do it on an as needed basis. And really, it comes down to each particular program and I’ll just contact the rest of that program.”

The pattern has shown up in almost all case studies and was talked more with Case 4: Power School and in case studies 6-11. There seems to be a line being drawn between what PD is offered both formally and informally within the school and what is being advertise or encouraged outside the school district.

**Case 4: Power School**

Case 4: Power School was done very informally due to several schedule conflicts during the interview process of the study. While the interview process was not as detailed as the
previous case studies, the information gathered from Power School matched more themes, patterns and characteristics that were discovered in Case Studies 3, 7, 8 and 11.

When the researcher asked if formal professional development affected their confidence in using any specific mobile technology in the classroom? Power School responded: “The frustrating part of it was we spent a lot of time going over aspects that most of us discovered while just exploring the technology. I would have liked to have spent more time on more advanced techniques.”

In Power School’s interview, she discussed about how she has only access to mobile technology in her room such as Chromebooks and the mention of their Smart Board and how they used it to mirror lessons to students during instructional time. Power School also said that despite those limitations, when she has PD with mobile technology, they are able to adapt lessons and curriculum for students. “Once I have been introduced to the technology, I feel pretty confident that I could adapt lessons to use the technology.” The difference between Power School and other case studies is they were able to use mobile technology that is available in their classroom. While they are confident in integrating and teaching once they have had PD, they do not feel confident in trying something unless they had tried it, or students try it in other classes. Power School also expressed during a follow-up interview that much of what they learned about their mobile technology, such as their SMART Boards they learned on their own and wanted to go into more advance features, but did not learn anything during their formal PD time.

Unlike Cases 1-3, where the in-service teachers had more access to other technology and as with Sally Patches in Case 3, they feel more confident with Chromebooks than iPads. Hakuna Matata also expressed more comfort with iPads than Chromebooks as they have more PD and experience using them in their classrooms. All five case studies expressed they were more
confident in using Smart boards as they have received formal PD and have had more student-led informal PD with students who feel even more comfortable using the technology.

**Case 5: Five Points**

Case 5: Five Points was very important during the study as Five Points has been able to work with all available mobile technology in the school and has served in all grade levels at the school. Five Points was one of the final interviews in the first round conducted for this qualitative research case study. Five Points has a huge passion for science and middle school science, and stated: “Oh and we have digital microscopes. They are brand-new. I’m just waiting for the stuff to be installed, but the little ones are standard high quality and you plug them in. They have slide kits and everything in there.” Five Points shares similar characteristics with The Joker, Sally Patches and Tool Box in Case 6.

Five Points enjoys using mobile technology: “I think it's pretty great. I don’t have any negative things to say about having technology in school. I think any training that we can get on it, it’s beneficial because there’s so much stuff that you can do and the kids are super into technology these days, so he can only help and it makes sense. Everything like quicker. And the last paper is easier to grade. Easier to locate. That was kind of neat.” When the researcher asked how formal professional development affected their confidence in using mobile technology in the classroom how and if they could explain? Five Points replied: “It’s helped a lot because I wouldn’t just know exactly what to do with like especially on the smart board as you can kind of figure it out usually. But yeah, it’s definitely helps having somebody show me how to do stuff. I think it’s beneficial for sure.”
Similar to Case 6: Tool Box, Five Points expressed more enjoyment using mobile technology after PD. While these themes and patterns were also present in Hakuna Matata, The Joker, Sally Patches and Power School, Five Points showed more willingness to dive in, similar to The Joker, who was willing to use both collaboration and student lead projects with the use of mobile technology. They both expressed that there isn’t any real shortage on what they can do with mobile technology despite having any type of PD either formally or informally.

**Case 6: Tool Box**

Case 6: Tool Box unlike the previous five case studies in this qualitative research has not received any formal PD. While they received annual classroom student system orientation for grading and attendance, Tool Box and cases 7-11 do not receive any type of PD formally or informally during the school year unless there is a change in curriculum instruction. Tool Box is in line with Case 7: Bitmap and with Case 8: Query. Both use what they understand and seek out their own PD or allow students to lead assignments. In Tool Box’s words: “They know the technology better because it’s their world.” Tool Box has had to pursue PD for themselves in order to prepared for them to use all of their available devices for a much more efficient capacity and to a much greater extent and effectiveness with students. This has proven more effective for Tool Box than to have without it and can be more specific if you need me. Tool Box stated: “For instance, the professional development sessions that I have gained the most from that I’ve gone to on three different occasions now is the Illinois Computer Educator Conference. I tried to go every year, but you can’t always get funding.”

Tool Box continued that if they were unable to walk into the classroom the next day and not be able to use it then students would become disengaged with the mobile technology or
start to ignore it. Tool Box did explain that while her students were more able to understand and teach others with the technology, there was little encouragement to continue this with other classrooms. “One factor was that the current administration is hands off. I don’t see admin really ever coming into the classroom to see me teach. The other part is that mainly the teachers are comfortable with traditional model of teaching and don’t see or have a desire to change that unless they are pushed. They haven’t really been exposed to anything that work. They aren’t discouraged, but they aren’t encouraged.” Being an 6-8 teacher, Toolbox has a different preparation time than other teachers in her grade level and those below. “It’s amazing, but that conference in particular has definitely expanded my ability to utilize that technology effectively.” Toolbox continued by saying: “Because of the way the conference was structured, I was able to walk into multiple sessions and see how it was being used, but also build lessons and activities directly in the sessions and practice using it with someone who is presenting. And that has been the number one greatest influence on how much I use it and how effectively I use it.”

This had led to almost no collaboration between teachers on mobile technology. “This was similar to what Query and Voluntary explained in their interviews, that they used more student-led PD with teaching how to use mobile technology in the classroom. Tool Box, however, stated they are very confident in adapting lessons using mobile technology as K-9 and Query stated during their interviews during this qualitative study.

Case 7: K-9

Case 7: K-9 much like Tool Box had not received any formal PD. Unlike Tool Box, K-9 has not sought out any formal PD at teacher conferences or is aware of such conferences to attend. K-9 shares similar themes, characteristics and patterns as Tool Box and Query. They do
not have a focus on student-led lessons. K-9 is an upper elementary teacher and uses any available mobile devices, both classroom and student personal devices, in the classroom. “I got to do more, I'd like to learn more if the courses and training is available, there is a lot whole lot more to do. I decided to go about next year, because I talked to each can be my teaching partner. And a lot of things that my new teaching partner will help me and work to bring me up to speed.”

K-9 had begun collaborating with another teacher who uses mobile technology on a more regular basis and has attended workshops. Due to both in-service teachers having similar planning periods when their students are not in the classroom, they will have more time to work with using mobile technology. Unlike Tool Box, Bitmap, Tackle Box, and Query who do not have matched planning periods to collaborate with each other. K-9 is confident that her collaboration with another teacher will lead to more integrated lessons using mobile technology. Started by K9: “I feel if we more training, it would build an excitement in us and help us to, you know, build awareness of what's actually available, what is working and what is the best teacher you can be.”

K-9 shared commonalities with Sally Patches, Hakuna Matata, and Five Points, but with a difference. While Sally Patches, Hakuna Matata and Five Points talked about doing more if they had more PD with technology, K-9 use of mobile technology was for video review on lessons and student writing activities and for giving and accepting assignments, research, and information and educational resources. Most PD and use of iPads in the classroom were done with the former technology director at the school who trained and developed lessons with teachers using specific iOS applications such as Stick Around, Kid Blog and iMovie. The use of these applications allowed students to create more Problem Based Learning lessons and projects
and that were based on their choices of lessons. With that person no longer on site, the teachers do not really have options available to them outside their own pursuits for PD and lesson integration.

K-9 would be more confident of and competent in using and implementing mobile technology in the classroom, but has not been given enough training. Students do not have school-issued devices anymore and the Internet has many connection issues inside the classroom and school. K-9 is looking very forward to the next school year’s collaboration with another teacher in her section of school who has more experience with various tools now available to educators. “I do what I know, you know, the degree in which I had the understanding the training that if I had more, I would definitely do more.”

Case 8: Bitmap

Case 8: Bitmap shared many of the same themes and experiences as Tool Box and K-9. Bitmap has worked with mobile technology since the mid-1990s. Bitmap also helped with the mobile application RPG Mathematics Curriculum game, Prodigy, when it was being developed in 1994. Bitmap had not had any formal PD since 2007, when he was part of several community college courses he took. Most of his work has been informal PD. “I have been a techy for ages, I started back in 1984 and I moved on from there and started doing tech in the early middle 1990s.” Bitmap contested by saying: “You have to be careful about overdoing it on technology too. Because one of the things that I’ve noticed is that if, if I play Kahoots too much, they get bored with it. Now I’ve done this before, I don't want to do it anymore. Let’s try something else.” Bitmap says that they find interests based for the students. In Bitmap’s own words: “Something new, something interesting, because these kids go through technology really, really
fast.” Bitmap realizes with current technology in either in or outside the classroom. Interests can wane quickly and what was once interesting, might not be of interest to a student or even a teacher later on.

