Teacher perceptions of pedagogical change in 1:1 laptop classrooms

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Teacher perceptions of pedagogical change in 1:1 laptop classrooms

by

Jessie Christensen

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Major: Education (Curriculum and Instructional Technology)

Program of Study Committee:
Denise Crawford, Major Professor
Larysa Nadolny
Donna Niday

Iowa State University
Ames, Iowa
2015
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I would like to thank my major professor, Denise Crawford, for her help and advice throughout my experience as a graduate student. Without her patience and suggestions, I never would have been able to finish with this program. I must also extend thanks to Larysa Nadolny and Donna Niday, the other members of my committee, for their suggestions and support throughout the long process of this research.

I also want to thank my parents, Deb and Chuck Christensen, and my best friend, Emily Smith, for helping to keep me sane over the last three years. Thank you for encouraging me when I was feeling down and reminding me to take some time to relax occasionally. I can never repay you for all of your support.
This research study sought to answer two research questions: 1) How do K-12 teachers perceive that their pedagogical approaches change or remain the same after being involved in a 1:1 program? and 2) What factors do K-12 teachers identify that impact or prevent pedagogical change? The researcher adapted sections of Becker and Anderson (1999)’s *Teaching Learning, and Computing Teacher Survey*. The instrument was distributed online by email and included 166 responses from teachers who had worked in a school with a 1:1 program for at least one year. Sixty-five percent (65%) of the participants believed that their pedagogical practices had changed as a result of being involved with a 1:1 program. The teachers provided classroom examples of how their classrooms had become more student-centered, their role became that of a facilitator, and they began to employ more project-based learning in their classrooms. Teachers reported that the biggest challenges they faced included the distraction of students by technology, a lack of training for teachers and students, and observed weaknesses in the technology infrastructure of schools. The teachers felt that the training of teachers and students, support for all parties, and careful planning of the technology infrastructure are important factors for helping teachers and students succeed in such programs.
CHAPTER 1
INTRODUCTION

In the words of Bebell and Kay (2009), “few modern educational initiatives have been as widespread, dramatic, and costly as the integration of computer technologies into American classrooms” (p. 11). Many students already have technology as a huge part of everyday life and 1:1 program initiatives are one of the ways that schools are trying to reach out to students and meet their educational needs (Donovan, Green, & Hartley, 2010). These programs involve the purchase of a number of laptops or mobile devices for all students at the school involved. The expectation is that all students are given a laptop or mobile device that is funded by the school to use at school and, in most cases, at home. Teachers are then expected to incorporate these devices into their instructional routine, with the goal being to align this use to existing learning goals. Educators hope that this will provide students with superior materials and resources, access to engaging lessons, and motivational appeal.

School districts have adopted such 1:1 initiatives for many reasons, but chiefly for the perceived benefits that students will gain as a result of using these devices for learning, such as “improved teaching and learning, greater efficiency, and the development of important skills in students” (Bebell & Kay, 2009, p. 11). However, some schools have decided to discontinue the initiatives after a few years, due to a variety of reasons (Lei & Zhao, 2008). One challenge associated with these initiatives is a lack of success on the part of the teachers to adjust to teaching with laptops in the context of the classroom. Oftentimes, teachers need a large amount of support in the form of professional
development (Drayton, Falk, Stroud, Hobbs, & Hammerman, 2010) and school climate (Inan & Lowther, 2010) in order for them to be successful within the 1:1 programs.

Several Iowa school districts have recently implemented 1:1 programs along with many other places around the country. A recent listing of 1:1 programs in school districts in Iowa documents at least 153 initiatives happening across the state (https://sites.google.com/a/aea 267.k12.ia.us/steps-for-technology-learning-environments/iowa1to1/iowa-1-1-districts). New 1:1 initiatives are beginning each year in Iowa.

Statement of Problem

Research has been conducted that reports outcomes of 1:1 programs that do examine how teachers change. Bebell and Kay (2010) for instance found that 80% of the teachers participating in a 1:1 program reported that their teaching had changed as a result of the initiative, though this result related only to using technology more frequently in the curriculum. No such research exists regarding if Iowa teachers’ pedagogical approaches have changed as a result of participating in a 1:1 program. Information about teachers and the potential for pedagogical changes is both timely and needed as more school districts decide on 1:1 program implementation plans. Outcomes from research in Iowa may not yield different results than research carried out elsewhere, but any results would be useful as the state prepares to move onward. A study that focuses on teachers’ pedagogical changes could provide another important lens for which schools and administrators could examine with the intention of in improving the success rate of 1:1 programs throughout Iowa.
Purpose of the Study

The purpose of this study is to examine how Iowa teachers perceive or do not perceive changes to their teaching styles or pedagogical approaches after teaching in a school that has a 1:1 program in place. The aim is to capture teachers’ perspectives on how they have or have not changed their pedagogical approaches while teaching in these technology intensive learning environments. The study also will investigate the factors teachers identify as impacting their pedagogical change or the lack thereof.

Significance of the Study

As previously stated, research focusing on teachers’ pedagogical changes taking place in Iowa school districts has not been systematically collected. Providers of professional development and school administrators in Iowa could greatly benefit from such results in terms of program initiatives and needs by learning from this teacher perspective. Results may be used to find better ways of assisting teachers during the process of adjusting to being successful instructional leaders in a 1:1 program environment, a crucial element needed in helping these types of innovative technology initiatives to be successful. This timely research is especially important in a state where the number of 1:1 programs is increasing each year.

Research Questions

This study draws upon the following two research questions:

1. How do K-12 teachers perceive that their pedagogical approaches change or remain the same after being involved in a 1:1 program?

2. What factors do K-12 teachers identify that impact or prevent pedagogical change?
Research Design

In order to answer the stated research questions, this study draws from a population of teachers who have experience teaching in schools that have established 1:1 programs. In order to take time into account and for possible pedagogical changes to occur, the focus of this study was on teachers who have taught in a school with a 1:1 program for at least one academic year. Purposeful sampling was employed in order to find the participants for this study, meaning that the participants were selected based upon if they were teaching in a school who had a 1:1 program for at least one year. Technology coordinators around the state were contacted by email via an existing listserv provided by an Area Educational Agency (AEA). The technology coordinators were then asked to forward the email that included research study information and a link to the online survey to teachers in their district who fit the study participant profile.

This study used in part a survey created by Becker and Anderson (1998) titled *Teaching Learning, and Computing*. This seminal study included multiple versions of surveys that were designed specifically for technology coordinators, administrators, and teachers. This current study built upon one section of the Becker and Anderson survey intended for classroom teachers. The section was titled *General Teaching Experiences*, but many of the questions were aligned specifically to the pedagogical change of teachers while using computers. Minor revisions were made to some of the questions to better reflect the change of technology and situation from the original administration of the instrument 17 years ago. A single question relating to pedagogical change was incorporated from Bebell and Kay’s Berkshire Wireless Learning Initiative work (2009) in order to better clarify the teacher’s feelings about their change or lack of change. The survey was distributed in an
online format by use of a link emailed to participants. The survey was hosted by a university’s *Qualtrics* website, on which the data were also stored in a password-protected space.

The purpose of this descriptive study was to report initial findings on pedagogical change as a result of participating in a 1:1 program. Therefore, analysis of the data relies on descriptive statistics, presenting the results of the survey to explain how teachers involved in a 1:1 program throughout the state of Iowa perceive any changes in their pedagogical approaches and what barriers may exist as a result. Open-ended responses to survey questions were coded as well to fully describe the phenomena being studied and to add additional input into the research questions addressed.

**Conceptual Framework**

The conceptual framework used to ground this research was based on Mishra and Koehler’s Technological Pedagogical Content Knowledge (TPACK) Model (Mishra & Koehler, 2006). The model represents the convergence of three different types of teacher knowledge – content, pedagogical, and technological – and focuses on what knowledge teachers must possess in order to effectively integrate technology into instruction. The model takes a look at the “connections, interactions, affordances, and constraints between and among content, pedagogy, and technology” (Mishra & Koehler, 2006, p. 1025). One important aspect of the model is that this framework exists within the scope of context. The way that the framework works and can be thought of is highly dependent on the context in which it falls.

Thus, this research study is situated within the context of teachers who are teaching in 1:1 programs. This environment creates a need for teachers to have sufficient TPACK
in order to coordinate the use of devices for every student while teaching in a technology-rich context. This study specifically focuses on three pedagogical knowledge (PK) domains of the framework: PK, TPK, and TPACK. Understanding how teachers adapt and accommodate these types of changes (i.e., 1:1 student access to devices) in their classrooms is of value to successful and sustained implementation of such programs.

Limitations

One primary limitation of this study is the reliance on the self-report data from the participants’ point of view. There are no observations of teachers teaching and no opportunities for an outsider to observe any pedagogical changes that occur. The research data are comprised entirely of the accounts and reflections of the teachers so the reliance on personal accounts make this study susceptible to misrepresentation or bias of the participants.

Also, the study involves only teachers who have taught in a 1:1 program for a year or longer and who are also teaching in Iowa. Thus, purposeful sampling further narrows the scope of the study. This excludes newer teachers to 1:1, which excludes their viewpoints of immediate change as well.

Definition of Terms

The following definitions are being used for terms in this study:

1:1 program – These programs believe that school improvement can happen by providing every student within the school or district with a personal laptop or mobile device. For the purposes of this study, these will be assumed to be programs with every student provided a device of their own 24/7, not just a class-shared cart during the school day. As Bebell and Kay (2010) describe it, 1:1 programs are “a new educational
reality…where technology resources are no longer shared as…teachers and students have been provided with their own laptop computers in school” (p. 6). The distinction is not made between schools that are fully provided with laptops or those where only certain grade levels are provided with laptops.

Pedagogical change – Pedagogy is a complicated term that seems to have a different definition for every source that tries to describe it. A definition from the Collins English Dictionary is “the principles, practice, or profession of teaching” (2012). Paired with the idea of change, this study takes pedagogical change to mean any changes that take place to those principles and practices of teaching.
CHAPTER 2

REVIEW OF THE RELEVANT LITERATURE

A simple Google search of 1:1 initiatives or laptop programs will bring back enough results to show that the idea is well-embraced and well-researched in educational communities. Many studies have been conducted and many initiatives have been attempted throughout the country and world. The focus began as early as 1985 with the Apple Classrooms of Tomorrow and has only continued to increase in numbers from there (Dunleavy & Heinecke, 2007). Thus, in the last thirty years, many schools have started some type of 1:1 initiative. Schools in Iowa have just recently in the last few years started to implement such types of initiatives in their districts (see Figure 1).

Figure 1. Locations of and technologies used in 1:1 schools in Iowa. Reprinted from the AEA 267 website, n.d., Retrieved from https://www.aea267.k12.ia.us. Copyright 2014 by OpenStreetMap contributors. Reprinted with permission.
This literature review begins with a more detailed explanation of TPACK, the conceptual framework used in this study. Following that description will be a discussion of pedagogical change that teachers have reported while being part of 1:1 initiatives. Then the discussion moves to an exploration of elements that have been identified for successful implementation of 1:1 initiatives, which explains a bit about possible factors that could affect teacher experiences. The literature review ends with an explanation of impacts and mixed responses to 1:1 initiatives.

**Technological Pedagogical Content Knowledge (TPACK)**

At the time of the development of the TPACK framework (Mishra & Koehler, 2006), the study and practice of educational technology suffered from a lack of theoretical grounding regarding the actual ways in which technology was integrated in the classroom. Shulman had created a theory of pedagogical content knowledge, which spoke of the existence of content knowledge (knowledge of a subject) and pedagogical knowledge (knowledge of teaching), which intersect to form pedagogical content knowledge (PCK), or the knowledge of how to effectively teach in content or topic-specific ways (Shulman, 1986). He suggested this type of knowledge as one of three types of knowledge that can be thought of as a way to understand how teachers gain knowledge in their field.

After the development of this theory, technology and concerns about the usage of technology began to rise to prevalence in the educational community. With this in mind, almost twenty years later, Mishra and Koehler designed a related framework that built upon Shulman’s existing PCK framework by adding a new component that represented technological knowledge (see Figure 2). The resulting framework, TPACK, focuses on the interplay of the three different components to represent balanced teaching (Mishra &
Koehler, 2006). The new theory was developed as a new way to think about effective technology integration in the classroom (Koehler & Mishra, 2009).

![TPACK Model](image)


As seen in the model, TPACK still includes Shulman’s ideas of content, pedagogical, and pedagogical content knowledge. These are represented by the blue circle, yellow circle, and the green overlap between them respectively. With the addition of technological knowledge, represented by the pink circle, new interactions and forms of knowledge emerge, as represented by the red and purple overlaps, as well as the dark colored overlap in the middle of all three circles.

The new types of knowledge introduced in this model include technological knowledge (TK), technological pedagogical knowledge (TPK), technological content knowledge (TCK), and technological pedagogical content knowledge (TPACK). Koehler
& Mishra (2009) describe those new types of knowledge in the following ways: TK is the knowledge and understanding of the usage of technology. TPK is the knowledge of how to use technology within their teaching and understand how technology changes teaching. TCK is the knowledge of how technology tools enhance content areas. TPACK represents a combination of all three of the basic types of knowledge and how they intersect. It can be thought of as a representation of effective integration of technology into the classroom.

All of the above knowledge is then enclosed in a dotted line within the model, representing different contexts. The way that TPACK is conceptualized or proceeds is different among individuals and contexts, so that no one teacher or environment has the exact same representation or combination of the TPACK factors (Koehler & Mishra, 2009; Mishra & Koehler, 2006). Effective technology integration could look different in every iteration of its appearance.

Pedagogical Change and Technology

One primary feature that seems to emerge in the midst of 1:1 initiatives is the transformation of pedagogy and instruction. Teachers have experienced changes in their practices and delivery of method, which also changes the overall atmosphere of the classroom (Bebell & Kay, 2010). It has been suggested these pedagogical changes gradually make a change from traditional to more constructivist in nature (Baker, Gearhart, & Herman, 1990; Gulek & Demirtas, 2005; Rockman et al., 2000). Constructivist classroom environments may be important for the success of the program (Donovan, Green, & Hartley, 2010).

