Computer self-efficacy: instructor and student perspectives in a university setting

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Computer self-efficacy: Instructor and student perspectives in a university setting

by

Kenneth D. Kass

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of
DOCTOR OF PHILOSOPHY

Major: Education (Curriculum and Instructional Technology)

Program of Study Committee:
Ana Paula Correia, Major Professor
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Iowa State University
Ames, Iowa
2014

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DEDICATION

For my parents Ira and Isabelle who instilled in me a lifelong love for learning, for Bob, Rhona and Anthony who believed in me all those years ago, fostering an interest and love of technology.

Your encouragement and support taught me to believe in myself and with effort, persistence and determination anything is possible.
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ABSTRACT

The purpose of this study was to examine instructor and student computer self-efficacy related to learning about and using computer technologies that are used within a university setting. In addition, this study explored feelings related to using and learning about new technologies and also examined the use of specific support resources. This study utilized survey methodology to examine instructor and student computer self-efficacy. The overall response rate on the survey was 56.98% ($n = 257$) for instructors and 12.39% ($n = 653$) for students. Computer self-efficacy related to using new technologies using specific support resources for both instructors and students was explored. Related to using a new technology with specific support resources and using product manuals for reference, students had a statistically significant higher level of computer self-efficacy. Further, related to using a new technology by watching someone else before trying it, students had a statistically significant higher computer self-efficacy.

Regarding using technology for specific academic tasks, instructors had a higher level of computer self-efficacy using Internet tools to conduct research and find journal articles on a topic. Conversely, students had a higher level of self-efficacy using social media to have meaningful interactions, using technology for entertainment, using technology to create engaging presentations, and using new applications on smart phones or tables. Related to feelings that are associated with the prospect of learning to use a new technology, both instructor and student groups first expressed a similar feeling of excitement. As far as the second most reported feeling, students noted frustration, whereas instructors indicated that of curiosity as a second theme. Related to satisfaction with technology support providers utilized, instructors tended to more frequently utilize university provided professional IT support. Both students and instructors relied relatively heavily on peers for support. In cases where personal interactions
were involved support was rated higher. Most notably there were strong correlations between satisfaction with instructor provided support and students, friends or colleagues and professional university IT support.
CHAPTER 1. INTRODUCTION

Introduction and Statement of the Problem

Technology has become increasingly pervasive in society today. In fact, the U.S. Supreme Court recently issued a ruling about the search of mobile phones, clearly indicating the prevalence of technology in our everyday lives: “Today many of the more than 90% of American adults who own cell phones keep on their person a digital record of nearly every aspect of their lives” (Riley v. California, 2014, p. 3). As such, it is clear that technology and computer skills are of increasing importance. Implementing technology in engaging and effective ways, which the students demand (Prensky, 2005), represents a “wicked” problem (Mishra & Koehler, 2006). Utilizing the Rittel and Weber (1973) framework of wicked and tame problems Mishra and Koehler (2008) suggested,

Working with wicked problems is a process of utilizing expert knowledge to design solutions that honor the complexities of the situations and the contexts presented by learners and classrooms. For this reason, there is no definitive solution to a technology integration problem. (p. 2)

An underlying foundational theory is self-efficacy; Bandura (1986) defined self-efficacy as an individual’s belief in their own abilities, which is defined as “people’s judgments of their capabilities to organize and execute courses of action required attaining designated types of performances” (p. 391). More specifically, computer self-efficacy (Compeau & Higgins, 1995; Davis, 1989; Hill, Smith, & Mann, 1987; Venkatesh & Davis 2000) has developed from Bandura’s (1977) core conception of self-efficacy. According to Compeau and Higgins (1995), “computer self-efficacy, then, refers to a judgment of one’s capability to use a computer. It is not concerned with what one has done in the past, but rather with judgments of what could be
done in the future” (p. 192). McDonald and Siegall (1992) defined computer self-efficacy as “the belief in one’s ability to successfully perform a technologically sophisticated new task” (p. 467). Although Bandura’s (1986) work on self-efficacy was clearly foundational in that it served to modify individual perceptions, it was recursive in that one’s self-efficacy can impact every interaction one has with the world. The concept of computer self-efficacy seems particularly important when conceptualizing the integration of technology in the classroom.

A fair amount has been written on the concept of self-efficacy (Bandura, 1977; Bandura & Cervone, 1983; Bandura, 1977; Wood & Bandura, 1989) and even on computer self-efficacy related to performing specific tasks on a computer (Compeau & Higgins, 1995; Hill et al. 1987). However, relatively few studies have explored computer self-efficacy of instructors and students at the same university. Given that instructors drive technology selection for coursework, this represents an interesting dynamic in terms of technology learning, satisfaction, perception, and use by instructors and students.

The computer self-efficacy studies that have been conducted had relatively small sample sizes (Laver, George, Ratcliffe, & Crotty, 2012) and focused on the use of technology to complete specific work-related tasks (Compeau & Higgins, 1995; Compeau, Higgins, & Huff, 1999). Furthermore, much of the computer self-efficacy research has not been situated within an educational context and, instead, has focused on work environments (Compeau & Higgins, 1995) or teaching with technology in an educational context (Albion 1999). An understanding of computer self-efficacy from both the instructor and student perspectives can serve to both illuminate and inform support resources, as well as provide information that can enhance teaching, learning, and educational programs.
Purpose of the Study

The purpose of this study was to examine instructor and student computer self-efficacy related to learning about and using computer technologies that are used within a university setting. In addition, this study explored feelings related to using and learning about new technologies and also compared the use of specific support resources. A modified computer self-efficacy scale was utilized (Laver et al., 2012) within the context of a medium-sized private university, referred to in this study by the pseudonym Middle Western University. This study extends the work of Laver et al. (2012) by examining student and instructor groups that included a wide range of participant ages and sought to provide additional insight and data related to computer self-efficacy.