Bitmap expressed similar patterns discussed with Power School on student-on-student engagement. Bitmap talks about why students do want to learn and be in charge of their learning as talked about in all case studies during this study. This is the first time a comment was given that students don’t want to be use the same type of mobile technology all the time. There are similar patterns that are talked about in Case 9: Query as Query having only access to available classroom iPads and student devices, they do get disengaged if they are constantly using the flashcard/review app, Quizlet. However, Bitmap does talk about how much like Query, he has found a way around this possible problem. “I can teach a lesson and then I can use a mobile technology to reinforce it. That’s generally my, teaching a lesson, reinforce it, and give them a problem, let’s use your technology to solve this problem.”

Bitmap had once again found a way to use mobile technology to refocus Student-Oriented Learning by adapting the lessons to work with the classroom mobile technology they have available. This did not show up in any of the pervious case studies and was a way to redirect student lead learning back to the teacher.

**Case 9: Query**

Case 9: Query shared many of the same themes, patterns and characteristics as Bitmap. However, where Bitmap had redirected student lead learning back to the teacher with their limited mobile technology and lack of PD. Query took the student lead model and redirected it into an almost formal PD for students using classroom iPads and personal student devices. Query
started: “I've never had any formal training in mobile technology other than, at one time there was a technology consultant at our school and was very helpful to me and introducing me to several apps that I have used in the past. Some of those have fallen by the wayside.” As the interview continued, Query talked about having a middle school student who used coding to format the review App, Quizlet for the entire class to use. “I have a seventh grader this year who has done some coding and on his own created a system whereby I can go to a shortening URL link like bit.ly and he's done some coding and created a system by which I don't have to look for raising of hands. He’s got it. He’s got it. So, that each team has an iPad. And the first person that touches their screen if it comes to my computer, tells me who touched it first. And then I call on that person. And then on my, on my computer I award points or deduct points and that shows on the screen and he's just recently engineered it so that, the kids see the question. I see the question and the answer.”

Query’s class traditionally has a chapter test and usually take two days to review the material from the class, and the entire section of what the students need to know is on Quizlet. The first day of review is Quizlet Live that the entire class enjoys. On the second day the students use what is call the “Quizlet row game”. Query divides the class into their rows, Query then flashes a flash card on the classroom projector screen and the first person in each row, have to raise their hand. If they know the answer, they raise your hand. If they know the answer, then they get a point. Then he then continues to the second row, third row, fourth row and back to the first row.

Not once during this qualitative case study has coding and programming been used fully to create a type of informal PD with students. The closest case was The Joker with her use of her STEM mobile technology with Snap Circuits and Mobile Levelers they used for Project Based
Learning Projects. The sense of having no formal PD, but using informal PD with a student who used coding and programming using the review app, Quizlet. However, it has still led a direct effect on Query’s self-efficacy in the classroom. “I would say lack of professional training has affected my confidence. I’m not, I, I like to use it, but I am well aware that I am severely limited and in troubleshooting different things. Whenever I try something and something goes wrong, you know, an iPad problem or a telephone problem or maybe it's because the signal from the Internet is, is weak, those things I just don't know how to deal with.”

Many times, the questions would be answered about Query’s students on how they are using their own experiences and devices to really take charge of their learning. One of the students was brought up during the interview on using coding with the app, Quizlet. The conversation was so intriguing and engaging. I agreed that they should reach out to the main application company on the use of the reflection tool. Query has been a teacher for over 35 years and has also been an administrator in that time. They offered a unique and larger view of teaching with mobile technology from early days with clickers to now the full use of projectors, GSuite for Education and especially with the app, Quizlet.

**Case 10: Tackle Box**

Case 10: Tackle Box’s interview was very similar to both Bitmap and Query with the same type of patterns given Tackle Box’s more than thirty years of teaching experience as was with both Bitmap and Query. Tackle Box was also the previous Robotics Club advisor before handing it over to Bitmap. Tackle Box talked during the interview process of using communication in their future goals with mobile technology. Tackle Box had at one point attended the National Science Teachers Convention and STA for formal PD. “They are
definitely offering that. I actually took a seminar also on Google Docs. They never were able to implement that I needed more training and even today they still thought well, when you were there” Tackle Box thought that they were going to switch over to homework on the computer and later move towards using their mobile technology to more Problem Based Learning.

Given their background as a science teacher, Tackle Box said they believed that using more mobile technology would bridge the gap between how students work collaboratively and also how they communicate outside of the classroom. When the researcher asked to identify up to three core subjects you feel confident with using mobile technology. Tackle Box has started that they have been teaching Biology, Anatomy and Physiology. “I have some other classes likes physics, but I don’t normally pool in or have the kids doing anything with mobile devices. I might show a YouTube video or something, right. And I'm teaching chemistry this year and I haven't yet figured out how to pull in the technology. They're more interested in mixing chemicals.” Unlike any of the other case studies, this was the first where an in-service teacher during this qualitative research had a teacher explain in their classroom that the students didn’t have any interest in using mobile technology in the classroom. This finding was not in the scope of the study or stated in the research questions but will be addressed in Chapter 5, as a suggestion for further research.

**Case 11: Voluntary**

Case 11: Voluntary was done very informally due to several schedule conflicts during the interview process of the study, similar to Case 4: Power School. While the interview process was not as detailed as the previous case studies, the information gathered from Voluntary matched more themes, patterns and characteristics that were discovered in Cases 3, 4, 7, and 8. When the
researcher asked: “What formal teacher professional development options are available (or have been) to you when it comes to integrating mobile technology in the classroom?” Voluntary stated: “We used to have a technology director at the school who gave us training and helped develop us. He is no longer here. I don't really have options available to me outside of my own pursuit.” Voluntary said that when they received PD, it was helpful and gave them more confidence than they had before, but it’s not available to them as much anymore. “I want to receive it, but I want to feel like we are being set up for success. I would like students at our school to have a school-issued device and a working wi-fi network, so that I’m never running into issues while trying to implement technology in the classroom.”

Voluntary’s interview showed a very key theme that showed up in all eleven case studies: “I want to receive more.” In all case studies, even those teachers who received formal PD on a regular basis desired more use of formal PD with mobile technology. This was present in almost all interviews.

Common Themes

After reviewing each case of the eleven teachers and making a rolling comparison of the cases, themes emerged from the data collected. Although a lot of data were gathered, this study focused on the main research question and its sub questions:

1. What were the experiences and attitudes of in-service teachers with formal m-learning professional development?
   a. How did in-service teachers perceive their ability to apply m-learning strategies obtained in professional development?
b. How confident were in-service teachers with their ability to use mobile technologies with learning and teaching?

c. How ready did in-service teachers feel they are to use mobile technologies with learning and teaching?

d. What were the attitudes of in-service teachers toward the professional development they’ve received for mobile technology teaching and learning?

Research Question 1 is answered in Theme 1, Experiences and Attitudes with Formal M-Learning Professional Development. All research questions relate to the relevance aspect of the TPACK model created by Niess (2011), which is based on how mobile technology is integrated and utilized by the eleven in-service teachers. Niess (2006 & 2011), and Pan and Franklin (2011), said that when teachers are engaged in professional development and using educational influences the adoption and integration of technology in classroom practice. However, Zee and Gillow-Wiles (2011) said that “in-service teachers are limited in their access to professional development opportunities that they need to develop their TPACK.” One of the main questions in this case study was what were the attitudes and experiences of in-service teachers who receive formal PD with mobile technology.

The study could have concluded that teachers who received formal PD in mobile technology are more than willing and positive in integrating and adapting mobile technology in their classrooms. Instead, the focus of this study was if teachers received formal or informal PD with mobile technology, would it affect their attitudes to adapt and integrate mobile technology in the classroom? This would later result in affecting the attitudes of their students to want to use mobile technology in Student Oriented Learning. Based on the research, teachers’ attitudes were very positive in using mobile technology in their Student Center Teaching. During the research
from both Midtown and Sidekick, there was no negative attitudes to be found when it came to having PD formally or informally with their available mobile technology.

None of the eleven teachers were forced to integrate or even use mobile technology during the fall semester. One set of teachers were given PD formally at the beginning of the school year and another set of teachers received no formal PD during the fall semester. Here all eleven teachers used mobile technology for Student Oriented Learning in their classrooms during the fall semester. Many of these teachers turned to having their students, direct informal PD using mobile technology in their subjects, lessons and projects with their school issued devices. While teachers: Toolbox, Bitmap, K-9, Tackle Box, Query and Voluntary had students use their own personal mobile technology for classroom lessons, assessments and projects.