Among the factors of constructivist environments, teachers show evidence of lecturing less and taking on the role of facilitator within their classrooms (Corn, Tagsold,
& Patel, 2011; Dunleavy, Dexter, & Heinecke, 2007; Rockman et al., 1997; Rockman et al., 1998). The classrooms are said to become more student-centered and student led than the traditional classroom environments (Dawson, Cavanaugh, & Ritshaupt, 2008; Drayton et al., 2010; Lowther, Ross, & Morrison, 2009; Rockman et al., 1997; Rockman et al., 1998). Teachers begin to employ more authentic learning activities, in which the activity is something applicable and useful outside of the classroom (Corn, Tagsold, & Patel, 2011). In this same vein, teachers may begin to structure their curriculum around more project-based learning (Dawson, Cavanaugh, & Ritzhaupt, 2008; Donovan, Green, & Hartley, 2010; Lowther, Ross, & Morrison, 2003; Rockman et al., 1998). This is not to say that every teacher experiences these changes or even that they experience these changes in the same way. The pedagogy that teachers employ depends on those same beliefs about technology, their content area, and education as a whole (Garthwait & Weller, 2005).

Factors for Success

As with any change of a large nature, there have been situations where implementation has not gone as well. There are still many other cases where the initiatives have been successful. These successful initiatives have found the right combination of approaches to combat those issues and to take advantage of all of the benefits that are available. A lot of the weight of success falls on creating the right environment for teachers to be successful at their job. Beyond that, Greaves, Hayes, Wilson, Gielen,ak, and Peterson (2012) state that “the value of technology in terms of student achievement depends on the quality of its implementation” (p. 10). So what factors are linked with the success of implementation?
Professional development

When a school begins to take on new changes, especially bigger ones such as 1:1 initiatives, it is expected that they also assist teachers and staff with the adjustment to these changes with some form of professional development. Research has suggested that these professional development sessions are essential to the successful transition of teachers into a 1:1 initiative, though that outcome is much more likely with increased amounts and quality of the professional development in question (Corn, Tagsold, & Patel, 2011; Drayton et al., 2010; Dunleavy, Dexter, & Heinecke, 2007; Inan & Lowther, 2010). A deficiency in professional development in what and how to adapt to the changes caused by the program can negatively impact the effective integration of technology (Inan & Lowther, 2010). Despite this fact, many teachers in studies that have been done still feel that the professional development that was offered to them was not sufficient (Corn, Tagsold, & Patel, 2011; Grimes & Warschauer, 2008).

Sufficient and quality professional development targets several different aspects. The immediate issue addressed is that of technology and the usage of the tools themselves. The more important issue that may not be obvious at a first glance is how the teachers will integrate the technology into their own teaching and lesson plans, which teachers may struggle with on their own (Corn, Tagsold, & Patel, 2011; Dunleavy, Dexter, & Heinecke, 2007). Research has shown that professional development is integral in the success of good integration of technology and pedagogy (Garthwait & Weller, 2005; Grimes & Warschauer, 2008; Inan & Lowther, 2010).
One of the many aspects of teaching and learning that can change with 1:1 initiatives is the issue of assessment. General classroom assessments may need to be adjusted to meet with changes in the curriculum, which is another thing with which teachers may struggle. For example, Beaudry (2004) documented several cases in which teachers fell short in their development of assessments to go along with the new lessons that they were doing, experiencing problems such as instructional goals not linking appropriately with the assessments or with aspects of the assessments being superfluous or unclear. The article goes on to state that “with little professional development and no graduate education in testing and assessment there was no understanding of quality on the tests that were designed” (p. 15). This statement suggests that professional development could and perhaps should address the issues of aligning assessments with new goals.

For issues of classroom management, professional development offers a ray of hope. With time and with appropriate professional development, teachers have shown evidence of becoming more proficient of their management of classrooms in 1:1 initiatives (Lei & Zhao, 2010). Management practices in professional development could serve to assist teachers in their adjustment.

An easily overlooked aspect that teachers may struggle with deals with their beliefs and attitudes about the usage of the technology in their classrooms. The beliefs and attitudes of teachers have proven to have an impact on the integration of technology in the classroom (Inan & Lowther, 2010). For example, the technology chosen by teachers and how those technologies are utilized is impacted by attitude, with those teachers with more positive attitudes exhibiting more effective use of technology (Bebell & Kay, 2010). In classrooms where teachers did not value the technology as highly, students might mirror
that attitude and either not rely on or not bring laptops with them to class (Donovan, Green, & Hartley, 2010). Professional development targeting beliefs and attitudes has proven to assist in their improvement, which in turn positively impacts technology integration (Inan & Lowther, 2010).

**School environment and culture**

Another extremely important factor in the success of teachers and 1:1 initiatives is the environment and culture of the school in which the initiative is taking place. In fact, environment factors can play a bigger role in the success of the students than student issues and content (Bebell & Kay, 2010). There are a couple of aspects that are of particular importance.

The policies and planning regarding technology can have very serious effects on both teachers and the outcomes of the programs. Lack of planning in regards to technology or limitations on things like network compatibility or the servers can make it difficult for lessons to progress or lessons to be planned (Beaudry, 2004; Drayton et al., 2010). Schools can also make policies that can sabotage teacher and student success. In not allowing students access to email capabilities or giving them a place in the intranet of the school, schools may be preventing students and teachers from being fully able to take advantage of the technology (Beaudry, 2004; Garthwait & Weller, 2005). If access to different technology and the equitable distribution of those technologies is also not adequately planned and executed, the overall success of the program can be affected (Bebell & Kay, 2010). A study by Garthwait and Weller (2005) provides two good examples of ways in which policies negatively affected the success of the program. In the first, a single printer was ordered for a grade level, it was placed in a poor location, and it was asked that only
final copies of papers be printed. All of these issues resulted in difficulties for any class
writing and printing papers. In a second example, students who broke rules would have
their internet access blocked. For classrooms being asked to use technology as much as
possible, this proved to be a huge issue, sometimes preventing students from taking part in
lessons.

The way in which a 1:1 initiative is managed and led throughout the process of
implementation can also have a large effect on the success of the program (Bebell & Kay,
2010). Administrators need to consider many different strategies during the program and
to maintain a large degree of flexibility to allow for changes in the situation and problems
that might arise (Donovan, Green, & Hartley, 2010; Lei & Zhao, 2010). All of the parties
relevant to the initiative must be able to come to a consensus about mutual goals for the
initiative and be able to stick with them (Drayton et al., 2010). Planning and approaches
need to be both carefully considered and implemented (Dunleavy & Heinecke, 2007).
However, Project RED has found that the most important aspect of leadership is the
principal of the school, who is thereby considered to be a major determining factor in the
success of a 1:1 initiative (Greaves et al., 2012). This study states that principals who
receive specialized training to lead change management in the schools and to help the
initiative move in a positive direction are critical for the success of a program.

Another factor is the costs and expenses planned for and handled by schools and
districts. Concerns have been raised by administrators and parents that the programs have
too high a cost for their level of effectiveness (Bahrampour, 2006). Costs refer to more than
just buying the laptops for all of the students. Schools often have to set up Wi-Fi networks
as well in order for students to be able to wirelessly access the internet within schools
(Bielefeldt, 2006). There are many other components to consider as well, including maintenance and replacement of damaged, lost, or stolen hardware. Another major concern within this category that can often be overlooked is the aging of the hardware and the various components of internet access. Currently, many laptops are marketed as having a shelf life of approximately three years or so. Regardless, after laptops have been purchased and have been in use for a time, laptops can begin to run much slower and break down more often (Lei & Zhao, 2010; Grimes & Warschauer, 2008). Especially with the heavy usage that student laptops see within schools, this can have dire consequences for students using such outdated machines. Natural aging of the machines may also simply begin to show in an inability to meet the needs of users any longer. For example, Bebell and Kay (2010) report “cutting edge Apple iBooks provided to all students and teachers at the beginning of the [Berkshire Wireless Learning Initiative] program, were showing the limitations of their age and amount of use by the second year of the program” (p. 53). Costs include all of these concerns and, if not planned for, can seriously impair the success of a program.

Despite the concerns, however, some data to support the idea that, despite a heavy initial cost, schools can save money in the long run with the implementation of 1:1 initiatives. While overhead expenditures of starting a program may be $100 to $400 per student, “positive impact could be as high as $56,437 per student per year… after accounting for the full impact of a career lifetime of increased tax revenues” (Greaves et al., 2012, p. 11). The projected savings are comprised of saving money on things like paper copies and also the tax revenue garnered from the students based on their level of education.
Overall attitudes and prevailing sentiment within a school setting can influence, making or breaking, how technology is used and what technologies teachers will adopt (Drayton et al., 2010). The environments that most easily breed success are dependent on a small number of factors. An environment that fosters open communication and sharing of ideas and strategies will be very helpful (Bielefeldt, 2006). If teachers have room to experiment with their approaches and tools, the outcome will be much better for all involved (Drayton et al., 2010). A final aspect that can mark a good environment for the success of an initiative is one in which technology use and growth is strongly supported (Inan & Lowther, 2010; Lei & Zhao, 2010).

**Tech support**

An unsurprising and large challenge that all initiatives must face is issues with the technology itself. Technology issues can come in almost infinite varieties, but there are a few that seem to crop up more often in the literature. An often cited technical issue is the short battery life of the laptops themselves, which can limit the usage of them throughout the day (Bielefeldt, 2006; Corn, Tagsold, & Patel, 2011; Dunleavy, Dexter, & Heinecke, 2007). Pair with this with other issues such as poorly placed and hard to access outlets and it is easy to see how this has the potential to be a major issue (Dunleavy, Dexter, & Heinecke, 2007). Another of those issues is limitations of servers within the schools, which can make it very difficult to have students simultaneously doing work on their laptops (Beaudry, 2004; Corn, Tagsold, & Patel, 2011). It can be equally disruptive if certain areas of the school do not have access to Wi-Fi or if the internet connection speed varies too much throughout the day (Corn, Tagsold, & Patel, 2011; Garthwait & Weller, 2005).
One of the things that most frustrates teachers is technical problems that might arise, and many teachers find that they want or need more technical support (Grimes & Warschauer, 2008). The presence and quality of technical support has proven to have an effect on those teacher beliefs and attitudes discussed in the section on professional development (Inan & Lowther, 2010). It has even been proven that laptops in high use require more tech support and maintenance than what would normally be needed in a school environment (Bielefeldt, 2006). An important emphasis may be made on having a support staff itself because having teachers fill that role has caused problems as new learners struggle with having to teach other new learners (Garthwait & Weller, 2005). Having a sufficient amount can be crucial as well because the quality of support can fall as the need for their help increases, putting severe strain on available resources (Lei & Zhao, 2010).

Beyond pure technical hiccups, teachers can often struggle with finding appropriate technological tools and making time to both address glitches and focus on curriculum (Garthwait & Weller, 2005). Having a technology support staff that can help to advise on these issues as well as be knowledgeable about other related issues such as management can help teachers to be more successful (Dunleavy, Dexter, & Heinecke, 2007). When the team is supportive, flexible, and knowledgeable about both the teachers and the stage in which the program is operating, they can help to provide different levels of support as needed.

**Time**

Another often discussed challenge to the implementation of 1:1 programs is the issue of time. Time plays a number of important roles in the process. For one, it has been
proven that just throwing laptops into an educational situation does not automatically change teaching and learning (Garthwait & Weller, 2005). There is an adjustment phase for the introduction to a 1:1 laptop program, much as there is an adjustment phase for almost any other important change to a system. Within this adjustment phase, both teachers and students have to change their ways of working within the school. Due to this, teachers often find that their workload is increased dramatically during the beginning phases of implementation (Garthwait & Weller, 2005). That time is the time in which they learn the skills that they need, find tools that they find valuable, and alter their lessons accordingly in order to involve the technology that they are required to use (Drayton et al., 2010). Corn, Tagsold, & Patel (2011) further report that teachers may face a drop in their own skills initially, as well as a difficulty spike in their daily work; however, the situation improved as time passed. Although the hurdle for beginning the program is high, as integration progresses, teachers do not need to spend as much time to work on their curriculum and their anxiety level decreases (Lei & Zhao, 2010). The time requirement to get to the point of comfort can prove to be longer than many schools or districts would like, typically a matter of years. Bebell and Kay (2010) found that, despite successes, among the teachers “almost everyone involved also expressed the sentiment that ‘even after a couple of years we still feel like were [sic] just getting accustomed to teaching in a 1:1 setting’ echoing the sentiment that the impacts of the initiative could take many years to be fully realized” (p. 21). Drayton et al. (2010) goes further to suggest that the first 1-3 years of an initiative may not give a good representation of the effects of the technology.
Impact of 1:1 Initiative Success

An important factor that is often brought up in the context of barriers for 1:1 initiatives is the effects on the students in the program. There are a number of different varieties of these effects. Among them is the important topic of improvement on standardized testing scores. The focus of much educational reform has been on standardized testing scores. They are an important component of the current educational sphere in this country. One of the current biggest concerns within schools is how to improve these scores. In the current environment, many schools would find it risky to invest so heavily into something that might bring down these important scores and put risks to their school. Little evidence has been found that having access to laptops truly does much to improve the scores on standardized tests (Garner, 2012). Writing assessments, particularly those that were hand-written, did not see improvements with student scores (Bebell & Kay, 2010; Gulek & Demirtas, 2005). Dunleavy and Heinecke (2007) found that the students with laptops did better with their science scores, but not so with the math scores.

On the other side, some researchers suggest that many standardized assessments are not accurate measures of academic gain in a 1:1 environment (Bebell & Kay, 2010). Researchers suggest that technology impacts many skills.

**General academic growth**

1:1 initiatives have begun to come into vogue in the educational community for several reasons. Among those reasons are a plethora of claimed and cited benefits for students, teachers, schools, and communities. Sources have claimed that laptops in the classroom contribute to the growth of academic performance in students in terms of grades, test scores, and GPA (Bebell & Kay, 2010; Gulek & Demirtas, 2005; Lei & Zhao, 2010,
Lowther, Ross, & Morrison, 2003). Access to laptop programs seems to enhance or further develop academic skills. The most oft cited benefits to the academic development of the students have been to writing skills, note-taking, and data collection.

However, along with concerns about testing scores, concerns have been raised over whether 1:1 initiatives might be causing the skills of students to decline in certain key areas. It was discussed earlier how teacher skills drop during the beginning phases of implementation, but students also experience a drop in their skills during the beginning, which can be a concern for administrators and teachers (Corn, Tagsold, & Patel, 2011). As far as specific skills are concerned, it has been speculated that reading and writing decline after involvement in 1:1 environments (Garner, 2012). Writing especially can be negatively impacted if students are lacking in keyboard skills (Grimes & Warschauer, 2008).

Along with a drop in skills, teachers and parents have raised concerns about whether or not technology is hampering the development of some other skills. Teachers have been concerned that technology has become too much of a crutch for students (Corn, Tagsold, & Patel, 2011). For example, depending upon automatic spreadsheets, such as Excel, might impact a student’s ability to understand how they work, make connections, and understand the results, by doing some of the mathematical recording for them (Drayton et al., 2010).

**Writing skills**

Writing skills encompass many different areas. The process of creating and revising drafts before producing a final product of a paper is considered a valuable practice in the study of writing. It appears that the usage of laptops in the classrooms encourages students to use this practice more (Grimes & Warschauer, 2008). Another important component of
the writing process is the usage of correct grammar, another skill that has seen improvements with laptops (Corn, Tagsold, & Patel, 2011). With the use of technology and word processing software, teachers have reported that the overall look and quality of the papers that they have received have improved, as well (Bebell & Kay, 2010; Drayton et al., 2010; Rockman et al., 1998). As Corn, Tagsold, and Patel (2011) state: “[English teachers] also reported that writing improved as a result of the 1:1 initiative, and papers were ‘better and longer’”.

In addition to some of the basic writing skills, laptops make a difference in some less obvious ways for writing. For example, Grimes and Warschauer (2008) report that teachers found they could more easily read and assess the writings of their students, due to the fact that they were easier to read after being created in a word processor. Another example exists by nature of the set-up of laptops themselves. The ability to have a virtual copy of notes can allow students to be more organized with their notes and materials for classes. In a study by Lei and Zhao (2008), they reported that “more than 80% of students reported being more organized, because they learned how to organize their notes for different subjects so that they could easily find them when needed” (p. 107). Organization of notes and the legibility of handwriting are not as apparent a skill as the mechanics of writing, but they still assist students and teachers in learning and understanding.

**Graphing and analyzing data**

The convenience of access to technology tools extends to more than just writing, however. Programs available on laptops enable students to easily collect and graphically represent data (Garthwait & Weller, 2005; Grimes & Warschauer, 2008). The act of collecting and representing data is a long way from being able to interpret and analyze the
data, but teachers in a study by Drayton et al. (2010) reported that they felt graphing software (such as Excel) improved the ability of students to graph and analyze data, along with the usage of probeware.

**21st century skills**

Along with the advancement of general technology skills, schools have also been pushing to involve more 21st century skills in the classroom. The Partnership for 21st Century Learning (P21) describes 21st century skills as “skills, knowledge, and expertise students must master to succeed in work and life” (2015). Beyond overall subjects and themes, their framework breaks the range of skills necessary into three groups: learning and innovation skills, information, media, and technology skills, and life and career skills. Along with basic technology skills, those 21st century skills are going to be useful to students in the workforce, beyond their school experience. In general, laptops have been found to support the students’ growth of 21st century skills (Grimes & Warschauer, 2008).

Under learning and innovation skills, P21 includes creativity, critical thinking, and problem solving, among other skills (2015). An unintended consequence of introducing students to laptops in the classroom has been a growth to creativity in terms of project creation and presentation. With the laptops, students have had the ability to be more creative with the work that they do (Bebell & Kay, 2010; Garthwait & Weller, 2005). This may be less due to the introduction of the laptops as a whole and more to the multimedia tools that these laptops provide to the students. Those tools have been attributed to enhancing student learning overall (Grimes & Warschauer, 2008). With this same idea in mind, students have an expanded arsenal of tools for how they choose to present information and so have the freedom to be more creative (Lei & Zhao, 2008).
In recent years, there have been attempts at curricular focus on critical thinking and problem solving, both considered to be necessary skills for students to develop in order to be successful in their future workplaces. Current research confirms that students are more likely to become involved with critical thinking and problem solving when given laptops (Gulek & Demirtas, 2005; Rockman et al., 1998). There have also been cases where students in a laptop experimental group have outscored students in a traditional control group on problem solving assessments (Lowther, Ross, & Morrison, 2003).

P21 includes information literacy and ICT (information, communications, and technology) literacy under the heading of information, media, and technology skills. One component of information literacy is the ability to research and find information effectively. Students with access to laptops have seen improvements in their ability to conduct research (Bebell & Kay, 2010; Lowther, Ross, & Morrison, 2003; Rockman et al., 1998).

It should come as no surprise that students who take part in a 1:1 initiative experience a marked growth in their abilities to use technology tools in general (Corn, Tagsold, & Patel, 2011; Dawson, Cavanaugh, & Ritzhaupt, 2008; Lei & Zhao, 2010; Lowther, Ross, & Morrison, 2003; Rockman et al., 2000). Some evidence suggests that students become more sophisticated in their usage of the technologies available to them, using the tools in more meaningful ways (Dawson, Cavanaugh, & Ritzhaupt, 2008; Dunleavy, Dexter, & Heinecke, 2007). As an example, from Lei and Zhao (2010), “…as students became more used to having own laptops, the uses of the laptops for learning purposes maintained at a high level or increased over time, while the uses for entertainment such as surfing online, chatting, and playing games decreased” (p. 42).
P21 also includes independence under the heading of life and career skills (2015). Laptops have also allowed students to be both more independent and more efficient about their work (Garthwait & Weller, 2005; Grimes & Warschauer, 2008; Rockman et al., 1998).

Engagement and motivation

Many studies and reports have claimed that one of the benefits of schools becoming involved with a 1:1 initiative is the growth of student engagement in regards to their learning (Beaudry, 2004; Babell & Kay, 2010; Dawson, Cavanaugh, & Ritzhaupt, 2008). Many modern students come from a background of heavy technology influence. Technology is a part of their daily life. Many of their daily essential and leisure activities are available to them through the medium of technology. For this reason, students are more prepared to pay better attention to technology, as it is very relevant to them. Many studies claim that students are much more willing to invest in and be involved with their own learning when they have access to their own laptops (Bielefeldt, 2006; Dunleavy, Dexter, & Heinecke, 2007; Garthwait & Weller, 2005). Students are able to do higher quality work faster with access to the technology tools.

Other student related factors include student discipline issues and the question of whether or not having the laptops actually serves to hinder the development of certain skills. Classroom management is already a large concern in traditional classroom, but the problem can become different with the addition of technology. Teachers may struggle with keeping students on task more or find that the computers are a distraction for the students (Corn, Tagsold, & Patel, 2011; Drayton et al., 2010; Dunleavy, Dexter, & Heinecke, 2007).
Monitoring what students are able to find and see when they have access to the internet can become a concern (Dunleavy, Dexter, & Heinecke, 2007; Grimes & Warschauer, 2008).

On the other side, despite literature that has defended 1:1 initiatives on the basis of increasing motivation, other studies have provided evidence to the contrary. For example, in their study on student engagement in a laptop middle school, Donovan, Green, and Hartley (2010) found that “when one considers student engagement to be relative to the assigned task, this study contradicts the notion that increased access to technology leads to increased student engagement - …students were both cognitively and physically engaged (many times in activities unrelated to the assigned task)” (p. 436). In this case, there seems to be a valid concern over whether or not the technology is proving to actually engage the students in a way that is beneficial to their education.

Other studies suggest that laptops are not being able to keep motivation and engagement sustained at a high level. Some studies have found that motivation and excitement regarding the laptops decreased as time passed (Drayton et al., 2010; Lei & Zhao, 2010). As students became used to using the laptops, they became everyday tools to them.

Summary of Findings

TPACK was used as the conceptual framework for this study. It models the interplay between technological, pedagogical, and content knowledge. The interplay is always slightly different depending on the context in which it takes place. The focus of this study is on the pedagogical component in the context of 1:1 initiatives being implemented in classrooms.
It is believed that many teachers change their pedagogical practices after teaching in classrooms with technology. Evidence indicates that classrooms move towards being more constructivist in nature. Teachers become facilitators more than lecturers, teaching with active learning and authentic projects.

Environments which are beneficial to the success of 1:1 implementations have a number of factors. They offer effective and timely professional development on key topics that will help teachers to be successful. The leadership of the schools and districts are well-prepared and careful in their planning for beginning and maintaining a 1:1 program. The school environment is friendly to technology growth and experimentation. Technology issues are considered and effective support is offered. The time needed to be successful is considered and planned for. All of these have the potential to number among factors to affect teachers.

Technology is believed to have many benefits to students, but many conflicting ideas and evidence exists in the literature as well. Scores on standardized tests may fall. General academic skills may rise, but other important skills may fall. Writing skills may be positively affected, along with graphing and analysis. The most important effects may be on the broader category of 21st century skills as whole, which face a variety of benefits. Engagement and motivation are an often cited benefit of initiatives, but they may have a downside.
CHAPTER 3

METHODOLOGY

As previously stated in the first two chapters, the purpose of this study was to examine how Iowa teachers perceive or do not perceive changes to their teaching styles or pedagogical approaches after teaching in a school that has a 1:1 program in place. The research conducted sought answers to two research questions: 1) How do K-12 teachers perceive that their pedagogical approaches change or remain the same after being involved in a 1:1 program? and 2) What factors do K-12 teachers identify that impact or prevent pedagogical change?

This chapter describes the method of carrying out research to answer these research questions. The chapter opens with a brief description of the subjects who took part in the research and the setting in which the research took place. Next, the discussion moves to a description of the survey instrument. Following that is a detailed summary of the method for the collection of the data. The method for analyzing the data is also described. The chapter concludes with a discussion of ethical considerations for the research study.

Subjects and Setting

The subjects in this study included 166 K-12 teachers from 9 regions around the state of Iowa (see Figure 3). Teachers’ participation was based on their involvement in a school district implementing some type of 1:1 program in Iowa. The criteria for filling out the survey was participants needed to have been teaching in the 1:1 program for at least 1 year. The schools varied in the types of technology that they employed in their 1:1 programs, though most relied on some form of laptop (53%) like a Macbook, Chromebooks
(29%), or iPads (14%) (see Figure 3). Participants represented elementary (14.6%), middle (24.5%), and high school (60.9%) teachers (see Figure 3).

Table 1. Participation by AEA.

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AEA 267</td>
<td>66</td>
<td>39%</td>
</tr>
<tr>
<td>2</td>
<td>Grant Wood AEA</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>3</td>
<td>Great Prairie AEA</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>4</td>
<td>Green Hills AEA</td>
<td>6</td>
<td>4%</td>
</tr>
<tr>
<td>5</td>
<td>Heartland AEA</td>
<td>32</td>
<td>19%</td>
</tr>
<tr>
<td>6</td>
<td>Keystone AEA</td>
<td>36</td>
<td>21%</td>
</tr>
<tr>
<td>7</td>
<td>Mississippi Bend AEA</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>8</td>
<td>Northwest AEA</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>9</td>
<td>Prairie Lakes AEA</td>
<td>17</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>168</td>
<td>100%</td>
</tr>
</tbody>
</table>

Purposive sampling was employed in locating participants for study. In purposive sampling, researchers use their own judgment to select a sample they believe will provide the data they need to carry out the study (Fraenkel, Wallen, & Hyun, 2012). This strategy was employed because the characteristics required for the study were specific and there were known populations located across the state of Iowa that would fit the description.

With the assistance of the Director of Technology for a local AEA, the survey and related information was disseminated to many of the technology coordinators/directors across the state by means of a listserv managed by the AEA. An email was sent that included all details about the study and a link to the survey (see Appendix A). Technology coordinators were asked to forward the message and link to teachers in their AEA region who were involved with a 1:1 program. Teachers who received the forwarded email could
click the link to participate in the online survey. The emails were sent out at two different times. The first went out in the middle of August, when teachers were starting their school year. Fifty-six participants responded to the first request to participate. Three weeks later, a reminder email was sent out using the same strategy to invite teachers once again to participate in the study. This second request resulted in 110 more participants responding, which brought the total number of participants to 166.

Description of the Survey Instrument

The survey used in this study was an adaptation of Becker and Anderson’s Teaching Learning, and Computing Survey (1998). The original survey was developed with the purpose of carrying out research on laptop initiatives in the National School Network. Three different versions of the survey were distributed: one for teachers, one for school technology coordinators, and one for school principals. All three had different foci and pulled in different data. The longest of the surveys was the teacher version, of which there were 4 iterations with overlapping sets of questions (Center for Research on Information Technology and Organizations, 2001). This research study used and adapted only part of the teacher survey, but worked from a master version available from the Center for Research on Information Technology and Organizations that included all four of the versions used in the original study. The master version consisted of 58 total questions separated out into five sections, labeled J-N.

For the purpose of this study, only certain parts of Becker’s teacher survey were adapted for use. Eleven questions were taken from Part M: General Teaching Experiences and adapted for use. These questions specifically related to changes in the pedagogical approaches of teachers and how they perceived that working with computers played a role
in making any changes to their pedagogical approaches. A few other questions from the survey were adapted and used to supplement the findings. Specifically, 2 questions relating to teacher beliefs about the advantages and disadvantages of computers were taken from Part L: Your Use of Computers. An additional 4 questions relating to school environment and technical support were taken from Part N: Work Environment. The changes were made to enable teachers to better understand and identify with the questions that were being asked.