In this study, Hakuna Matata, The Joker, Sally Patches, Power School, and Five Points had formal PD not only at the beginning of the fall semester at their school, but also received regular PD every Wednesday during the fall semester, but not all were formal PD meetings about mobile technology. These PD meetings did reflect the use of mobile technology or various applications all the teachers use in the classroom during the fall semester. The findings with these teachers were mixed, but comparable data was found during the study with all five teachers.

Hakuna Matata talked about their experience with PD during her time as a second-grade teacher the past few years. Hakuna received PD usually at the beginning of the school year and on a regular basis on Wednesdays following dismissal of school. Most PD was on various programs they used from representatives from various organizations such as Lexia, Zearn, ST Math, Moby Max for their PD. Hakuna Matata, and Sally Patches both described that the PD was about how best to use the devices by informal trial and error. They usually had follow-up phone
calls and questions on the program or operations of each of the applications. Hakuna Matata said that being the K-2 Instructional Coach, she received Google Drive training at the beginning of the year. “That is the root and the most helpful since we use everything in Drive and our use of Gmail and communication in Drive and GSuite. Otherwise they would struggle,” she said.

The same “struggle” was also described by Sally Patches and Power School, who said that their formal PD showed the potential of the program used beyond what they felt comfortable with. Hakuna Matata also said: “Once I am ready for this, then I can go ahead and start moving forward. Then, just broad overview or other types of reports using the program with their mobile technology. During the follow-up interview with the researcher, Hakuna Matata said that they think there has been that shift using mobile technology, but only in some classrooms.

Many of the in-service teachers talked about what was more about teacher comfort level on where they would use mobile technology with their Student Learning. “Some feel they need more control or monitoring for that. We use more technology for guiding than creating.” The use of iPads and the Chromebooks are not necessarily being used outside of a related program, such as Google Classroom and so forth. “There are connections, but not they are not happening that often.” The other mobile technology in the classroom that the in-service teacher used more was with the Smart boards; they received their formal PD at the beginning of the fall semester.

Both Power School and The Joker confirmed this type of use of mobile technology. During the follow-up interview, The Joker said that it wasn’t necessarily using mobile technology as PD on Wednesday, that it was more staff learning. “It’s more infrequent with teacher lead. There are different grade level collaboration and teacher-led learning. It’s not necessary using first-grade teaching with mobile technology, but teaching on that grade level. It might look different in a middle school classroom as Power School, who is a 6-8th grade in-
service teacher, put it, “The frustrating part of it was we spent a lot of time going over aspects that most of us discovered while just exploring the technology. I would have liked to have spent more time on more advanced techniques.”

Sally Patches also shared this in both the initial and follow-up interviews: “Like I said for what we have had on it, it’s great for little facts, but I can’t build with it for lessons. I have to get into there and try a trial and error thing. Where if I had a successful PD, I would be able to implement this without so many trial and error. If it was a great PD, it would have affected in me in a positive way. The ones we have had haven’t been great.”

The pattern that showed up in all eleven in-service teachers in this study was that they wanted to do more with mobile technology, but only knew beginning-level uses for mobile technology in their classrooms. This will be discussed more thoroughly in Chapter 5. While Power School and Sally Patches did want PD to be more than early stages, Five Points believed that the formal PD did allow them to better adapt mobile technology in their classroom. Five Points believed that any PD training that they can get is beneficial “because there's so much stuff that you can do and the kids are super into technology these days, so he can only help and it makes sense.”

Subtheme A: In-Service Teachers Perceive Their Ability to Apply M-Learning Strategies Obtained in Professional Development

During this qualitative case study, all eleven teachers provided mixed replies on their ability to apply mobile learning strategies from formal PD. As the researcher discovered, the question should be restated: “In-service teachers perceive their ability to apply m-learning strategies obtained in professional development?” Hakuna Matata, The Joker, Sally Patches, and
Five Points expressed they were able to apply mobile technology into their lessons and classrooms. Most used mobile technology to communicate with students and parents, and for students to communicate with each other, as well to give and accept assignments, research, and information and educational resources.

Most PD and use of current technology in the classroom were done with various professionals hired to give training and develop lessons with teachers during Wednesday PD days at the school. Power School said during her initial and follow-up interview that they would be “way more confident and competent in using and implementing Google Classrooms, once restructuring and more lessons are adapted.” They do not have as many mobile devices outside of Chromebooks for the classroom, so Power School has not been using many other devices. Sally Patches also discussed this during her interview:

“The PD I have had for any technology have been ok, but they haven’t really dived in depth into what I want to use in my classroom. Such as building the lesson into how you can make them interactive with slide shows. Those are boring, I know how to do slide shows. It doesn’t get me building things and actually working with the apps. That’s the problem. In order to really to use it, I have to know how it works and get into the nitty gritty of it.”

From the first five case studies with Hakuna Matata, Sally Patches, The Joker, Power School, and Five Points only The Joker and Five Points used their formal PD to adapt more m-learning strategies in their Student Oriented Learning. Even though Five Points stated they would like to have more formal PD for using mobile technology, both Five Points and The Joker stated that they took their formal PD and then used informal PD on their own time to better adapt and integrate lessons into the classroom.
Subtheme B: Use Mobile Technologies with Learning and Teaching

All eleven teachers were able to use mobile technology from iPads to STEM mobile technology tools and applications with student learning and teaching. Throughout the study and with six of the teachers not receiving any formal PD with mobile technology during the fall semester, all teachers felt they were confident in using mobile technology based on past formal PD or their own informal PD. As K-9 said during the initial and follow-up interview: “I feel confident with what I know. I feel confident using the iPad, the phone. Apple TV. I feel confident with what I have and what I know. So, I utilize what I have, so I utilize what I have. I don’t know what exactly I am missing because I don’t know what I don’t know but I am comfortable with what I have.”

During this qualitative research study, not one in-service teacher expressed disinterest or rejection of using mobile technology in student learning or adaption of their classes or lesson plans. K-9, Tool Box, and Voluntary all expressed the desire to seek out more informal PD in order to continue working with the mobile technology they available to them and their students.

Subtheme C: How Ready Do In-Service Teachers Feel to Use Mobile Technology in Learning and Teaching

As shown in Subtheme B, all in-service teachers in this qualitative case study felt they were ready to use mobile technology in their classrooms. Tackle Box said that they use mobile technology “if they understand it,” as did Power School, Voluntary, and Bitmap. They used the mobile technology they knew how to use, whether that was through formal or informal PD. If they didn’t understand or knew how to use mobile technology, they didn’t use it. During the initial interview with The Joker, they said if they didn’t understand their STEM mobile
technology or how to adapt it into learning, they would not use it. While all eleven in-service teachers said they did not like not using mobile technology available to them, but if they can’t or don’t know how to use it and their students don’t understand it, they will leave it.

Sub Theme D: Attitudes Toward the PD They Received for Mobile Technology

All teachers’ attitudes toward the PD they received for mobile technology were mixed from the case studies that received PD for mobile technology. While half of the teachers received formal PD for mobile technology during the fall semester, the other half who did not receive formal or informal PD all expressed similar attitudes. The attitudes for the in-service teacher are as follows:

Hakuna Matata: “I think maybe more ongoing formal professional development would be helpful especially as we get new hires, more kind of formal check ins for those teachers that are still have a lot of questions or those are ready to go to the next steps of using the program in depth.”

The Joker: “I think overall, when it comes to technology, especially like professional development technology session, it’s got to be engaging. It’s got to make the teachers want to give a piece to follow. It can’t be all at once because it’s overwhelming, and they will be leaving thinking it’s too much, but they want more of it.”

Sally Patches: “I love PD, it’s very important and I love to have more in depth where I can have a hands-on approach, but I need to get someone who knows what they are doing is the biggest issue.”
Power School: “Once I have been introduced to the technology, I feel pretty confident that I could adapt lessons to use the technology, but I want to go farther than something I’ve discovered on my own.”

Five Points: “There is plenty of benefits with any PD and the kids are highly into it. I have nothing bad to say about it, but there is always more out there we could use.”

Tool Box: “The problem with formal PD is that it can be overwhelming at times with larger groups. I find I learn better in smaller groups, I still want PD, but not all at me at once.”

K-9: “I feel if we had more training, it would build an excitement in us and help us too, you know build awareness of what I actually available and what is working and be the best teacher you can be with it.”

Bitmap: “My goals are limited due to acceptability of it and understanding when to put it in and use it the most. We need this information.”

Query: “I would say lack of professional training has affected my confidence. I'm not, I, I like to use it, but I am well aware that I am severely limited and in troubleshooting different things.”

Tackle Box: “It tweaked my interest in using it, it might be something that somebody could actually do or offer without having to go to a convention or something similar and I would want to do more with it.”

Voluntary: “I want to receive it, but I want to feel like we are being set up for success.”