Additional surveys surfaced after research in the area of 1:1 programs and results. One question was added to the survey that were used in a study conducted by Bebell and Kay (2009). Six specific demographic questions were included as well. Four open-ended questions were created for this iteration of the survey to probe further into teacher perspectives about pedagogical change and the factors related to it. The completed adapted survey consisted of 31 questions (see Appendix B).

The survey adapted for use in this study was originally used for research conducted by the National Science Foundation and the Center for Research on Information Technology and Organizations. The original survey was subject to validation studies on self-report measures, exploratory studies of survey measures of changes in teaching practices, and pilot studies to test measurement approaches (Center for Research on Information Technology and Organizations, 2001). While efforts were made to keep the sections of the survey used as intact as possible, the survey was still broken into smaller sections and some words were changed in order to better reflect situations in a current classroom.
Data Collection

A descriptive survey methodology approach was used to collect the data, one that summarizes the characteristics and changes in teachers’ pedagogical approaches. This approach was selected because it was a convenient and efficient way of ascertaining the teacher perspectives of their pedagogical stance and if any changes occurred to their pedagogical approaches as a result of teaching in a 1:1 program. The structure and timing of the study did not allow for observation of any perceived changes. Therefore, the data collected relied on teacher recollections of events that had happened.

The survey was distributed through the Internet. This choice was made due to the number of potential participants and the scattered locations. Almost 150 school districts across Iowa have a 1:1 program in place at the elementary, middle school, and/or high school level. This study is an attempt to collect data from as many teachers as possible across the state. Teachers are also often very busy and an Internet-based survey is less likely to be intrusive or to take up a lot of their time. Internet surveys are best used in situations where the population is large and scattered, the funding for the research is low, there is need for a quick turnaround, and the option for mobile interaction is a benefit (Fraenkel, Wallen, & Hyun, 2012).

The data were collected by way of an online, cross-sectional survey. According to Fraenkel, Wallen, and Hyun (2012), “a cross-sectional survey collects information from a sample that has been drawn from a predetermined population. Furthermore, the information is collected at just one point in time…” (p. 394). This was considered appropriate for the situation based on the goal to investigate perceptions on change from a past point in time, rather than on-going change. The survey for the purposes of this study was administered in
August and then a reminder email was sent again in September to recruit additional participants.

The survey was built and hosted on the university’s Qualtrics website. Potential participants were sent an email inviting them to participate in the survey. The email included information about the survey and a link to take part (see Appendix A). If participants clicked on the link provided in the email, they were greeted with information about the research study and their participant rights. Continuing past that page implied their consent for participation.

The research study received exemption from the institution’s Internal Review Board (see Appendix C). Due to the nature of the study, it met exemption requirements, so permission was granted for researchers to conduct the study.

Data Analysis

The data were stored online in the Qualtrics database under the researcher’s password protected profile. Back-up versions of the data were stored in the university’s cloud-based online storage program, also under a password protected profile. For analysis purposes, the file was transferred briefly to the researcher’s password protected, university-owned computer. Once finished, the complete file was restored to the cloud-based storage program, along with any recorded findings, and was removed from the researcher’s university-owned computer.

The multiple choice questions on the survey were aligned to the research questions. Data were analyzed using descriptive statistics to extract the following results: the frequency of response, the percentage of each response and the standard deviation of each response.
The open-ended questions relating to what factors teachers believed to cause change or lack thereof were thoroughly read and coded based on recurring terms and ideas throughout the answers. Those codes were further grouped into larger themes in order to provide a broader picture of how the respondents felt regarding the questions. Themes, according to Creswell (2013) are “broad units of information that consist of several codes aggregated to form a common idea” (p.186). The themes were arranged and presented in order to provide the scope of answers provided by the participants.

Ethical Considerations

Participants were made aware from the beginning of the study that their participation was voluntary and they could back out at any time. Their continued participation in the survey was clearly marked to imply their consent. No individual names were ever associated with the data or the results.

Due to the fact that the study was dealing primarily with teachers reflecting on their own change and pedagogical stance, there was very little risk for participants who participated in the study. The information was not enough to trace back to individuals that had taken part, nor could the information pose a threat to their jobs. The survey information was linked only to a code that verified when they took the survey. It was not associated with their name at any point.
CHAPTER 4

RESULTS

The purpose of this research study was to investigate how teachers perceive their change or lack of change in their pedagogical style after being involved in a 1:1 program. The study also sought to explore factors that might affect this change or lack of change. In order to examine those topics, the researcher sampled K-12 teachers in the state of Iowa who had experience teaching in a 1:1 program for at least one academic year. Teachers agreeing to participate accessed an email that included the link to an online survey through the Qualtrics website.

This chapter contains a description of the survey findings after two distributions of the email message sent, one in August and one in September. The chapter begins with a description of the teachers who participated in the study, which includes demographic information provided by the participants’ responses. Next, the discussion section is organized around the findings aligned to the two research questions. Each section about a research question begins by discussing the quantitative findings pertaining to that question and ends with a discussion of the quantitative findings.

Participant Information

There were a total of 166 recorded participants in the survey. Due to the nature and length of the survey, the number of participants was larger at the beginning while responding to the survey and was lower for some of the later parts of the survey. As stated in the previous chapter, the participants represented 9 AEAs across the state of Iowa. Most participants taught at the high school grade level (61%), but 24% of respondents taught at the middle school level and 15% taught at the elementary level, as well. Their 1:1
programs supported mainly laptop (Mac or Chromebook) (82%) or tablet-based technologies (15%).

Participants in the study represented a distinct population of teachers in the state, according to ethnicity. The ethnicities of those who participated were predominantly white (98%), though there were a few representatives of other ethnicities including Hispanic (1%). Gender also was heavily weighted towards female participants. Seventy-two percent (72%) of the participants were female and 28% were male. However, the distribution of teaching experience among the participants did vary (see Table 2), as did the time period in which their schools had participated in and supported a 1:1 program (see Table 3).

Table 2. Teacher Age Groups and Years of Teaching Experience

<table>
<thead>
<tr>
<th>What is your age?</th>
<th>How many years have you been teaching?</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24 years old</td>
<td>Less than 5 years</td>
<td>5-10 years</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>25-34 years old</td>
<td>15</td>
<td>26</td>
</tr>
<tr>
<td>35-44 years old</td>
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<td>6</td>
</tr>
<tr>
<td>45-54 years old</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>55-64 years old</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>65-74 years old</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>75 years or older</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>35</td>
</tr>
</tbody>
</table>
Table 3. Years of School Participation in 1:1 Program

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 year (started 2014-2015)</td>
<td>30</td>
<td>18%</td>
</tr>
<tr>
<td>2</td>
<td>2 years (started 2013-2014)</td>
<td>28</td>
<td>17%</td>
</tr>
<tr>
<td>3</td>
<td>3 years (started 2012-2013)</td>
<td>30</td>
<td>18%</td>
</tr>
<tr>
<td>4</td>
<td>4 years (started 2011-2012)</td>
<td>28</td>
<td>17%</td>
</tr>
<tr>
<td>5</td>
<td>5 years (started 2010-2011)</td>
<td>24</td>
<td>15%</td>
</tr>
<tr>
<td>6</td>
<td>More than 5 years (started 2009-2010 or before)</td>
<td>23</td>
<td>14%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>183</td>
<td>100%</td>
</tr>
</tbody>
</table>

Perception of Teachers’ Pedagogical Change

The questions on the survey instrument were aligned with the two research questions addressed in the study. This section addresses the question: How do K-12 teachers perceive that their pedagogical approaches change or remain the same after being involved in a 1:1 program? Responses to that question were organized around three pedagogical components: teacher practice (classroom practices), types of assignments, and instructional planning. Each component included a number of factors to which participants indicated whether they implemented these factors more, same, or less than they did before 1:1 program implementation. Each of these three sections on the survey then ended with a Likert-scale (1 to 5) summarizing question asking participants to rate how much of an effect that technology had on the changes discussed within that particular section of the survey. One represented no role and four represented a major role. Five represented a teacher’s belief that no change had taken place at all, making the effect of technology unimportant in this section.
Teacher Practices (Classroom Practices)

Four out of the eight statements on the survey in this section represented qualities normally present within classrooms that reflect more constructivist approaches to learning (see Appendix B). Those statements included the presence of many activities going on in a classroom at the same time, student interest influencing topics of lessons, evaluation of students through products rather than tests, and teachers allowing students to teach them. In all of these listed areas, the majority of teachers who participated in the study indicated that they were using these practices more often than they were before starting the 1:1 program (represented in the data by an indication of “more” or “much more”). Sixty-five percent (65%) of the participants reported having “more” multiple activities going on in the room at the same time during the 1:1 program. While 60% of the teachers said they were now letting student interest influence topics in lessons more than before. Just over half (52%) of the participants said they were evaluating students more now through products instead of tests. Sixty-nine percent (69%) of the participants reported that they were allowing themselves to be taught more by students now than before (see Figure 3).

![Figure 3](image-url)

*Figure 3.* Teachers who were willing (more or less) to be taught by students.
One statement in this section of the survey inquired about a long-time staple in most traditional instructional contexts, that being a reliance on using standard textbooks for classroom instruction. Just over half (51%) of the teachers reported that they were using their textbooks as a guide for instruction actually less than they were before the 1:1 program. Another 30% of the participants reported using it about the same amount as they did before.

An interesting finding from this section was related to the need to monitor and supervise students in the classroom. Fifty-four percent (54%) of the teachers reported that they needed to more closely monitor and supervise students while working in a 1:1 environment. Another 44% indicated that they needed to supervise and monitor students about the same amount as they did before. This finding (i.e., need for more student supervision) reappears several times throughout the study and will be discussed in more detail later.

These results about teacher practice indicate that slightly more than half of the teacher respondents in this study reported changes to their classroom teaching practices. There is some indication that these self-reported changes in the participants’ teaching practices happened as a result of the implementation of the 1:1 program. In the summary question for this section, a clear majority (94%) responded that technology played at least a minor, substantial, or major role in changing their classroom practices. In fact, 64% of these teachers believed that technology had a substantial or major role in changing their classroom practices (see Figure 4).
Types of Assignments

In this section, eight statements were listed describing types of assignments that teachers might give to students. Three of the eight statements represented the types of assignments more known to be given in classrooms reflecting constructivist approaches to teaching and learning. Examples of these statements include having students teach or help other students, having students explore a topic on their own, without direction, and having students review and revise their own work. Well over half of the participating teachers (64%) indicated that they were having students teach other students more often than they were before the implementation of the 1:1 program (see Figure 5). Additionally, 69% reported having students explore topics on their own more than before the 1:1 program (see Figure 6). Finally, 61% of the teachers reported having students review and revise their work more often than before.
There was a single statement included on the survey that typically represents “traditional” educational practice - having students answer questions from their textbooks. Exactly half (50%) of the teachers reported giving this type of assignment less than they did before the implementation of a 1:1 program. Out of the remaining half of the participants, 27% reported that they were still assigning questions out of a textbook about
the same as they had before the 1:1 implementation and 20% reported that they had never assigned questions out of a textbook. The remaining 3% of participants was comprised of teachers who were assigning questions out of their textbooks more or much more than before (see Figure 7).

![Bar chart showing the percentage of teachers who had students answering questions in textbooks.]

**Figure 7.** Teachers who had students answering questions in textbooks.

As in the previous section, participants were asked a summary question relating to the effects of technology on the changes – related to the types of assignments they were giving to students. Again, a majority (97%) of the participating teachers indicated a belief that technology played at least a minor, substantial, or major role in the changes to types of assignments given to students. Over half (66%) believed that technology played a substantial or major role in the changes they made to student assignments in their classrooms (see Figure 8).
Instructional Planning

The section of the survey on instructional planning presented the teacher participants with four statements that addressed different activities which teachers may undertake as a part of their planning process. Again, participants were asked to rank whether they participated in these four activities more, the same, or less than they did before the implementation of the 1:1 program. Examples of these instructional planning activities were working with other teachers on curriculum planning, talking with other teachers about teaching strategies, spending time preparing lessons, and reflecting deeply on what good teaching is. Exactly half of the participants (50%) reported that they worked more often with other teachers on curriculum planning than before the 1:1 program, while 44% reported they worked with other teachers about the same amount as they did before. Just over half of the participants (55%) indicated they were talking more often with other teachers about teaching strategies, while 42% reported talking to other teachers about the same amount of time as they did before. Fifty-one percent (51%) reported spending more time preparing lessons than before the 1:1 program, while 44% said they spent the same
amount of time as before. Nearly half of the participants (52%) reported spending more time reflecting upon what good teaching is than before the 1:1 program, while just under half (47%) reported doing about the same amount of reflecting upon their teaching as before.

In sum, teachers showed the least amount of change to this aspect of pedagogical change, instructional planning, that was highlighted on the survey. Regardless, the summary question relating to the effects of technology on the teachers’ instructional planning process reported that 86% of the teachers believed that technology played at least a minor, substantial, or major role in the changes that occurring to their instructional planning process. Just over fifty percent (53%) responded that technology was playing a substantial or major role in changing the way they were planning instruction (see Figure 9).

![Figure 9. Effect of technology on changing teachers’ instructional planning.](image-url)
Summary of Teachers’ Pedagogical Changes

A final section on the Pedagogical Change part of the survey gave teachers the opportunity to respond to several items that clearly helped them summarize their overall perceptions of pedagogical change and if that change was related in any way to being involved in a 1:1 program. One question at the end of this section simply asked teachers whether they believed their pedagogical style had changed as a result of being involved in a 1:1 program. With a total of 132 teachers responding, 65% indicated that yes, it had changed and 35% believed that it had not changed (see Figure 10). This finding is consistent with trends presented in the previous sections of change in pedagogical practice. Over half of the participants reported changes in nearly every category of classroom practices and types of assignments.

Figure 10. Teachers’ overall perceptions of pedagogical change related to 1:1 program participation.

Finally, a series of statements were listed on the survey related to additional pedagogical changes in which the teachers responded in terms of their degree of agreement or disagreement (i.e., 1 Strongly disagree – 5 Strongly agree) with each statement.
Responses to these statements provided additional clarification that teachers were at least perceiving that their pedagogical practices were changing to some degree. The majority of respondents at least “agreed” or “strongly agreed” that their delivery of curriculum (87%), school climate (80%), role in the classroom (73%), goals for students (58%), understanding of how people learn (56%), and beliefs about teaching and learning (52%) have changed to some degree as a result of having a 1:1 program at their school. These findings are consistent with other results reported thus far findings (see Figure 11).

![Graph showing teacher responses to various pedagogical changes.](image-url)

*Figure 11. Additional teachers’ perceptions of pedagogical change while teaching in a 1:1 program.*

**Examples of Stated Pedagogical Changes in the Classroom**

Participants who perceived any changes in their pedagogical approaches were given an opportunity to respond to an open-ended question at the end of this section that invited them to write about a specific classroom example that would describe the pedagogical
changes that were happening in their classrooms. These responses were coded for themes and organized into a basic summary of topics provided below. The themes identified included: student-centered classrooms, teachers as facilitators, project-based learning, expansion of information sources, technology skills, and distractions for students.

**Student-centered classrooms**

Teachers discussed a number of ways that their classrooms had become more student centered. They mentioned several components that are consistent with the ideals of a student-centered classroom. Participants speak of having students work more on their own using the technology, which frees up more instructional time for teachers to interact with students and personalize instruction for individual students. For example, one participant states, “We use YouTube videos on how to do specific tasks we also use these in woods classes on how to do certain kinds of joints. This allows me to help students more on an individual basis.” With students in charge of their own learning, teachers can have more individual interactions with students who might need more assistance. Thus, students can work at their own pace and take ownership of their own learning. With access to technology, students appear to have more influence over what topics are taught in classrooms and they are being given more choices and options in terms of projects they can complete than they had without technology. One participant commented,

In many cases, students have more independence in what they choose to study and the way that they choose to present the information. Class projects have been more interesting even for myself as I walk around and see what different ideas students come up with and the different educational technologies they use to convey the information learned.
In discussing the wealth of project options and choices that students have available, another participant stated, “Today, a student can write a song, make a video, create a presentation in a gob of ways (google pres. keynote, prezi, pow-toon, glogster etc) make a slide show, take and edit photos, word process etc. It's just made life so much more cool!”

**Teachers as facilitators**

Teachers described how they were starting to see their role in the classroom change as well, from being lecturers to being facilitators. Participants described ways in which they or colleagues were beginning to flip their classrooms. Students are working alone, from home, and coming into the classrooms for more individualized help and instruction. Teachers are doing more guiding and facilitating rather than lecturing in front of the classroom. One teacher described their new role as a “partner in learning”. With technology able to provide students with basic facts on demand, teachers have found that they need to focus less on basic facts. They report focusing more on teaching students how to think and understand using the facts that they have access to. One participant remarked,

I wouldn't say that I had students focus on basic facts that much in the past, but especially with the consistent access to technology there is even less reliance on this. For the most part, if a student can just ‘Google’ it, it's probably not the greatest use of their learning time. So, I have continued to work on providing higher order thinking during each lesson.

**Project-based learning**

Teachers report using more projects to evaluate learning, as opposed to tests. As many schools still have a focus on high-stakes testing, it is interesting to note that teachers
are using more projects. A participant provided the following example of a project in their classroom and the type of assessment that it had replaced:

Before 1:1 -- Students begin World Geography class by reading a paper copy of an article I provide over the earthquake in Nepal, including its causes and effects.

With 1:1 -- Students use research skills they've learned in class to compile key information on the earthquake in Nepal, including its causes and effects. They read articles, study images, and watch videos.”

Teachers also report having students work together more in the classroom now than they did before 1:1 programs.

**Expansion of information sources**

Teachers described how having technology in the classrooms has expanded the sources of information for teachers and students. With access to the internet, students are exposed to information that is updated and current, more so than the information in a textbook. Particularly in fields that are seeing significant growth, students are able to see the most up-to-date information. This also includes being kept up-to-date on current events. Additionally, when questions arise for teachers and students that no one in the classroom can answer, it can become a ‘teachable’ moment within how to accurately locate those answers using the available technology. For example, a participant stated,

Myself and my students are able to pull more current information right at our fingertips. If we have a question about something related to classroom instruction we can use those teachable moments to find answers. My students are much more able to use what is around them to find answers to their questions, rather than just doing ROTE problems from the book.
Science and math classrooms also benefit from the usage of programs such as spreadsheets and simulations, allowing them to work more quickly and have experiences that would otherwise be difficult to achieve in the classroom.

**Technology skills**

Teachers report that students use more technology in the classrooms. It follows that their skills with technology may grow as well. Teachers find that students are learning many skills associated with technology and learning to run many types of hardware and software. Often, students are experiencing more growth in these skills than the teachers. One participant remarked, “They often know more about computers than I do and I’m not that old!”

**Distractions for students**

Along with many positive changes, teachers also reported a number of negative changes associated with technology. The primary negative change reported was teachers have an increased need to monitor their students while they use technology. Many state that the technology is proving to be a distraction to students, with access to games and social media. A typical response included statements such as, “Students put things off more, and spend more time "playing" on the internet rather than working. Thus, I need to monitor and remind many more often to be, or stay, on task.” Monitoring and distraction continues to appear as a theme later on in the chapter. Teachers also worry that technology is encouraging students to be lazier with assignments like their writing. One participant worried that “many students do not proofread, they seem to feel that they don't have to reread it, it is already typed, so they are done.”
Thus, participants who did perceive that they experienced pedagogical changes in their teaching shared examples that were organized around the themes of student-centered classrooms, teachers as facilitators, project-based learning, expansion of information sources, technology skills, and distractions for students. Next, the second research question is addressed and reports participants’ responses around factors that they identify as impacting or preventing pedagogical change in a 1:1 program.

Factors Impacting or Preventing Change

The second half of the survey was focused on answering the second research question: What factors do K-12 teachers identify that impact or prevent pedagogical change? The first part of this section asked a variety of questions to establish a context under which the findings of the open-ended questions can be understood. The questions attempted to establish a basic understanding of the programs and experiences from which the participants were speaking. These findings have been separated into topical subsections and can be found below. After those findings, the open-ended questions about the factors impacting or preventing teachers’ pedagogical change are discussed.

Reasons for changing teaching practices (pedagogical change)

This section of the survey presented participants with 11 components that might be present in changing teaching practices found within a school, such as a shift to a 1:1 program. Participants rated these components on a scale of one to four (1=Not a reason, 2=Minor reason, 3=Moderate reason, 4=Major reason) to represent the degree of impact that these components had on the changes that teachers experienced in their pedagogy while participating in 1:1 programs. The factors most associated with affecting pedagogical change included opportunities or experiences with technology (M=2.93, SD=0.92), staff
development and workshops (M=2.77, SD=0.85), discussions with colleagues (M=2.67, SD=0.85), discussions with other people (M=2.49, SD=0.90), changes in climate or emphasis of the school (M=2.57, SD=0.95), and changes in district policies and expectations (M=2.40, SD=0.90). Nearly all of the participants (95%) believed that opportunities with laptops or other technologies played at least a minor role in the changes they had experienced. Further, sixty-six percent (66%) believed it played at least a moderate or major role. On previous questions in the survey, participants reported that technology played a role in their pedagogical changes. Participants’ responses on this section of the survey confirm that finding. Specifically, 95% of the participants also felt that staff development and workshops played at least a minor role in changes to their pedagogical approaches, and 61% indicated that workshops were a moderate or major reason for those changes. Another finding indicated that the majority of participants (93%) also thought that discussions with colleagues played at least a minor role in helping to change their teaching practices, while a little over half (57%) believed it had a moderate or major role. The majority of participants (86%) indicated that discussions with others (non-colleagues) had affected their teaching practices with just under half (48%) believing the discussions played a moderate or major role. Other reasons that participants attributed to their change in teaching practices, at least to a minor degree, included changes in school climate (85%) and changes in district policies or expectations (81%).

Support for change

Next, participants were asked to respond to three questions about the types of support available to them while teaching in a 1:1 program. Specifically, the questions asked about technical support, instructional support, and help in supervising students. The goal
was to see how much the participants felt that they needed these types of support, how often they were able to receive support, and the quality of the support that was given. Participants were asked to rank all three on a Likert-scale, but the scale was different for each question.

The first question asked how often did teachers need each type of support (i.e., technical, instructional, and help supervising students) and they answered this question using the following scale: 1=Not at all, 2=Seldom, 3=1-3 times a month, 4= Weekly or more. The mean response for technical support was 2.41 (SD=0.66), with over half of the participants (61%) reporting that they seldom needed technical support. Almost one-third of the teachers (29%) reported needing technical support 1-3 times a month (see Figure 12). For instructional support (M=2.04, SD=0.68), over half of the participants (59%) reported that they seldom needed this type of support. Less than 40% of the participants reported that they needed instructional support 1-3 times a month (20%) or not at all (19%) (see Figure 12). Participants were also asked if they needed support in supervising students (aides, volunteers, etc.) (M=1.85, SD=0.93). A clear majority of teachers reported that they needed little support for supervising students, by responding with seldom (44%) or not at all (41%) (see Figure 12).

The second question addressing support asked participants how often each type of support was available when they needed it. Participants responded using the following Likert scale: 1=Not available, 2=Sometimes, 3=Frequently, 4=Mostly, 5= Almost always. Of those participants who responded that they needed technical support (M=3.61, SD=1.18), slightly over half of the participants reported that it was almost always (33%) or mostly (18%) available when they needed it. A small amount of participants (2%)
reported that technical support was never available to them (see Figure 13). Regarding instructional support (M=3.11, SD=1.25), over half of the participants reported that instructional support was frequently (24%) or only sometimes (34%) available to them (see Figure 13). The majority of participants also found that help in supervising students (M=2.60, SD=1.39) was only sometimes (34%) or not at all available (25%) to them (see Figure 13).

The last question addressing support asked about the quality of support that the teachers were receiving. Participants answered this question using a 6-point Likert scale that included: 1=No support needed, 2=Poor, 3=Fair, 4=Good, 5=Very good, 6=Excellent. The majority of participants rated the quality of technical support (M=4.70, SD=1.20) provided to them as excellent (33%) or very good (28%) (see Figure 14). Reports about the quality of instructional support provided (M=4.09, SD=1.39) were mixed, but still favored a positive view, with reports of good (27%), very good (22%), and excellent (18%) making up more than half of the responses (see Figure 14). Respondents also reported their perceptions about the quality of support given to them in terms of helping to supervise students (M=3.36, SD=1.74). Just over one quarter of the respondents (26%) indicated they had received “no support” in supervising students. Classroom teachers are used to not receiving any support of this kind so this response is not surprising. Although 23% of the participants rated the quality of this type of support as good (see Figure 14).
Figure 12. Teacher responses addressing how often they need support for three types of support.

Figure 13. Teacher responses on the availability for three types of support.
In the open-ended response section, participants were asked the following question, “What is a common challenge that you encounter that makes a 1:1 program implementation difficult?” The teachers’ responses were read and then sorted into themes that were identified as challenges and repeatedly mentioned by the respondents. These themes included: distraction of students, lack of training for teachers, weaknesses in classroom management, lack of training for students, lack of shared goals, mixed views on the role of technology, weak infrastructures, and lack of technical and administrative support. Each are briefly described next.

**Distraction of students**

The most frequently discussed challenge in the response to this open-ended question was how students were distracted by the technology, specifically by social media and games. Many teachers described having trouble getting students to do what they were
expected to with their laptops and to stop “wasting time” with other activities. One teacher went as far as to say that providing technology to the students felt like “setting down a beer in front of an alcoholic.” Another teacher suggests that schools should “turn off the distractions like Chat, Facebook, Twitter, etc. so you can actually get their attention.” This specific challenge also included teacher comments that mentioned how easy it was for students to use technology to cheat on assignments and exams. For example, one teacher observed that “students are beginning to take screen shots of test/quizzes and sharing these with other students who will be taking the test/quiz later in the day.”

**Lack of training for teachers**

Many teachers were concerned about a lack of training they received in terms of implementing a 1:1 program. Teachers commented about being short on knowledge about the technical skills that were necessary to teach with technology. One teacher reported being handed an iPad and being told to teach with it despite not even knowing how to turn it on. As another participant stated, “If teachers cannot use it, they will not integrate it into their lessons.” Alongside a lack of technical training, teachers were hindered by a lack of training on how to use the technology for instruction. Some teachers reported that they were just expected to integrate the technology into their classrooms, without any idea of ways in which to do so effectively. For example, one participant said, “The first several years of our program laptops were merely used to replace posters/projects -- learning was not transformed merely modified.”

There was some concern that teachers were not given adequate time to adjust to these changes, explore with technology, and learn the ways in which to be effective instructors with technology. In one teacher’s words, “It's important for teachers to have
time to collaborate to transform education. Education that targets lower level thought processes is a waste in a 1:1 environment.”

**Weaknesses in classroom management**

Teachers revealed a concern about their ability to manage a classroom in 1:1 environments. It was noted that teachers with weak classroom management skills were not excelling in this type of environment because, as one teacher explains, “Being 1:1 only magnifies classroom areas of weakness.” Another participant reported:

If teachers are not adept in managing their classroom, instruction without technology is difficult. This becomes much worse if students in a poorly-managed classroom have laptops or other tools to increase their ability to disrupt the classroom. As a former technology integrationist and a present instructional coach, I have seen the importance of effective classroom management on many levels.