All in-service teachers in this study stated unanimously that they wanted more in-depth PD with mobile technology. All in-service teachers expressed that there has to be a shift in PD when it comes to using mobile technology, but only in some classrooms. It’s more about teacher comfort where that has happened. Some feel they need more control or monitoring they want to
use more technology for guiding than creating. All in-service teachers believe that having the students take charge of their learning with using mobile technology for creation instead of simple assessment and think it needs to happen more often and they believe there needs to be more discussion based on students having a chance to voice their opinions as stated by The Joker: “There needs to be less presentation and more discussion and more creating.”

As Tool Box stated: “PD best practice and presented in the worst way in what they tell us not to do instead of works the best in what we can do. Since even though teachers aren’t comfortable everyone has a cellphone. That gets them interested because it gets people to participate in a minor way.” When in-service teachers take what they learned during PD and then apply it quickly before they feel it has not use with their lessons and classroom. In a well-designed created formal PD session, as The Joker stated: “pump you up and makes you excited to get in the classroom and do that. And if you wait too long, it feels like it's too much or you forget about it or it doesn't get used.” The structure and use of a formal PD can make the differences in an in-service teacher will use it or not.
CHAPTER 5
DISCUSSION, RECOMMENDATIONS, AND CONCLUSIONS

Formal professional development will not be the solution for every teacher, whether pre-service, in-service, or post-service, just as iPads, Chromebooks, and STEM will not be for everyone. These technological tools add diversity to every in-service teacher’s Student Oriented Learning classroom. Anthony (2012), Cakir (2012), Chen (2009), Lui & Lee (2012), Niess (2011), and Zee & Gillow-Wiles (2012), are conducting or have conducted research on how teachers use mobile technology for the classroom, which can potentially be successful for specific subject areas or curricula. The current study concludes that formal or informal PD can be beneficial for in-service teachers in order to utilize and integrate mobile technology into their classrooms and in turn their school.

Attention, confidence, and additional learning design cannot function in Student Oriented Learning and TPACK instructional model until relevance is met for in-service teachers. In-service teachers will only use mobile technology if they know it is relevant to their classroom. The use of PD, Niess (2011) stated: “the importance of the curriculum content as the primary focus of the instruction while the digital tools and resources to support different types of learning are a secondary aspect for guiding the teachers in integrating appropriate technologies as learning tools.” The successful understanding of how mobile technology can be a viable tool for Student Oriented Learning will affect how an in-service teacher will utilize mobile technology in their school.
The questions asked in this study:

1. What were the experiences and attitudes of in-service teachers with formal m-learning professional development?
   a) How do in-service teachers perceive their ability to apply m-learning strategies obtained in professional development?
   b) How confident were in-service teachers with their ability to use mobile technologies with learning and teaching?
   c) How ready do in-service teachers feel they are to use mobile technologies with learning and teaching?
   d) What are the attitudes of in-service teachers towards the professional development they’ve received for mobile technology teaching and learning?

When this study began, it was stated by the researcher that the use of either formal or informal PD would influence an in-service teacher to integrate or utilize mobile technology in their Student Oriented Learning classroom or curriculum. Social Cognitive Theory is said that it cannot sustain itself on simple replication, but by trying them and succeeding or failing at them, but by evaluating their success in the replication of others. Bandura (1986) clearly states that when a teacher applies a familiar skill to a daily practice, they are found to more successful at adapting new ideas and practices into their Student Oriented Learning curriculums. The successful practices of mobile technology integration and utilization in the classroom are based on combining student cognition, intention and emotion with authentic learning tasks as described by Technology Integration Education Theory. The eleven in-service teachers in the case studies needed relevant reasons to integrate mobile technology into their student centered learning
classrooms, whether they received formal PD or not. All eleven cases did not use mobile technology that was not relevant for their Student Oriented learning curriculum or goals.

Integration and Utilization of Mobile Technology With PD

With Technology Integrated Education (TIE) with Mobile Learning, Frick (2011) said that “knowing how” and “know what are integrated with learner emotions and intentions” will better serve the integration of technology within any established learning environment. Technology, Pedagogy and Content Technology (TPACK) is clearly stated by Niess (2011) cannot simply be given technology and expected to use it in in their student centered teaching classroom. In future research, a full 32-week school year should be studied along with the inclusion of a public K-12 school (as opposed to private schools as in this study) to show more long-term effects of using mobile technology in the classroom.

All eleven in-service teachers found using mobile technology in the classroom as very relevant to their student centered teaching and expressed that they wanted to use more mobile technology in the classroom with their students. Power School expressed in the study that they would like to receive even more PD with their available mobile technology. Power School noted that during their PD sessions they were frustrated going over parts that they had either discovered or knew about on their own while exploring of mobile technology. Sally Patches said they would like more ongoing PD, which would be helpful for incoming teachers and allow more formal check ins with in-service teachers who are ready to go to the next step with using their mobile technology in the classroom with students. The findings show that this was a constant source of frustration for all five in-service teachers who had formal PD, but did not know where to take the use of their mobile technology after establishing it in their curriculum.
The most successful of the eleven case studies receiving formal PD was The Joker, who received very specific PD that helped with specific programs and how to use them effectively in the classroom. The Joker did state that their school was very good at making sure that their staff was trained, and their administration was very vocal in making sure all staff members were receiving the correct mobile technology and learning tools that their teachers needed to develop their curriculum accordingly. While Tool Box was also successful among the six in-service teachers who did not receive formal PD, Tool Box was also similar to all the other case studies took the mobile technology back to the students for them to drive their understand learning at their own pace. As all eleven in-service teachers stated: “It’s the students’ world that they use these in on a regular basis.”

As stated in Chapter 4, almost all of the teachers studied turned their formal or informal PD they received for their mobile technology back to the students. Tool Box expressed that with her school, they had a very traditional curriculum: “I love taking mobile technology and presenting it traditionally and flipping it. It totally blows the kids’ minds and even if they don’t care about what you are teaching. They are loving it with the features or content used with it.” This finding shows that in a more student-led classroom where students take a teacher’s lesson and use their available mobile technology to create their own lessons or projects to show their understanding and application in the classroom.

This was found in all eleven case studies. The Joker and Sally Patches talked about how students took a traditional history lesson and then turned it from a standard report or understanding of the lesson into a type of video, green screen, hyperlinked digital document or even created digital debates on their classroom projectors or smart boards. For example, when Kee (2014) used mobile technology for students to read online news articles or online shopping
websites. Students began digital conversations and taught their peers on how to create digital documents for research and online exploration and moved towards the trends of ubiquitous learning and self-paced learning if they integrate the mobile devices into their understanding and learning.

Anthony (2012) said that when technology planning and integration are complementary, they can lead to collective implementation that leads to success. In both the TPACK and Social Cognitive Theory both Chen (2012) and Niess (2011) started that teachers do not learn new behaviors only by trying them and either succeeding or failing, but by evaluating their success in promoting the replication of the actions of others. The research proved that all eleven in-service teachers showed no use of mobile technology if they could not adapt them to their curriculum. During the study all eleven in-service teachers expressed they want to use mobile technology more in their lessons and curriculum and want to received PD either formally or informally through their schools or through conferences or outside training. As Voluntary stated: “I want to receive it, but I want to feel like we are being set up for success.”

Teachers who have observed a model performing a behavior as explained by Chen (2012) and Niess (2011) that by evaluating teachers success in producing the replication of others can lead to mobile technology adaption and utilization as explained in TIE Theory. This is a model for how students’ self-efficacy is modeled through the guidance of their teachers in student centered teacher. The learning tasks can then be syntheses and influence technology integration as stated by Anthony (2012). This shows the model of Social Cognition with the information being obtained through teachers’ observations for creating guidelines for future behavior.

The issues that arose in the study could be how one school prefers a traditional curriculum with mobile technology used at the in-service teacher’s interests and the other wants
to have it as part of their daily curriculum and culture goals for the school. As quoted by educator Michael Cohen (2019), “It takes years to develop that level of awareness not just of self, but of others. It requires you to know your strengths and acknowledge your weaknesses (p. 105).” Lastly, not all in-service teachers have access to the same forms of technology in each of their classrooms. Some have different types of mobile technology designed for different curriculum and different learning goals with student centered teaching. These specific types of STEM or other mobile tools may not be adaptable for every lesson or subject area within an established or developing classroom or school curriculum. Stated in Chapter 1, Anthony (2012), Bandura (1999), and Niess (2011) that a teacher should know how to integrate technology to make teaching and learning highly effective amount students. The Joker, Query, 5 Points and Tool Box clearly showed that when they knew how to integrate mobile technology in an engaging way, it showed that a high amount of their students were more engaged in their learning during classroom time. As 5 Points stated: It’s nice to be able to walk in and be familiar with the apps or any of the technology and any goals I might have for my students. As long as I can show them how to use it, then I think I’m good.”

Query said that while their training is limited, they latched onto their use of Quizlet as it’s pretty simple and they use it on a regular basis and see it used throughout all the classes, Query currently teaches. “I am confident that there are things out that would enhance my teaching even better.” “Given more time and some training, I would be able use it to enhance my teaching.” Tool Box mirrored this same pattern by saying they are more than willing to purchase some mobile technology on their own as they see it very beneficial to their teaching and giving students more opportunities to make their learning their own. “It preserves anonymity and it really helps students to work at their true level without worrying about anyone else and what
they are doing.” The finds prove that all in-service teachers expressed they want to use more mobile technology in the classroom and receive training for it and feel it will not only enhance their teaching, but also enhance student learning in a collaborative curriculum with the proper PD.

Relevance in Schools

This research studied one private and one charter school, but both were considered part of Private Education. As stated in Chapter 5, while one half of the in-service teachers received formal PD for their mobile technology and the other half did not received any formal PD for their school mobile technology. There was a school initiative from administration that one school should receive PD not only in mobile technology, but also in schoolwide curriculum on a regular basis. In the first half of cases, it was given every Wednesday after school as a requirement. While the other school did not have any initiative that their in-service teachers receive any formal PD with their mobile technology, when PD was required for their curriculum, it was usually in areas that are not associated with mobile technology. The study found that both schools do not have an onsite technology coordinator or instructional technology coach that would apply the formal training. While one school had several representatives that led formal PD for various sessions, they did not all conform to mobile technology or to all grade levels.

With schools facing tight budgets and cuts, private schools face even larger challenges with lack of funds and not having the needed staff to meet requirements to apply, integrate, and utilize mobile technology for in-service teachers. Chen (2012) and Kretchmann (2015) have found that limited budgets do influence the use of mobile technology in classrooms. Anthony (2012), Öz (2014), and Varol (2013) also have found that various treads in education such as
mobile technology, STEM, culture, etc. can shape mobile technology use. These inconsistencies can affect self-efficacy with experienced in-service teachers in how they will adapt and utilize mobile technology. The current study showed similar results.

Curriculum (school, state, federal, or cultural) is still a vital part of the use of mobile technology in the classroom. Mobile technology is still a classroom tool, used for creation, scaffolding and assessment, but only when motivated by the teacher to use. Anthony (2012), Chen (2012), Li & Lu (2013), Niess (2011), and Zee & Gillow-Wiles (2012) discovered that mobile technology such as: iPad, Chromebooks, robotics, Apps and Smart Boards have shown popular results with their students, but only after all teachers not only all received formal PD, but also how to use the various mobile technologies with their classroom curriculum. Having formal PD not only given to in-service teachers, but also encouraged by the school administration could lead to more integration and utilization with mobile technology in student centered teaching.

The second part of this discussion deals with collaboration with mobile technology. This qualitative case study was based on in-service teachers’ use or lack of formal PD, but during the study, some of the in-service teachers used teacher and student collaboration to integrate and utilize mobile technology in their classrooms. Tool Box, Sally Patches, Query, K-9, and The Joker had their students demonstrate and use their classroom mobile technology in a student-led informal PD design for the in-service teacher and peers. Query and Tool Box explained that their students were more familiar with their mobile technology and were allowed to bring in their own devices for classroom and educational use. They were able to create a PD environment where they taught the teacher how to better utilize their classroom mobile technology. In their interview Query said they allowed one of their students to take full control of one of their classroom
mobile technology and program and use coding to recreate the way they review and assess their learning.

K-9, Sally Patches, The Joker, and Tool Box talked about collaborating with their co-workers in learning their various types of classroom mobile technology from devices to apps in addition to how they could adapt their lessons and gradually have students start leading the lessons after the initial instruction of the classroom lesson. With the continuing emergence of student-led classrooms where students have more choice in how they understand and demonstrate depth of knowledge with their classroom lessons and instructions. Formal PD for mobile technology use needs to be more readily available to in-service. All eleven in-service teachers want more professional development when it comes to mobile technology to have more success with adaption and utilization in student lead teaching. This research shows that when there is a more mobile technology initiative from school administration to have formal PD on a regular basis with their in-service teachers and in-service teachers are able to allow students to explore, create and lead with their available mobile technology. There is not only more use of mobile technology in classroom curriculum, but also with student engagement and success.

Recommendation for Future Research

Administration Involvement

Due to a lack of information from administrations during this study, a common theme that emerged from the case study showed that much of the in-service teacher’s formal PD came from a leadership initiative on the use of mobile technology in the classroom and curriculum. Anthony (2012) suggested the involvement of leadership from schools and classrooms using
mobile technology was imperative in creating a vision and promoting school culture for digital learning. Both Hakuna Matata and The Joker serve as Instructional Coaches in their schools. Instructional coaches are defined as coaches who build teacher capacity and their understanding of instructional practices as related to their curriculum (Lu & Lei, 2012).

An instructional coach is a learner who models continuous improvement, lifelong learning, to ensure student success in schools. All instructional coaches work collaboratively as a team with their in-service teachers to lead to a shared vision of mobile and non-technology use in student centered teaching similar to school administration. The findings saw that when the instructional coach was more involved with the PD practices with the in-service teachers who had formal PD, there were better uses of adaption (Lotter & Peters, 2014). The data is supported by the interviews from Sally Patches and 5 Points described in their interviews, there was a shared vision between administration and instructional coaches on how to use the formal PD that teachers had on a regular basis and what goals they were to meet or exceed with their students. This was not the case with the second school as administration while encouraging of the use of mobile technology in the classroom do not make it part of their school culture. Past research had shown that administration had been instrumental in the integration of mobile technology in a K-12 system (Anthony, 2012). As Tool Box, Voluntary and Tackle Box revealed during the study, that the use of mobile technology is not top priority to the school.

In fairness, both schools have dealt with budget cuts and enrollment like many schools and the use of funds are more directed towards needed areas of the school. However, as research has suggested from Anthony (2012), Chen (2012), Niess (2011), and Zee & Gillow-wiles (2015), having a direct vision from administration and presenting a clear leadership goal can lead to more teachers adapting and utilizing mobile technology.
Teacher Collaboration

During the case study, the researcher learned that a common pattern that lead to more use of mobile technology whether the in-service teachers received formal or informal PD was collaboration. Tool Box and K-9, both stated during their interviews that they would be having another in-service teacher work in collaboration for their classrooms. Tool Box said during their interview, they would be working with another teacher who did not use very much mobile technology in their classroom, but did have several devices available to them that they did not know how to adapt to their lesson plans or integrate into their classroom. K-9 had talked about working a teacher in upper elementary that used mobile technology in their classroom and wanted to share more lessons on how they used mobile technology with their students.

This was a common theme from recommendation 1 about school leadership being more involved in the implementation of mobile technology in school curriculum. Teachers have been at times known to work in isolation when trying to adapt mobile technology in their SCT (Kretschmann, 2015). Both K-9 and Tool Box had this co-teaching collaboration develop from a proactive stance from their school’s administration. The school leadership encourages the teacher collaboration with their staff. However, as Hakuna Matata and Power School pointed out in their interviews during the case study, “what works for one classroom can’t always translate to another grade level.” The Researcher learned during their follow up interviews with Hakuna Matata that while there is mobile technology used in all classrooms, outside of the use of various Apps and smart boards and document cameras, not all classrooms have the same mobile technology. Early grade levels use iPads and upper grade levels (3-8) use Chromebooks with STEM technology starting in 2nd grade and then being used on grade levels above. Teachers
needs to know students’ level of thinking and being able to provide resources that can support student center teaching for application of learning in their curriculum (Liu & Lee, 2013).

The finding was a major part of this study as most schools that use mobile technology usually use one type, either a tablet-like device or a desktop/laptop computer type for students and faculty. Mobile technologies are to create a type of learning that is consumed, interacting, providing communication and creativity with students (Kesk et. al., 2011). While Tackle Box and Query talked about the need for more curation between various mobile technology devices for their classrooms and usage, they are not always useful from one classroom to another. Just as Five Points and Bitmap described their devices might work out well in all classes, but students might find constant use of the same digital app or program to become tedious and boring that would lead to loss of engagement in the classroom. As Tackle Box pointed out in his science classroom: “Students are more interested in mixing chemicals than trying to do a presentation or use dissection app.” During the follow up interview, Tackle Box was completing a section of worm dissection and students were more focused on exploring the worm more than if they could document or use mobile technology to explore more.

**Student-Led Classroom**

Continuing from recommendation 2, student use of mobile technology was a very vital part of the study. Kee (2014) suggested that students were technologically competent and ready to use mobile technology in the classroom. Kee (2014) and Chen (2012) both suggested that students prefer personalized learning when it comes to using mobile technology in their learning. The researcher learned that students were most engaged with their learning with mobile technology was not if their teachers knew how to use mobile technology, but provided ways in
how they could use it. Students who assume leadership roles in group work using mobile technology are able to implement more effective lesson and project planning for teachers (Huh et. al/ 2014). This ties into collective efficacy as Bandura (1979) that allows to promote better outcomes when it comes to utilizing mobile technology in student center teaching.