**Lack of training for students**

Teachers found training to be lacking for students, as well as for themselves. Teachers reported that administrators made many assumptions about students being technology-literate based on their being “digital natives” (Prensky, 2001). However, teachers described how students often struggle with the technology as well and could use additional training in order to become comfortable learning with the technology. Teachers believe that students still need training on basic skills like keyboarding. One participant remarked, “If students find they cannot easily use the device or program and they cannot get their questions answered quickly, they will lose interest.” Teachers also think that students need to be better informed of expectations regarding the use of the technology in the classroom and the outcomes to their learning. One participant suggested, “If the
students had to take a class on computer, internet, social media issues, etc. they would be better prepared for the responsibilities of having a 1:1 laptop.”

**Lack of shared goals**

Along with a lack of transparent expectations for students, teachers also reported that it was a hindrance for teachers and administrators to not have a shared set of goals and visions for the 1:1 program. Teachers who did not share the school/district goals (to go to the 1:1 program) were reportedly unwilling to “change” and administrators did not always offer incentives for teachers to embrace the technology and foster change in the classrooms. That said, teachers who refused to let students use the technology in their classes were not helping the 1:1 program to succeed. One participant stated, “All parties (administration, staff, parents and students) must have ‘buy in’. They must believe that this is the right choice for educating young people and be willing to provide whatever support is needed.”

As a result, teachers across the school/district were not consistent in how much they were using the technology, how effectively they were using the technology, and how they were responding to students while using the technology – appropriately and/or inappropriately.

**Mixed views on the role of technology**

Teachers were very concerned that administrators were seeing technology as an immediate way to improve learning, all on its own. Some teachers perceived that administrators seemed to believe that no other strategic planning or innovative strategy needed to be used, that technology alone would improve learning and teaching. Merely by introducing technology into the classroom, learning outcomes would improve. Teachers were concerned that there was little focus on how to effectively learn with technology. For example, one participant suggested that administrators need to focus more on “finding
ways to incorporate technology that are meaningful, purposeful and relevant to the curriculum; and not simply using technology just because.”

**Weak infrastructures**

Teachers voiced concerns about weaknesses in the infrastructure surrounding technology in schools. Many described not being able to access the internet when it was needed. They were concerned that networks were not set up correctly in order to adequately handle all the students and teachers who needed access at one time. For example, one teacher explained, “Sometimes the internet connection has been faulty (slow, etc.). It makes it tough to continue to have students take online weekly reading tests when a fifth of them are getting booted off.” Teachers also reported concerns related to the mismatches and problems related with the hardware selected. Many noted broken technology or dead batteries. One even reported that “students [have] different computers and operating systems than the teachers,” which made it very difficult to teach when everyone was using a different system, so everyone was not on the same page so to speak.

**Lack of technical and administrative support**

The final factor that impacts pedagogical change that teachers discussed was the lack of multiple forms of support. Teachers felt they were lacking in the amount of technical support they needed to overcome some of the issues they faced when using the technology. For example, one teacher observed that

1:1 was great at getting us the computers and the technology we needed, but we do not have the man power to run it all. I think that some of the money really needs to be used to hire a long term person who will help teachers implement the program to its full potential.
They also indicated, in one participant’s words, “limited support and communication” from administration, especially in communicating the desired expectations and changes that were being made.

**Open-Ended Response: Key Factors to Impact 1:1**

Along with challenges, teachers were asked to reflect upon what they felt were key factors that were necessary for 1:1 programs to be successful. These responses were deeply connected to the issues that they raised in the previous section. Combined, they present an idealized view of an environment for the successful implementation of a 1:1 program. The responses to this open-ended question organized around repeated themes from the participants’ written responses. The themes for the key factors for success included: training for teachers and students, support from all parties, role of the teachers, strong infrastructure, expectations for students, and technical support.

**Training for teachers and students**

One of the most popular responses to this question was to provide sufficient training for both teachers AND students, something mentioned in the challenges as well. Teachers need to be trained not only in technical skills, but also in the pedagogy behind using the technology effectively in the classroom. One participant explained that without additional training, “Some teachers have a hard time moving past the ‘Digital Worksheet’ aspect of having 1:1 computers.” Teachers believed that students should also receive some focused training with the technology that they would be expected to use and then expectations for using the technology in the classroom. For example, in one teacher’s experience”

Rollout nights for students and parents were important for us. We needed to be able to get the computer to them WITH the information that goes along with it (lease
agreement, laptop care, etc). Making sure that we are teaching students early how to use the technology is important as well. We cannot just assume that all students are comfortable with it.

In addition, adequate time should be given for teachers and students to truly adjust to this new learning environment and for their new skills to increase and strengthen. One participant felt that “if teachers cannot use [the technology], they will not integrate it into their lessons. Likewise, if students find they cannot easily use the device or program and they cannot get their questions answered quickly, they will lose interest.”

**Support from all parties**

Teachers also indicated that 1:1 programs should have the support of all parties involved with its implementation. This would include teachers, administrators, students, parents, and communities. Participants believed that if all parties had a common agreement of shared goals and expectations for the 1:1 program and for technology use, efforts to implement such programs would be much more successful. One participant remarked, “All stakeholders need to be well-educated on how the program will work in the school. This helps gain support and helps to ensure all are starting on the same page.” Teachers also believed that the parties should think carefully before implementation about their educational needs, how technology can or cannot meet those needs, and what technological tools will be right for the job. If those factors are considered, less mistakes may be made in the implementation of 1:1 programs.
Role of the teachers

Teachers also believe that they should play a larger role in the development and decision-making processes involved in the planning for and implementation of 1:1 programs. Participants believed that if they were involved in the process for implementing the programs, they will be more involved and therefore dedicated to supporting the changes and promoting success within the program. Teachers also evaluated their own dispositions and believed that they would be more likely to achieve success if they were risk-takers and willing to change in the first place. One participant said, “Some teachers are reluctant to give technology a try because it is different and then they have to start changing how they have always done things.” Another adds more by saying that teachers require “a student-first mentality always keeping the students' needs at the forefront of every decision.”

Strong infrastructure

Teachers also believed that one requirement for a successful 1:1 program includes a well-planned and strong infrastructure to support the technology being used. One “must” for most respondents was that the internet should always be accessible. School networks should be able to handle an adequate amount of traffic. The types of hardware being selected for 1:1 programs should be taken into consideration in terms of the need for use, support, and repairs. For example, one participant raised the point that “1:1 cannot succeed without enough room for kids to charge devices.”

Expectations for students

Teachers commented frequently about the need to have common expectations for students. Those expectations should be shared and followed school-wide. This comment was usually associated with having consequences and then approaches for handling the
misuse of technology in the classroom. Suggestions included making sure teachers received some advanced training on approaches related to classroom management (and management of the technology) in a 1:1 program. Another suggestion mentioned that both administrators and teachers should consider how to engage students in learning content, rather than dealing with the misuse of technology like viewing social media during class. Educators should anticipate that social media will be a problem and have some contingency plans for what to do about issues that arise.

**Technical support**

Finally, teachers repeatedly mention the need for technical support in order for them to feel that they can be successful. Teachers in this study believed that more staff should be hired to assist not only with the technology, but with the instructional approaches used to teach with technology as well. The quality of support provided also needs to be considered and to be timely according to needs that arise. One participant suggested:

> You need to make sure to have a good tech staff to help you with anything that may happen. It can be as small as a broken key or as a server malfunction. Once you have teachers start putting their lessons and assignments online, it is really hard to adapt if there is a server problem and they cannot use their computers. Also that tech staff needs to be able to assist other staff members in using the technology properly to get the most out of their classrooms.

**Summary of Findings**

This research study investigated if and how changes were made to teachers’ pedagogical approaches after being involved in a 1:1 program for at least one year. The study sought to answer two research questions: 1) How do K-12 teachers perceive that their
pedagogical approaches change or remain the same after being involved in a 1:1 program? and 2) What factors do K-12 teachers identify that impact or prevent pedagogical change?

In all, 166 K-12 teachers responded to the survey.

Overall, sixty-five percent (65%) of participants reported a change in their pedagogical practices and 69% believed that technology had a substantial or major effect on the changes that they experienced. Among the specific pedagogical changes that participants reported included changes in assessment practices, the allowance of students teaching teachers, and changing the types of assignments given to students. Teachers also reported that technology directly changed how they planned their instruction, but not as significantly as those mentioned previously. Participants reported that support, both technical and instructional, is still an important and needed component of a successful implementation of 1:1 programs. The biggest challenges to 1:1 reported by teachers included the distraction of students by technology, a lack of training for teachers and students, and observed weaknesses in the technology infrastructure of schools. Likewise, the training of teachers and students, support for all parties, and careful planning of the technology infrastructure are also important for helping teachers and students succeed in such programs.
CHAPTER 5
SUMMARY AND CONCLUSION

As stated in previous chapters, this study was conducted with the goal of gathering information about how teachers in 1:1 programs in Iowa perceive that their pedagogical styles change or do not change as a result of being part of a technology intensive program. Becker and Anderson’s *Teaching Learning, and Computing* survey was adapted to be used for the study. Information about the study, consent, and a link to the survey was emailed to technology directors across the state of Iowa. Those technology directors then forwarded the email to teachers who fit the criteria for inclusion in the study. If the teachers who received the study information were interested in participating, they were able to click on the link and complete the survey online. The information was gathered during the months of August and September and analyzed shortly thereafter.

Over half of the participants reported that being part of a 1:1 program did change their pedagogy in some manner. Teachers responded to questions addressing teacher/classroom practices, types of assignments, and instructional planning. Over half of the teachers reported that they were using constructivist types of classroom practices (i.e., having multiple activities going on in the room, letting student interest influence topics taught, evaluating through projects rather than tests, and allowing students to teach teachers) more now than they were before 1:1 programs. Over half again reported that they were using traditional types of classroom practices, such as relying on textbooks for instruction, less than they were before. Teachers reported that they were giving constructivist types of assignments more now than they were before 1:1 program implementation. Roughly half of the participants reported that their instructional planning
changed as a result of 1:1 programs. Overall, 65% reported a change in their pedagogical practices. A total of 69% believed that technology played a role in those changes. Thus, these results indicate that nearly two-thirds of the teachers who participated in this study did experience changes to their pedagogy as a result of teaching in a 1:1 program. According to Becker and Anderson (1999) these results would reflect that these teachers were moving towards using more constructivist practices. Similar findings were reported in previous studies (Corn, Tagsold, & Patel, 2011; Dawson, Cavanaugh, & Ritzhaupt, 2008; Garthwait & Weller, 2005; Gulek & Demirtas, 2005; Lowther, Ross, & Morrison, 2003).

The participants were asked to reflect on classroom examples of change that they were able to observe in their own experience. Many participants reported examples that supported the reported changes towards constructivist practices, as demonstrated in the responses to the Likert-scale questions summarized above. Those examples included teachers finding that their classrooms and instruction were becoming more student-centered, the role of teachers shifting to becoming facilitators, and classroom instruction becoming more project-based. Teachers also reported that adding technology to the classrooms resulted in an expansion to the sources of information that were available to teachers and students. Teachers found that the technology skills of their students were growing. Finally, teachers expressed concerns that technology and especially social media was proving to be a huge distraction to students in the classroom. Other studies have also found evidence that technology may be distracting and found teachers struggling to engage students (Corn, Tagsold, & Patel, 2011; Drayton et al., 2010; Dunleavy, Dexter, & Heinecke, 2007).
Teachers were asked to respond to statements outlining reasons for which their teaching practices may have changed. The majority of participants responded that opportunities with laptops or other technologies played at least a minor role in the changes that they had experienced. The other factors most associated with affecting pedagogical change included staff development and workshops, discussions with colleagues, discussions with other people, changes in climate or emphasis of the school, and changes in district policies and expectations. Literature has supported the importance of staff development (Corn, Tagsold, & Patel, 2011; Drayton et al., 2010; Dunleavy, Dexter, & Heinecke, 2007; Inan & Lowther, 2010), school climate (Drayton et al., 2010), and school policies (Garthwait & Weller, 2005) to the success of a 1:1 program.

Teachers were asked to rate the types of support that were available to them in their school environment. The three types of support highlighted were technical support, instructional support, and help in supervising students. Teachers were asked to indicate how much they felt they needed each type of support, how often each type of support was available when it was needed, and what the quality of the support provided was. Over half of the participants reported seldom needing technical support or instructional support. The majority of participants reported needing help supervising students seldom or not at all. Technical support was reported to be almost always or mostly available, instructional support was frequently or only sometimes available, and help in supervising students was only sometimes or not at all available. Technical support was reported to be excellent or very good and instructional support was reported to be good or very good. A quarter of participants received no support in help supervising students, but another quarter reported that the help they received had been good.
In the second section of the survey, teachers were asked to write about some challenges that they had experienced or observed which they felt made 1:1 program implementation difficult. The most popular reported challenges included the distraction of students by the technology, a lack of training for teachers and students, and weaknesses in the technology infrastructure of the schools. Teachers voiced many concerns about students accessing social media and playing games during classroom activities, as well as cheating on assignments and tests. Teachers found they were lacking technical training and training on how to effectively teach with technology. Students lacked technical knowledge as well. School networks were not able to support the amount of students and teachers that needed to access the internet at one time. Other challenges included weaknesses in classroom management, a lack of shared goals among teachers and administrators, mixed views on the role of technology in the classroom, and a lack of technical and administrative support.