The Joker, Tool Box, and Query allowed for almost full student lead learning in their course work. After introducing a history unit in the classroom, The Joker allowed students to view a brief overview of black Americans during the second World War using the History Channel along with other World War II interviews on YouTube. Then he challenged the students to link those voices with parts of a poem-writing project. The prompt was: “After World War II, by the next war in Korea War, the Army is desegregated and there have been big changes and other things in the world. Students were instructed to make a connection between the poem and those historic events, then left to determine how they would present them. Some students created a video; some used a green screen to put themselves in these historical situations and then presented their poem.

While The Joker taught the initiation lesson and proposed a main research question, the students were left in charge of how they would present it using the available mobile technology in the classroom. Query had a student use their main assessment mobile technology app, Quizlet and using coding and programming to create a buzz in round for Quizlet and then taught Query and the students how to create their own using Quizlet. This led to more engaged students and the use of the pair programming model, which consists of two programmers sharing a single workstation (one screen, keyboard and mouse among the pair). The programmer at the keyboard is usually called the “driver,” The other, actively involved in the programming task, but also focusing more on overall direction, is the “navigator.” (Programmers often swap roles every few
minutes or so). This type of formal PD that is done in an informal way, as much of the 
collaboration is done by the individual while the collaboration stays at a minimum.

Student-led classrooms while very student driven still follow the STC and TIE Theory. 
Tool Box talked about how their students were experts with the mobile technology, but still 
needed direction by presenting the lesson. Tool Box uses the interactive app, Nearpod, which is 
an interactive Power Point Presentation tool. Tool Box would transition from their classroom 
lecture into is using student lessons using Nearpod, where Tool Box would create the slide set 
for the lesson and students completed it at their own pace. Tool Box usually move assessment 
into it depending on the lesson. Tool Box usually uses content where it might be from student 
textbooks and students have to then use the information from the slide. The use of mobile 
technology using Nearpod is a mix of content, assessment on their part and students can move at 
their own pace. These findings suggest that students leading to showing the understanding of 
content, assessment and presentation that students directing informal PD in the classroom is also 
essential into adaption and utilization in the classroom.

In fairness, in-service teachers and instructional coaches are still needed for the creation 
and applying of classroom lessons and curriculum, as Tackle Box, Bitmap and 5 Points described 
in their interviews. Students want to be educated, but do not know where to start. As Tackle Box 
talked about their students with chemistry, students want to experiment with the use of mobile 
technology, but they do need direction in how it works and what it can be used for. Bitmap 
described during their follow up interview, that once students have been shown the basics, they 
would let them take the mobile technology and see what they could do with it, but still needed 
direction in where it could be applied as 5 Points described during their initiative interview. 
Power School and Sally Patches also said that many times student do need to be monitored with
their use of mobile technology. Many times, students will get off task and search for various videos, games or other applications that are not appropriate for classroom use of mobile technology. As K-9, Bitmap and Tool Box talked about in their follow up interviews, it was teaching students to be responsible with mobile technology and know how to apply and how to explore instead of left on their own intentions.

The Major finding of this study is that student involvement is very important when it comes to utilization and adaption of mobile technology in the classroom. As stated in Chapter 1, Anthony (2012), Niess (2011), Liu & Lee (2013), and Zee & Gillow-wiles (2010) found that student-centered teachers indicated that students were capable of learning more with mobile technology through exploration, whereas the teacher-centered teachers expressed the importance of guiding students in more hands on exploration and experimentation with their learning when adapting and utilizing mobile technology. All eleven in-service teachers in this study also expressed that many times when students do use technology at their own discretions, they do have incidents where they try to stream content such as: videos, movies and games that are not part of the lesson or project and get off task when trying to completely assignments. As Tool Box, The Joker, and Query said during their interviews, less presentation and more discussion. The use of student lead PD can be a best practice and presented in an active way. Even though in-service teachers aren’t always comfortable with mobile technology outside of a cellphone, as Tool Box stated: “That gets them interested because it gets people to participate even if it’s in a minor way.”

There would need to be future research to maintain the balance of teacher influence and students leading in what they have as many choices as possible when selecting their use of mobile technology for their lessons. This study was limited to just eleven in-service teachers
selected from both schools. Many students were described as wanting more lecturing or teacher directed lessons as they feel more comfortable with the teacher leading the lesson than if they were allowed to have more choice in how they present their understanding of curriculum or through assessment.

**Mobile Technology Functionality**

During the initiation interviewing of this study, six of the case studies did talk about functionality problems that have occurred during their use of mobile technology. Anthony (2012), Finger (2009), Kree (2014), Kretschmann (2015) experienced similar problems during their studies. They found wi-fi connectivity, website, video blocking and filtering when studying school use of mobile technology. Voluntary, Tackle Box, Bitmap and Query said during their interviews that students no longer had dedicated one to one iPads in their classrooms. Students were encouraged to bring their own mobile devices, usually smart phones or their own tablets for classroom use. They also talked during their interviews that their Internet connections were spotty and hard to connect at times, which has led them not seeking out more formal PD through conferences or other forms of PD, since they cannot rely on their devices working or use websites or apps not being blocked or unable to work on their network.

Hakuna Matata and Sally Patches also expressed technology problems with mobile technology since they didn’t have an on-site technology maintenance person to fix any problems that occur during lessons. If teachers have problems using mobile technology, they are less likely to use available mobile technology for their classroom as it might not function correctly and might not have the problem solved immediately or shortly after the problem occur. Students also can be less engaged in a lesson if they know, expect, or witness their devices are not functioning
correctly. Also, as stated in the previous recommendation, students who use their own devices to bypass classroom technology functioning problems can get off task as they use their own devices to stream content that is not related to their lessons such as games and videos. Other issues a school district and/or implementing school mobile technology should discuss are the following:

- Bandwidth
- Blocking of educational sites or resources
- Policy on personal device for student usage versus a dedicated mobile device for student usage
- Dedicated on campus technology employee for trouble shooting or instructional coaching on a daily basis
- How students connect with interactive devices and digital application with classroom teachers.

A few in-service teachers found success, although the technical issues and the personal cellphone use could have adversely affected the study. In all of the interviews with the in-service teachers, they stated they would prefer a dedicated-on site technology employee and coordinator for formal PD with staff on the use and training of mobile technology in the classroom. While there are part time employees who serve for technology management for both schools, they are more for set up of mobile technology, maintaining of school systems, Wi-Fi and data distributing. Neither school has an onsite instructional technology coach or coordinator who serves time with technology maintenance and mobile technology teaching and curriculum design and implementation.
Implications and Conclusions

This study indicates that the use of PD either formal or informal does have a direct affect on an in-service teacher’s integration and utilization of mobile technology in a SCT classroom. While pedagogy is a main driver in a classroom, technology, especially mobile technology can be an accelerator in student driven learning (Fullan, 2013). As explained earlier, the main terminology for PD is to the acquisition of skills and knowledge, both for personal development and for career advancement and is not considered a onetime occurrence in any professional area from business management to education. There is evidence that the use of PD when provided to in-service teachers is credited with making improvements to classroom instruction, management, and alignment of curriculum with their students. The research showed that when administration places an active role in offering or provided PD to their teachers, they are creating a culturized system that can lead to better use, integration and utilization of mobile technology in their students’ education.

Researchers reading this study may have the opinion that the eleven in-service teachers chosen between two private school using mobile technology is not a large enough study to know how or whether PD formal or informal affect in-service teachers to adapt and utilize mobile technology in their classrooms. As findings discovered, the move towards more of a student-led classroom lead to a more in-depth inquiry for students using m-learning. We should explore these instructional implications on how it can build in problem solving, critical thinking, collaboration that can capture the tasks of the use of mobile technology and look at the frames of student and teacher exploration of m-learning curriculum. These small shifts as the research as shown could be very benedictional when it comes PD with mobile technology. In the end, the
The purpose of this study was to find out if the use of formal or informal PD with mobile technology could be beneficial in the adapting and later utilizing mobile technology for student centered teaching in their classrooms. In-service teachers who use mobile technology in their curriculum are not specialist when it comes to mobile technology. In-service teachers are professionals or adapt lessons and subject matter into curriculum to reach student learning goals in K-12 schools.

Mobile technology is another tool used for classroom instruction, adaption of learning and scaffolding of understanding and exploration of education. Mobile technology allows students to create, explore and design their learning and educational experiences. As we know from Bandura’s (1977, 2006) research that human judgment and problem solving depends more on specialized knowledge and people tend to draw on their own experiences and turn to others who are well informed on the matters when they do not understand a process or design. Niess’s (2011) explained that teacher instruction, resources, management and student experiences need to be re-envisioned and design when it comes to using classroom technology in student centered teaching.

The use of Professional Development, formal or informal, for in-service teachers is very beneficial in using mobile technology for adaption of curriculum in classrooms and schools. With more and more types of mobile technology being put into schools, the need for PD for not only in-service teachers, but school staff is very important. Query, Voluntary, K-9, Sally Patches and Power School expressed their frustration in not having enough formal PD for their available mobile technology while showing interest in having more formal PD or more resources for informal PD made available for them to explore on their own so they could use in the classroom for lessons and students’ learning.
Future research will be needed in this same approach will work in public, social economic and home schooling. Also, technology barriers could be an issue for schools that are looking to start using mobile technology in one to one program or in their classrooms or districts. The main recommendation for this research is that in-service teachers receive formal PD when first using mobile technology and moving from a lectured or teacher lead classroom into a co-collaborative classroom using mobile technology with students. The Joker, K-9, Query and Tool Box were influence to have students drive the use of mobile technology in their classroom as they were more equipped to use mobile technology since it has been a part of their life styles instead of developing over the years as it has with all eleven in-service teachers. There has been much research on the use of mobile technology in the classroom for student success. This study poses a possible solution to help reluctant in-service teachers in wanting to use mobile technology in their classrooms, but do not know where to start.

During this study, Query asked if the researcher knew of any resources that would aid in their understanding of new applications or discovering new and emerging mobile technologies for the classroom. The researcher was happy to recommend two websites, created by current in-service teachers, that demonstrate the use of mobile technology in the classroom and how it can work for various subjects. By the end of the study, K-9 and Five Points had expressed new ideas they have learned from their new collaboration with other grade level teachers on the use of mobile technology with lessons they were having a problem with adapting with students. Of these three case studies, these three in-service teachers found relevance in how PD formally or informally can lead to more adaption and utilizing of mobile technology in their curriculum.

The use of formal and informal PD can be very influence able in using mobile technology in student-led teaching and can be transformational for student learning and teacher classroom
self-efficacy. This will truly give both in-service teachers and their students the ability to create, inspire and lead in their classrooms and make the use of mobile technology truly their own in education. The use of teacher collaboration can discover the strength and weaknesses of using and adapting mobile technology into any curriculum that will be successful for their students. With mobile technology, having in-service teachers teach the way a student can learn with it instead of how a student can learn from it will be a step forward in the true adaptation and utilization with mobile technology in education. In conclusion, mobile technology is a teacher tool that can bring about creativity and understanding with a student and from this tool, an in-service teacher can build from it a new type of student centered teaching in their classrooms they can then pass on to their students.
REFERENCES


APPENDIX A

SCHOOL GRANTING PERMISSIONS OF RESEARCH STUDY
School Granting Permission of Research Study

Letter Granting Permission

Dear XXX,

I’m e-mailing you today to tell you that my research for my dissertation will be starting very soon. I need written permission so that I can conduct my demographic and later teacher interviews for my case study. The demographic survey will be conducted online and completely confidential and will take about 10 minutes to complete. Once surveys have been collected and scored, there will be five staff members chosen at random to have one-on-one interviews. I’m planning on doing this in March or early April depending on official approval by the IRB at Northern Illinois University. If you have any questions, you can email me at: XXXX@XXX.

Thank you for your time,

Ryan Read
M.S.Ed. in Instructional Technology

Ryan,

Yes, you have my permission to conduct your demographic and teacher interviews for your case study at XXX.
If you need anything else, please let me know.

Thanks!

XXXXX
Elementary Principal
Midtown School

Phone: XXX.XXX.XXX
Fax: XXX.XXX.XXX
APPENDIX B

COVER LETTER AND DEMOGRAPHIC SURVEY
A Cover Letter and Demographic Survey will be sent to all school staff. Those who do not teach classes or use technology will be narrowed down after results before the Informational Survey is given.

Cover Letter - Demographic Survey E-mail
Hi, my name is Ryan Read. I’m e-mailing you about a study that I’m conducting for my PhD dissertation. The study is about teacher experiences and attitudes with the use of mobile technology in the classroom. You will be asked to complete a simple online demographic survey (the link is below). Participation is confidential and voluntary. Also, you can withdraw any time if you change your mind. There are no known risks to participation. This study has been cleared by the Northern Illinois University Institutional Review Board (IRB), and it takes about ten minutes to complete.

If you would like to participate, please reply to this e-mail message and then click the link below. Remember, this completely confidential and your personal information will not be shared with anyone.

If you do not want to participate, please send me a reply e-mail saying ‘No thanks.’

Thank you for your time.

Ryan C. Read
M.S.Ed. Instructional Technology

Demographic Survey Questions
1. I am a
   ● Teacher
   ● Administrator
   ● Para Professional
   ● Instructional Coach
   ● Other___________

2. My Gender is
   ● Male
   ● Female
   ● Choose not to Identify

3. My Ethnicity is
   ● White/Caucasian
   ● Black/African American
   ● Asian
   ● Latino/Spanish
   ● Multi-racial
   ● Other________
4. I have been teaching
   ● 0-3 years
   ● 4-9 years
   ● 10-15 years
   ● 15+

5. I generally Teach
   ● Pre-school
   ● Elementary
   ● Middle School
   ● High School
   ● Multiple Grades
   ● Other

6. My age range is
   ● 18-25
   ● 26-30
   ● 31-35
   ● 36-40
   ● 41-45
   ● 46-50
   ● 51-55
   ● 56-60
   ● 61-65
   ● 66+

7. I receive formal Professional Development (Check all that Apply)
   ● During Work Days
   ● During Planning Time
   ● On my Own time
   ● Almost Never
   ● Never

8. When provided Mobile Technology for my classroom I receive Professional Development
   ● All of the time
   ● Most of the time
   ● Some of the time
   ● Never

9. How much formal Professional Development have you received in the last year? Last 5 years?
10. Was any of that PD related to mobile technology use in the classroom?
   a. If yes, please describe.
   b. If yes, what mobile technologies (list)?

11. When using mobile technology, I use the digital resources or apps that are provided to me.
   ● Strongly Agree
   ● Agree
   ● Slightly Agree
   ● Disagree
   ● Strongly Disagree
   ● None are provided
   ● Sometimes – please explain….

12. I feel comfortable using mobile technologies in my teaching and students’ learning.
   ● Strongly Agree
   ● Agree
   ● Slightly Agree
   ● Disagree
   ● Strongly Disagree
   ● Other….please explain….
APPENDIX C

INFORMATIONAL SURVEY
Informational Survey

Likert-Scale
(Strongly Agree, Agree, Slightly Agree, Neither Agree nor Disagree, Slightly Disagree, Disagree, Strongly Disagree)

1. Mobile technology has assisted my overall teaching process this semester
2. I plan better use for my teaching with mobile technology than without it.
3. The use of mobile technology in learning makes my teaching more productive.
4. I find the use of mobile technology to enhance my teaching process.
5. My motivation for teaching has been enhanced by the use of mobile technology in and outside of my classroom.
6. I find mobile technology easy to use in my classroom for teaching and learning.
7. When using mobile technology, I feel confident to use the digital resources or apps that are provided to me.
8. When my lessons cannot be adapted to mobile technology I feel confident looking for alternative ways to use mobile technology.
9. When I receive professional development for mobile technology, I feel confident immediately using it in the classroom.
10. When I do not receive professional development, I still feel confident using mobile technology in the classroom.
11. I have searched and downloaded information from websites in order to use mobile technology to enhance my teaching.
12. I feel confident in my ability to find mobile technologies to use in my classroom.
13. When formal professional development is not offered, I feel confident looking for other professional development resources (i.e., conferences, videos, etc.).
14. I feel confident in my ability to design learning tasks for students using mobile technology.
15. I find using mobile technology impacts and challenges my teaching with or without having had professional development on the mobile technology.
APPENDIX D

INTERVIEW GUIDE AND QUESTIONS
Interview Guide and Questions

INSTRUCTIONS

Good morning (afternoon). My name is Ryan Read. Thank you for coming. This interview involves two parts. The first part are open-ended questions, in which I will ask you about your experiences using mobile technology as a teacher in your classroom. The purpose is to get your perceptions of your experiences inside and outside of the classroom. There are no right or wrong or desirable or undesirable answers. I would like you to feel comfortable with saying what you really think and how you really feel. The second part will involve what professional development you have been given or not given in the use of instructional integration with mobile technology inside and outside the classroom.

RECORDER INSTRUCTIONS

If it is okay with you, I will be recording our conversation. The purpose of this is so that I can get all the details but at the same time be able to carry on an attentive conversation with you. I assure you that all your comments will remain confidential. I will be compiling a report which will contain all teachers’ comments without any reference to individuals.

PREAMBLE/CONSENT FORM INSTRUCTIONS

Before we get started, please take a few minutes to read this preamble (read and sign this consent form). (Hand Teacher consent form/preamble.) (After Teacher returns preamble/consent form, turn tape recorder on.)