Teachers also reported on factors which they felt were essential to the success of 1:1 programs. The factors which they reported were deeply connected to the challenges they mentioned on the previous question. The factors suggested included training for teachers and students, support from all parties involved in 1:1 program implementation, an increased role of teachers in the decision-making process, clear and consistent expectations for students, a strong technology infrastructure, and support for technology and pedagogy. All of the factors should be carefully planned for in order to increase the likelihood of success for 1:1 programs.
Discussion

The first research question for the study sought to determine how teachers perceive that their pedagogical approaches change or remain the same after being involved and teaching in a 1:1 program. Literature suggests that teachers commonly experience a change in their pedagogy after teaching in a 1:1 program. Those changes are often reported as a change away from traditional practices and towards constructivist practices (Baker, Gearhart, & Herman, 1990; Gulek & Demirtas, 2005; Rockman et al., 2000). Findings from this study were consistent with this tendency. Over half of the participants (65%) indicated they were experiencing a change in their classroom practices and responded much the same way as others in previous studies. They reported growth in the types of activities that are commonly associated with constructivist classrooms (such as having multiple activities going on in the room at the same time, letting student interest influence lesson topics, evaluating through products instead of tests, and allowing themselves to be taught by students). This group of teachers also expressed a decline in practices that typically are more consistent with those characteristics associated with traditional instruction (such as a reliance on textbooks). In past studies, researchers note that teachers tend to become more of a facilitator in his/her classroom while in a 1:1 program (Corn, Tagsold, & Patel, 2011; Gulek & Demirtas, 2005). As discussed in Chapter 4, the open-ended responses revealed that many participants now thought of themselves as facilitators or “partners in learning”. In addition, teachers in this study evidenced a trend towards student-centered learning. In open-ended responses, many individuals reported as much in their own words, like this example: “While the course objectives and standards have not changed, the approach has, as it is much easier to implement more constructivist or student-focused methods. The
students are learning, not by me telling, but by them showing.” Previous studies also documented results that teachers who participated in 1:1 programs found that their classrooms were becoming more student-centered as a result (Dawson, Cavanaugh, & Ritzhaupt, 2008; Drayton et al., 2010; Lowther, Ross, & Morrison, 2003).

Another similar trend that is documented in the literature and commonly happens when 1:1 programs are implemented is the types of assignments teachers give tend to support more of a constructivist approach to learning. Teachers in this study indicated that they were using more group work and project-based learning, evidenced in both the responses to Likert-scale questions and the open-ended responses. Previous research supports both increased amounts of group-work (Corn, Tagsold, & Patel, 2011) and project-based learning as well (Dawson, Cavanaugh, & Ritzhaupt, 2008; Donovan, Green, & Hartley, 2010; Lowther, Ross, & Morrison, 2003). Overall, major trends towards constructivist approaches to learning in 1:1 programs are supported well by the literature and it was reassuring to see it reflected in the results of this study as well.

Teachers reported that changes to their instructional planning practices were more varied and complicated than the other changes described above. It was a little over half believed their instructional planning practices had changed and a little under half believed those practices had stayed the same, for the majority of the provided statements. The topic of instructional planning is not addressed with as much focus as other areas, an interesting point given that planning is such an important part of the teaching process.

Overall, nearly 70% of the participating teachers ascribed the changes they experienced to technology. Participants indicated that technology least influenced changes to their instructional planning. In Becker and Ravitz’s (1999) study, nearly half of the
participants were noted to be confident users (frequent or skilled in computer use) of technology, so the researchers were correlating teacher changes to student assignments and classroom practices computer use. Less of the participants in this current study reported that computers played a role in those practices associated with instructional planning while, in the 1999 study, a higher percentage of novice users reported computers contributed to the changes in instructional planning. For the current study, all teachers were assumed to be confident users, not accounting for those teachers who are just adjusting to using technology in order to teach in a 1:1 program. The differences between the findings of this study and Becker and Ravitz’s (1999) study in regards to changes in instructional planning might be explained that difference in experience. The 1999 study featured teachers who were less confident in using technology and so those teachers may have noticed more impact from technology on their instructional planning. The current study featured teachers who were more confident and may not have then seen as big an impact. They had already learned some of the technology and so did not face as large of an adjustment as those nearly twenty years ago.

All of the findings in this section create a picture of what the pedagogical knowledge (PK) looks like in the context of 1:1 program schools. The pedagogical aspect changes in a couple of ways, which can potentially impact what the technological pedagogical knowledge (TPK) and the technological pedagogical content knowledge (TPACK) will look like for teachers in the classrooms. The factors discussed in the results for the second research question illustrate the effects of context and pedagogical change on the other components of the TPACK framework as well.
This study’s second research question asked what teachers perceived to be factors impacting or preventing pedagogical change. There were a number of questions that probed participants with the purpose of establishing a context. The open-ended responses asked for teachers to reflect on specific important factors and challenges that they experienced or encountered while participating in a 1:1 program.

Student distractions was one of the most popular responses from teachers when commenting about challenges facing 1:1 programs. Teachers expressed a lot of concern for students who were on social media and playing games during what they considered classroom instructional time. This same concern appears in other studies as well, with many claiming student distraction as a common barrier for successful 1:1 program implementations (Corn, Tagsold, & Patel, 2011; Donovan, Green, & Hartley, 2010; Dunleavy, Dexter, & Heinecke, 2007). It was both surprising and yet not surprising that this finding would emerge as a major challenge for teachers. Students using social media in classrooms is clearly addressed in the literature, but it seems like it is presented as a relatively minor issue and one that is not focused on as intently as other issues that arise. However, it is an issue that needs more investigation and attention. The current cultural trend is towards heavy reliance on and usage of social media by the general public, so they naturally can move into K-12 classrooms very easily if not addressed with policy and/or expectations. Student distraction actually emerged again in this study when participants listed key factors for successful implementation. Administration and other stakeholders must consider how social media and games will be handled in schools that are planning for 1:1 programs and then have a contingency plan to address it.
The issue of plagiarism by students was mentioned alongside issues about how the technology itself was distracting for students. This issue garners high amounts of concern from people even outside of K-12 education, yet plagiarism does not typically appear in most findings or concerns of teachers in the literature. Especially in schools that are having concerns related to classroom management with 1:1 programs, it would be interesting to see how plagiarism is being addressed.

Lack of training was frequently mentioned and was described as necessary for both teachers (Corn, Tagsold, & Patel, 2011; Drayton et al., 2010; Dunleavy, Dexter, & Heinecke, 2007) and students. Teachers were lacking both technical training and instructional training. One interesting finding from this study was how teachers mentioned the lack of training. They saw this as an important expectation for 1:1 programs, that students really did not have some of the necessary technology skills as first assumed. An example from a study by Grimes and Warschauer (2008) illustrated that students did not do as well on writing if they had weak keyboarding skills, which was more common in the school that did not have a required keyboarding course. Training for students is something that administrators might consider as well. This section demonstrates a critical weakness in technological knowledge (TK) and technological pedagogical knowledge (TPK). Although PK has shown to shift, the weaknesses in these two areas make it impossible for teachers in some areas to adequately reach TPACK.

Teachers expressed a concern about having a lack of shared goals or visions related to the 1:1 program implementations. It appeared to have left teachers without motivation to change and caused problems with the long-term success of the 1:1 program. Others have noted that all parties involved in a 1:1 program must be focused and committed to the same
goals and vision (Babell & Kay, 2010; Drayton et al., 2010; Lei & Zhao, 2010). Overarching views of technology and the role that it plays also fits into this category. Just as all stakeholders must share the same goals and vision, everyone must have a belief that technology can lead to improvement, but it cannot by itself guarantee success. It was evident from some participant responses in this study that they did not feel they were always involved in the process of planning of the 1:1 programs. If teachers were involved in the initial planning stages, they might have bought more into the overall goals and vision of their school’s 1:1 program, thus helping them to feel as though they are valued.

Weakness in the infrastructure was a challenge expressed by several participants. Teachers were concerned about the numerous hardware-related issues they encountered and the limited network capabilities they experienced. This is a key factor that administrators must consider when they are preparing for 1:1 programs. Infrastructure issues are common in schools with 1:1 programs and are well-documented in the literature (Beaudry, 2004; Drayton et al., 2010; Garthwait & Weller, 2005). Identified as a key factor to success in this study, teachers were confident that a 1:1 program with a well-planned and organized infrastructure were probably going to be those programs experiencing the most success.

Technical support is still needed and required by many teachers, and was cited both as a challenge and as a key factor to success in this study. Many previous studies have reported that teachers need better technical support or have stated that good technical support will positively impact the success of 1:1 programs (Bielefeldt, 2006; Dunleavy, Dexter, & Heinecke, 2007; Garthwait & Weller, 2005; Grimes & Warschauer, 2008). Although technical support remains a constant issue for 1:1 programs, it is important to
note that administrators and districts must consider spending money on technical support and then ensure that the technical support that is being given to teachers is enough to keep the 1:1 program moving forward.

Conclusions

Overall, teachers in this study reported changes to their pedagogical approaches when teaching in a 1:1 program. Teachers reported that the most significant changes were being made to their classroom practices and the types of assignments they were giving to students. Teachers were experiencing less of a change to their instructional planning practices. Thus, teachers in Iowa are experiencing many of the same types of changes that others have experienced while teaching in 1:1 programs. While components of 1:1 programs are many and complex, teachers in this study did attribute some of their pedagogical changes they have experienced directly to technology.

Teachers identified several factors that were attributed to the success or failure of their experiences in 1:1 programs. Many of these same challenges mentioned by teachers in this study are similar to those mentioned by teachers across the country. Many of the reported issues could be addressed by sufficient planning and preparation at the start of the 1:1 program. All stakeholders (administrators, teachers, parents, etc.) need to be sure to discuss and align the program goals, the vision for the program, and the expectations for teachers and students. They should also consider the infrastructure of the school in relationship to those goals. The instructional needs of the students and teachers must be supported by the infrastructure, not hindered by it. Another challenge with giving 1:1 access to students is the distraction it can cause, especially social media and games. As can be easily seen by current trends in society as a whole, this can be viewed as a larger issue
than just what is experienced in schools. This is a difficult challenge to deal with at present, but administrators and other stakeholders should acknowledge that the distraction is likely to occur and then consider what steps teachers and students might take to lessen the distractions in the classroom. Critical shortcomings in TK and TPK appear to be holding teachers back from exhibiting true TPACK tendencies in their classrooms.

Recommendations for Future Research

One major theme emerging from the results of this study was that teachers reported that they were struggling with classroom management in classrooms with 1:1 technology. They struggled with keeping students on task, keeping them off of social media and games, and combating the threat of plagiarism and cheating by the students using the technology. The topic of classroom management is not widely focused on in the literature. The high report of classroom management issues in this study suggests that more attention should be given to how to manage a classroom with 1:1 devices. What effect is classroom management having on these programs as a whole? How are schools addressing changes in classroom management? It would be helpful to explore these topics further to better assist and inform schools that are establishing 1:1 programs.

Currently, curriculum changes are taking place in Iowa and throughout schools across the country. Meeting national standards and academic performance goals are always at the forefront of what is taking place in classrooms. One specific change that will take place in Iowa schools is the type of assessments that students will be required to take. Those new assessments are likely to be delivered using an online format. Every student will need access to some type of device to take those assessments. For schools that have not made the move to 1:1, it will be interesting to see what impact that will have on the assessment
in general, but the access students have to complete the test as well. A comparison between non 1:1 and 1:1 schools in both experience of and performance on the new assessments might be timely to see if any difference exists.

Two components of 1:1 programs not discussed in this research because of sample size are the size of schools involved and the socio-economic status of the students in the schools. Does size of school impact implementation of such a program, and how does socio-economic status impact access to and student performance in a 1:1 program? More research is needed that addresses questions around these two components.

Another interesting area not addressed in this study is the effect of teachers’ content area knowledge and what content areas these teachers were teaching on the findings for pedagogical change and factors impacting or preventing change. This study did not specifically ask for teachers to list a content area with which they were teaching, though some mentioned their content area in their open-ended responses. Particularly in the area of instructional planning in the first section of the survey, the content area information of the teachers involved has potential to show some interesting data. Elementary teachers tend to work more closely together, while secondary education teachers were more focused on their own content areas. It would be interesting to see how changes are happening within content areas and what effects teaching in specific content areas might have on experiences with 1:1 programs.

1:1 initiatives continue to grow in popularity around the country and in the state of Iowa. The educational environment of Iowa is also on the brink of many big changes. In the face of these changes, research on implementing and growing 1:1 programs within the state continues to offer many fruitful avenues. As the number of programs continue to
grow, research that follows such initiatives becomes increasingly critical for the success of both teachers and students in learning environments.
REFERENCES


APPENDIX A

INTRODUCTORY EMAIL

We are contacting you to ask for your help in identifying possible participants for our study that involves identifying K-12 teachers who have completed at least 1 year of teaching in a 1:1 program. We are hoping that you will take the time to forward this email to technology directors/coaches in school districts in your AEA that have implemented a 1:1 program (Fall 2014 or before). Then, we hope that the technology director/coach will forward on to K-12 teachers who are teaching in 1:1 classrooms. The teacher’s individual name or email address will not at any time be associated with individual responses. Participating in the study is voluntary and a teacher could withdraw at any point. There are no foreseeable risks from participating in this study. Specific information about the research study follows and can be shared.

Seeking PreK-12 Teacher Study Participants in 1:1 Programs!

ISU Research Study: Teacher Perceptions of Pedagogical Change in 1:1 Classrooms/Programs

Background: In the past few years nearly 150+ school district across Iowa have implemented some type of 1:1 program at a particular grade level (e.g., elementary, middle school/junior high, high school). Previous research has reported that teachers’ pedagogical approaches change as a result of teaching in a 1:1 environment (Bebell & Kay, 2010). There is such data, to our knowledge, that document the impact a 1:1 program has had on teachers’ pedagogical approaches in Iowa classrooms. Thus, the purpose of this study is to examine how Iowa teachers perceive or do not perceive changes in their teaching styles or pedagogical approaches while teaching in a 1:1 program.

Purpose of the Study: The aim of this study is to capture teachers’ perspectives on how they have or have not changed their pedagogical approaches while teaching in a technology intensive learning environment (i.e., 1:1 program). For the purpose of this study a 1:1 program will be defined as all students having access to a mobile device (i.e., laptop, Chromebook, iPad, etc.) for 24/7 and/or during an entire instructional day (not allowed to take them home). This study will also investigate the factors teachers identify as impacting their pedagogical change or lack thereof.

Directions to Participants: Participating in this study is voluntary and anyone can withdraw at any point. There are no foreseeable risks from participating in the study. A link to the online questionnaire is provided below and should take 10-15 minutes to complete. Please answer each question to the best of your knowledge as your thoughtful and candid responses are appreciated. Again, your responses will be kept completely confidential as no individual name or email address will be associated with individual responses at any time.