1. Please describe how you define the use of mobile technology in the classroom.
2. Please identify up to three core subjects you feel confident using mobile technology in.
3. What types of mobile technologies have you used in the classroom?
   a. Examples: clickers, iPads, laptops, robotics, phones, AR, etc.
4. Did formal professional development influence your use of any specific mobile technologies, which ones, and how?
5. Please describe your future goals in using mobile technology in the classroom.
   a. Example – student learning
   b. Example – communication
   c. If you don’t have any, why not? Please explain.
6. What formal teacher professional development options are available (or have been) to you when it comes to integrating mobile technology in the classroom?
   a. Please describe.
7. Has formal PD affected your confidence in using mobile technology in the classroom?
   a. How? Can you describe?
   b. If it hasn’t, why not? Please explain.
8. Please describe how you feel professional development has helped your future use of mobile technology in the classroom.
   a. If it hasn’t, why not?
9. Has formal professional development affected your confidence in using any specific mobile technology in the classroom? How? Which ones? Can you describe?
10. Has formal professional development affected your confidence in using any of the specific mobile technology in **specific subject areas**? Which ones and how?
11. Has formal professional development affected your confidence towards your future goals for using mobile technologies in the classroom? How?
12. Are there any mobile technologies you do not feel confident in your ability to use in the classroom? Which ones? Why not?
13. How confident in your ability are you towards adapting non-technology lessons to ones that incorporate mobile technology? Can you describe/expand?
14. What other attitudes do you have towards formal professional development regarding mobile technology use in the classroom that you’d be willing to share?
15. Are there other experiences you’ve had with formal professional development regarding mobile technology use in the classroom that we haven’t discussed?
16. What questions do you have for me?
APPENDIX E

INFORMED CONSENT FORM
Informed Consent Form

Ryan Read  
Email: xxx@xxx.com  
Phone Contact: xxx-xxx-xxxx

Thank you for agreeing to participate in this study, which will take place from XXX. This form details the purpose of this study, a description of the involvement required and your rights as a participant.  
The purpose of this study is to gain insight into teachers experiences and attitudes toward professional development of integration of mobile technology in the classroom.

The benefits of the research will be:
• To better understand how Professional Development affects a teacher’s experiences with and attitudes toward to integrate and utilization of mobile technology in the classroom.  
• To identify significant components that could help in development of Professional Development with Mobile Technology.

The methods that will be used to meet this purpose include one-on-one interviews.

You are encouraged to ask questions or raise concerns at any time about the nature of the study or the methods I am using. Please contact me at any time at the e-mail address or telephone number listed above.

Our discussion will be audio recorded to help me accurately capture your insights in your own words. The audio will only be heard by me for the purpose of this study. If you feel uncomfortable with the recorder, you may ask that it be turned off at any time.

You also have the right to withdraw from the study at any time. In the event you choose to withdraw from the study all information you provide (including audio) will be destroyed and omitted from the final paper.

Insights gathered by you and other participants will be used in writing a dissertation, which will be read by my committee chair and review board and presented at Northern Illinois University at time of defense.

Though direct quotes from you may be used in the paper, your name and other identifying information will be kept confidential.

By signing this consent form, I certify that I ____________________________ agree to (Print full name here) the terms of this agreement.  
____________________________ ______________ (Signature) (Date)
APPENDIX F

EMAIL TO PARTICIPANTS ABOUT INTERVIEWS
Email to Participants about Interviews

Dear (teacher),

I am conducting interviews as part of my dissertation research study to increase our understanding of how Professional Development influences a teacher’s experiences and perceptions of using Mobile Technologies in the classroom for teaching and learning. As a teacher you are in an ideal position to give me valuable first-hand information from your own perspective.

The interview takes around 30 minutes and is very informal. I am simply trying to capture your thoughts and perspectives on being a teacher using mobile technology in your classroom. Your responses to the questions will be kept confidential. Each interview will be assigned a number code to help ensure that personal identifiers are not revealed during the analysis and write up of findings.

There is no compensation for participating in this study. However, your participation will be a valuable addition to our research and findings could lead to greater public understanding of how formal professional development influences the use of mobile technology in the classroom for others in the field. If you are willing to participate please suggest a day and time that suits you and I'll do my best to be available. I am also able to meet in a one to one online interview through: Skype, Google Hangouts or Today’s Meet. If you have any questions, please do not hesitate to ask.

Thank You,
Ryan C. Read
APPENDIX G

EXIT LETTER
Exit Letter

Thank you for participating as a research participant in the present study concerning your experiences and attitudes regarding Professional Development with Mobile Technology in the classroom.

Again, I thank you for your participation in this study. If you have any questions regarding this study, please feel free to contact me at this time. (email: xxx@xxxx.xx; telephone: XXX-XXX-XXX). In the event that you feel distressed by participation in this study, we encourage you to contact me at any time.

Thanks again for your participation
APPENDIX H
FIELD NOTES TEMPLATE
Field Notes Template

[filename]: (Teacher ID Code)
[TITLE]: (Interview)
[DATE]
In these sections I insert the filename of each document as a header, give each field note a short title, and record the date.

[DESCRIPTION OF ACTIVITY]
This is for describing what happened during the day as accurately as I can. I take a ‘who, what, when, where, why, how’ approach and try to stick to ‘facts’ to create a verbal snapshot of what happened. This includes noting direct quotes and snippets of conversations, text messages, filenames of voice recordings, and what photos I took.

I am aware that all field notes are constructed, and what we choose to take notes about are influenced by a range of factors, so in this section I try to minimize that. My objective is to keep description separate from analytical work for as long as possible while recognizing that these snapshots are just that; a glimpse of a point in time from a particular perspective, through a particular lens.

[REFLECTIONS]
I reflect on the day’s experiences, writing about how I might have influenced events, what went wrong (and what I could do differently next time), and how I feel about the process.

[EMERGING QUESTIONS/ANALYSES]
Here I note questions I might ask, potential lines of inquiry, and theories that might be useful. This is where I start to do some analytical work.

[FUTURE ACTION]
This is a ‘to-do’ list of actions. I usually include a timeframe alongside each point.
APPENDIX I

LETTER OF APPROVAL FROM INSTITUTIONAL REVIEW BOARD
Letter of Approval from Institutional Review Board

07-Jan-2019

TO: Cindy York

Educational Technology, Research and Assessment

RE: Protocol # HS18-0334 “Professional development of in-service teachers utilizing mobile technology in their classrooms”

Your Initial Review submission was reviewed and approved under Expedited procedures by Institutional Review Board #1 on 07-Jan-2019. Please note the following information about your approved research protocol:

Protocol Approval period: 07-Jan-2019 - 06-Jan-2020

If your project will continue beyond that date, or if you intend to make modifications to the study, you will need additional approval and should contact the Office of Research Compliance and Integrity for assistance. Continuing review of the project, conducted at least annually, will be necessary until you no longer retain any identifiers that could link the subjects to the data collected. Please remember to use your protocol number (HS18-0334) on any documents or correspondence with the IRB concerning your research protocol.

Please note that the IRB has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process. Unless you have been approved for a waiver of the written signature of informed consent, this notice includes a date-stamped copy of the approved consent form for your use. NIU policy requires that informed consent documents given to subjects participating in non-exempt research bear the approval stamp of the NIU IRB. This stamped document is the only consent form that may be photocopied for distribution to study participants.

It is important for you to note that as a research investigator involved with human subjects, you are responsible for ensuring that this project has current IRB approval at all times, and for retaining the signed consent forms obtained from your subjects for a minimum of three years after the study is concluded. If consent for the study is being given by proxy (guardian, etc.), it is your responsibility to document the authority of that person to consent for the subject. Also, the committee recommends that you include an acknowledgment by the subject, or the subject's representative, that he or she has received a copy of the consent form. In addition, you are required to promptly report to the IRB any injuries or other unanticipated problems or risks to subjects and others. The IRB extends best wishes for success in your research endeavors.
APPENDIX J

MEMBER CHECKING EMAIL
Dear Mr./Ms. Last Name:

Thank you for your time during our interview on Professional Development with Mobile Learning. Your insights were truly helpful in my research for my dissertation. To check on the validity and trustworthiness of our interview, I have enclosed a transcript of our interview. Please look over the transcript and review if our interview and my interpretation of your feedback is genuine. Please respond back as soon as possible if we need to clarify any discrepancy or errors.

Thank you again for your time.

Sincerely,

Ryan Read
XXX@XXX.XXX
XXX-XXX-XXX
### Interview Schedule

<table>
<thead>
<tr>
<th>In-Service Teacher</th>
<th>Initial Interview</th>
<th>Follow-Up Interview</th>
<th>Exit Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sally Patches</td>
<td>2/14/2019</td>
<td>3/02/2019</td>
<td>3/25/2019</td>
</tr>
<tr>
<td>Voluntary</td>
<td>3/08/2019</td>
<td>3/12/2019</td>
<td>3/30/2019</td>
</tr>
<tr>
<td>Tackle Box</td>
<td>2/18/2019</td>
<td>3/03/2019</td>
<td>3/20/2019</td>
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