Please link below to access questionnaire:
https://iastate.qualtrics.com/jfe/form/SV_8dH7CH9MRQyfHx3

Thank you in advance for taking time to complete this questionnaire. We would appreciate your response by Friday, August 7. If you have any questions about this research study, please contact Dr. Denise Crawford (dschmidt@iastate.edu or 515.294.9191). We will send out a summary of the results to all participants when completed. Again, thank you!
Jessie Christensen  
Masters Student, Curriculum and Instructional Technology

Denise Crawford  
Associate Professor
APPENDIX B

SURVEY INSTRUMENT

Perceived Pedagogical Changes in 1:1 Classrooms

Q1 Project Title: Teacher Perceptions of Pedagogical Change in 1:1 Programs  
Project Investigators: Jessie Christensen, Dr. Denise Schmidt-Crawford, Iowa State University  
The purpose of this study is to examine if teachers perceive any pedagogical changes in their teaching after working in schools involved with 1:1 programs. You are being invited to participate in this study because you are currently teaching in a 1:1 program and/or school district. Your participation involves completing an online questionnaire (15-20 minutes). The online questionnaire contains 9 demographic questions, 17 multiple-choice questions, and 2 open-ended questions. Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. Your name will not at any time be associated with your individual responses. Participating in the study is voluntary and you may withdraw at any point. There are no foreseeable risks from participating in the study. Thank you in advance for taking time to complete this questionnaire. Please answer each question to the best of your knowledge. Your thoughtful and candid responses will be greatly appreciated. Again, your responses will be kept completely confidential. If you have any questions about this research, please contact Jessie Christensen, jmc1dsm@iastate.edu (515-201-5789) or Denise Crawford, dschmidt@iastate.edu (515-294-9141). Thank you! If you agree to participate in the study, please click the ">>" button.
Q2 In what Area Educational Agency (AEA) district is your school located?
○ AEA 267 (1)
○ Grant Wood AEA (2)
○ Great Prairie AEA (3)
○ Green Hills AEA (4)
○ Heartland AEA (5)
○ Keystone AEA (6)
○ Mississippi Bend AEA (7)
○ Northwest AEA (8)
○ Prairie Lakes AEA (9)

Q3 What is your email address?

Q4 What is your gender?
○ Male (1)
○ Female (2)

Q5 What is your age?
○ 18-24 years old (1)
○ 25-34 years old (2)
○ 35-44 years old (3)
○ 45-54 years old (4)
○ 55-64 years old (5)
○ 65-74 years old (6)
○ 75 years or older (7)

Q6 What is your ethnicity?
○ White (1)
○ Hispanic or Latino (2)
○ Black or African American (3)
○ Native American or American Indian (4)
○ Asian / Pacific Islander (5)
○ Other (please specify) (6) ____________________

Q7 What grade level do you teach?
○ Elementary (1)
○ Middle School (2)
○ High School (3)
Q8 How many years have you been teaching?
- Less than 5 years (1)
- 5-10 years (2)
- 11-15 years (3)
- 16-20 years (4)
- 21-25 years (5)
- More than 25 years (6)

Q9 How many years has your school had a 1:1 program for students?
- 1 year (started 2014-2015) (1)
- 2 years (started 2013-2014) (2)
- 3 years (started 2012-2013) (3)
- 4 years (started 2011-2012) (4)
- 5 years (started 2010-2011) (5)
- More than 5 years (started 2009-2010 or before) (6)

Q10 What best describes the mobile device that students are currently using in your classroom?
- Mac Laptops (1)
- PC Laptops (2)
- iPads (3)
- Android tablets (4)
- Window tablets (5)
- Chromebooks (6)
- Netbooks (7)
- BYOD/BYOT (8)
- Combination of platforms (9)
- Other (10)
Q11 Compared to before the 1:1 program implementation, how much do you employ the following practices?
<table>
<thead>
<tr>
<th></th>
<th>Less now (1)</th>
<th>Same (2)</th>
<th>More (3)</th>
<th>Much more (4)</th>
<th>Never did (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan a lesson using principles of direct instruction (review, teach, guided practice, individual practice)</td>
<td>○</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Have many activities going on in the room at the same time</td>
<td>○</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Use the textbook as my primary guide through units</td>
<td>○</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Let student interest partly influence the topics in a lesson</td>
<td>○</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Closely monitor and supervise students while they work</td>
<td>○</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Give students a reward for doing well on a big assignment</td>
<td>○</td>
<td></td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Evaluate students through their products instead of tests (7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allow myself to be taught by students (8)</td>
<td></td>
<td></td>
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</tbody>
</table>

Q12 How much of a role has technology played in the changes to student assignments reported above?
- ☐ No role at all (technology wasn't involved) (1)
- ☐ A minor role (in most cases) (2)
- ☐ A substantial role in many cases (3)
- ☐ A major role in most of those changes (4)
- ☐ Not applicable/no changes (5)
Q13 Compared to before the 1:1 program implementation, how often do you give the following types of assignments?

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Less now (1)</th>
<th>Same (2)</th>
<th>More (3)</th>
<th>Much more (4)</th>
<th>Never did (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have students teach or help other students (1)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Have students explore a topic on their own, without direction (2)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>Have students review and revise their own work (3)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Have students make predictions and investigate them (4)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Have students work on long projects (5)</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Have students answer questions in their textbooks (6)</td>
<td>○</td>
<td>○</td>
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<td>○</td>
</tr>
<tr>
<td>Have students work in groups (7)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Have students write a page or more on a single subject (8)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Q14 How much of a role has technology played in the changes to student assignments reported above?

- No role at all (technology wasn't involved) (1)
- A minor role (in most cases) (2)
- A substantial role in many cases (3)
- A major role in most of those changes (4)
- Not applicable/no changes (5)
Q15 Compared to before the 1:1 program implementation, how much do you...

<table>
<thead>
<tr>
<th>Activity</th>
<th>Less now (1)</th>
<th>Same (2)</th>
<th>More (3)</th>
<th>Much more (4)</th>
<th>Never did (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work with other teachers on curriculum planning (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talk with other teachers about teaching strategies (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spend time preparing lessons (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reflect deeply about what good teaching is (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q16 How much of a role has technology played in the changes you reported above?
- No role at all (technology wasn't involved) (1)
- A minor role (in most cases) (2)
- A substantial role in many cases (3)
- A major role in most of those changes (4)
- Not applicable/no changes (5)
Q17 How has the 1:1 program changed the way you think about the following?

<table>
<thead>
<tr>
<th></th>
<th>Not affected by implementation (1)</th>
<th>Smallchange (2)</th>
<th>Moderatechange (3)</th>
<th>Bigchange (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The way you organize space in your classroom (1)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The way you break up your class period into activities (2)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Your beliefs about curriculum priorities (3)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Your goals in teaching (4)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Q18 Rate your degree of agreement with the following statements.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree (1)</th>
<th>Disagree (2)</th>
<th>Neutral (3)</th>
<th>Agree (4)</th>
<th>Strongly agree (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>My goals for students have changed</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My role in the classroom has changed</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The school climate has changed</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My beliefs about teaching and learning have changed</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My understanding about how people learn has changed</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The delivery of curriculum in my class has changed</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Q19 Do you believe that your pedagogical style has changed as a direct result of the 1:1 program?
☐ Yes (1)
☐ No (2)

Answer If Do you believe that your pedagogical style has changed since beginning the 1:1 initiative? Yes Is Selected

Q20 Briefly describe, using a classroom example if possible, what you believe to be the most significant way that your pedagogical style has changed as a result of the 1:1 program.
Q21 Since the beginning of the 1:1 program, which of these experiences have you had as a teacher? (Check all that apply.)

- Informally mentor another teacher (1)
- Formally assigned to mentor a teacher (2)
- Give a workshop or conference talk (3)
- Give workshops for teachers on at least 5 different occasions (4)
- Teach a college-level course for credit (5)
- Publish an article in a magazine or journal for professional educators (6)
- I had none of these experiences (7)
- Other: please specify (8) ____________________
Q22 Considering all of the ways that you have changed your teaching practice since the 1:1 program implementation, how much of a role did each of the following reasons play?
<table>
<thead>
<tr>
<th>Changes in the subjects or grade levels you teach (1)</th>
<th>Not a reason (1)</th>
<th>Minor reason (2)</th>
<th>Moderate reason (3)</th>
<th>Major reason (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in district policies or expectations (2)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Changes in the climate or emphasis at your school (3)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Changes in the abilities or prior achievement of the students you teach (4)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Staff development and workshop experiences you have had (5)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Discussions you have had with colleagues at your school (6)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Discussions you have had with other people (7)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Changes in the main goals you have for students (8)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Changes in your understanding of how people learn or understand things (9)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Changes in the textbooks you are given to use (10)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Opportunities or experiences you have had with laptops or other technologies (11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q23 Which of these are advantages of using technology with teaching?
<table>
<thead>
<tr>
<th></th>
<th>Not true/not an advantage (1)</th>
<th>Somewhat true/mild advantage (2)</th>
<th>True/modest advantage (3)</th>
<th>True/strong advantage (4)</th>
<th>Don't know (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students create better looking products than they could do with just writing and other traditional media (1)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Technology provides a welcome break for students from more routine learning activities (2)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Students help one another more while doing work with technology (3)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Students take more initiative outside of class time - doing extra research or polishing their work (4)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Students’ writing quality is better when using word processing (5)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Students work harder at their assignments when they use technology (6)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Students are more willing to do second drafts (7)</td>
<td></td>
<td></td>
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<td>-------------------------------------------------</td>
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<td>---</td>
</tr>
<tr>
<td>Students are communicating and producing in different ways (8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Q24 Which of these are disadvantages of using technology with teaching?
<table>
<thead>
<tr>
<th>Statement</th>
<th>Not true/not a disadvantage (1)</th>
<th>Somewhat true/mild disadvantage (2)</th>
<th>True/modest disadvantage (3)</th>
<th>True/strong disadvantage (4)</th>
<th>Don't know (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology is too unpredictable - crashes or does not work right (1)</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>Technology is hard to figure out how to use (2)</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>Many students use technology in order to avoid doing more important school work (3)</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>Many students are not careful enough with expensive equipment (4)</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>It is difficult to integrate technology into most of my regular lesson plans (5)</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>Often too many students need my help at the same time (6)</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
</tr>
<tr>
<td>Students often get so wound up I can not settle them down afterwards (7)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>A teacher has to give up too much instructional responsibility to the technology - I feel like I am not really teaching (8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students can cheat easier - copying other work and turning it in as their own (9)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Students are easily distracted by social media (i.e., Facebook, Twitter) during instructional time (10)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Q25 The following statements describe teachers’ work environments. Please indicate how much each statement agrees or disagrees with your own work situation.
<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree (1)</th>
<th>Moderately disagree (2)</th>
<th>Slightly disagree (3)</th>
<th>Slightly agree (4)</th>
<th>Moderately agree (5)</th>
<th>Strongly agree (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion of school goals and how to achieve them is a regular part of our faculty meetings. (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other teachers encourage me to try out new ideas. (2)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The people who give me the best ideas for improving my teaching also tend to know a lot about using technology. (3)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>My principal's values and philosophy of education are similar to my own. (4)</td>
<td>Teacher salaries who successfully introduce a major innovation in their teaching are given public recognition among other teachers. (5)</td>
<td>New ideas presented at in-services are discussed afterwards by teachers in the school. (6)</td>
<td></td>
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</tr>
</tbody>
</table>
Each time there is a staff development meeting, it covers a different topic. (7)

Most teachers here share my beliefs about what the central goals of the school should be. (8)

Teachers in this school are continually learning and seeking new ideas. (9)

It is common for us to share samples of student work. (10)
<table>
<thead>
<tr>
<th>If most teachers feel that another teacher is not doing a good job, they will press that teacher to improve. (11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher's play an important role in defining staff development activities. (12)</td>
</tr>
<tr>
<td>Major staff development activities are followed by support to help teachers implement new practices. (13)</td>
</tr>
</tbody>
</table>

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<thead>
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<tbody>
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</table>

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<tbody>
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</thead>
<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>
Q26 How often do you need each type of support?

<table>
<thead>
<tr>
<th></th>
<th>Not at all (1)</th>
<th>Seldom (2)</th>
<th>1-3 times a month (3)</th>
<th>Weekly or more (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(computer or software fixes) (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructional support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(incorporating technology into lessons) (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help in supervising</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>students (aides, volunteers, etc.) (3)</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Q27 How available is each type of support when you need it?

<table>
<thead>
<tr>
<th></th>
<th>Not available (1)</th>
<th>Sometimes (2)</th>
<th>Frequently (3)</th>
<th>Mostly (4)</th>
<th>Almost always (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical support (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructional support (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help in supervising</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>students (3)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Q28 What is the quality for the support that you receive?

<table>
<thead>
<tr>
<th></th>
<th>No support received (1)</th>
<th>Poor (2)</th>
<th>Fair (3)</th>
<th>Good (4)</th>
<th>Very good (5)</th>
<th>Excellent (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical support (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructional support (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help in supervising</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>students (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q29 What is a key implementation factor(s) that must be present for a 1:1 program to be successful? Briefly explain your response.

Q30 What is a common challenge that you encounter that makes a 1:1 program implementation difficult? Briefly explain your response.

Q31 Additional comments:
Date: 6/12/2015

To: Jesse Christensen

3632 4th Place
Des Moines, IA 50310

From: Office for Responsible Research

Title: Teacher Perceptions of Pedagogical Change in 1:1 Laptop Classrooms

IRB ID: 15-360

Study Review Date: 6/11/2015

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 46 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement, survey or interview procedures with adults or observation of public behavior where:
  - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects;
  - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- You do not need to submit an application for annual continuing review.
- You must carry out the research as described in the IRB application. Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research involving Humans will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. Only the IRB or designees may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

Please be aware that approval from other entities may also be needed. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4556 or IRB@iastate.edu.