Research Questions

Guided by, and grounded in, computer self-efficacy and self-efficacy constructs, the following research questions guided this research study, which explored both instructor and student perceptions in a university context:

1. What is the computer self-efficacy related to using a new technology with specific support resources?
   a) What is the level of interest in learning more about technology?
2. What is computer self-efficacy related to using technology to complete specific tasks?
   a) What correlation, if any, is there between computer self-efficacy related to using a new technology and computer self-efficacy related to using technology to complete specific tasks?
b) What correlation, if any, is there between computer self-efficacy related to using a new technology with specific support resources and self-efficacy related to using technology to complete specific tasks?

3. What feelings are associated with the prospect of learning to use a new technology?
   a) What support providers are utilized when help is needed with a technology problem?
   b) What correlation, if any, is there between satisfactions with one support provider or another?

**Motivation for the Study**

As an information technology (IT) director at Middle Western University, the researcher was fortunate to have had the opportunity to work with many different instructors; some instructors were interested and engaged in technology innovation, yet curiously others were downright critical, and in some cases, even scornful, toward technology. Through the researcher’s graduate program, time was spent focusing on the importance of pedagogical alignment between technology and instructional practice. One framework for technology integration that had a significant impact on the researcher was technological pedagogical content knowledge (TPACK). The TPACK framework builds on Shulman’s (1986) pedagogical content knowledge: “A second kind of content knowledge is pedagogical knowledge, which goes beyond knowledge of subject matter per se to the dimension of subject matter knowledge for teaching” (p. 9). TPACK adds an additional technology component to Shulman’s pedagogical content knowledge model. According to Mishra and Koehler (2008),

The heart of good teaching with technology are three core components: content, pedagogy & technology. Equally important are the relationships between these three components. It is the interactions, between and among these components, playing out
differently across diverse contexts, which account for the wide variations seen in educational technology integration. These three knowledge bases (content, pedagogy and technology) form the core of the TPACK framework. (p. 3)

Still, it remained curiously interesting why some instructors were interested and engaged in using technology where it was pedagogically aligned and others did not. The researcher’s graduate program coursework was unique in that it was especially inclusive and interdisciplinary. Sociological coursework provided a perspective into the underpinnings of the way individuals act, interact, and make meaning. Educational technology coursework included helpful frameworks that support careful and deliberate technology integration. These experiences, along with exposure to a dataset that measured self-efficacy, led the researcher to explore computer self-efficacy. This interest led to a self-efficacy, then a computer self-efficacy, literature search. Leveraging previously designed computer self-efficacy instruments; an opportunity to conduct a study and collect data at Middle Western University emerged. As the nuances and complexity of computer self-efficacy related to learning and technology use became evident, a survey study was designed and conducted that included closed and open-ended questions.

**Significance of the Study**

This study is significant in that it extends the current computer self-efficacy literature by utilizing an updated instrument to measure and explore computer self-efficacy of instructors and students within a university context. Previous work did not utilize these updated measures in a university setting, and did not explore both instructor and student computer self-efficacy. This information is of particular value as it has implications that can be used to inform technology
resourcing, teaching, and training programs that can serve to increase computer self-efficacy and ultimately influence technology adoption and use within a university context.

**Definitions of Terms**

*Computer self-efficacy:* “a judgment of one’s capability to use a computer. It is not concerned with what one has done in the past, but rather with judgments of what could be done in the future” (Compeau & Higgins, 1995, p. 192). The literature related to computer self-efficacy is focused specifically on utilizing a computer to perform specific job-related tasks.

*General computer self-efficacy:* a less specific form of computer self-efficacy that tends to cross over multiple computer application domains and “can be thought of as a collection of all [computer self-efficacies] accumulated over time” (Marakas, Yi, & Johnson, 1998, p. 129).

*Learning ecosystem:* An ecosystem that encompasses both the physical and virtual learning spaces; both critical components to the teaching and learning experiences and their supporting technologies.

*Self-efficacy:* “concerned with people’s beliefs in their capabilities to produce given attainments” (Bandura, 2006, p. 307).

*Technological pedagogical content knowledge (TPACK):* a framework introduced by Mishra and Koehler (2006) who, building on the work of Shulman’s (1986) pedagogical content knowledge, added a technological component.

*Technology acceptance model:* a model, introduced by Davis (1989), that suggests that technology use can be influenced by intent, by perception of utility, as well as, but to a lesser extent, by perceived ease of use (Davis, 1989).
Theory of planned behavior: a theory that suggests that performance is a function of intentions and perceived behavioral control and, further, is an evolution of the earlier theory of reasoned action. Central to this model is the concept of intention, which according to Ajzen (1991), encompasses motivational factors: “As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance” (Ajzen, 1991, p. 181).

Unified theory of acceptance and use of technology: introduced by Venkatesh Morris, Davis, & Davis (2003), within this model there are four key components: performance expectancy (improving job performance), effort expectancy (ease of use), social influence (impact of what others say about the system and how it should be used), and facilitating conditions (support) (Venkatesh et al., 2003).
CHAPTER 2 LITERATURE REVIEW

Introduction

This analysis of the literature focuses on key factors that influence technology use and adoption both in an educational and a workplace context. The literature review first explores reasons for integrating technology in a university setting and then explores self-efficacy theory, which influences motivation and persistence. The construct of self-efficacy, as introduced by Bandura (1977), is explored and examined as a model that can explain motivation and behavior. Concepts and debates related to self-efficacy are further examined within an academic context and a computer use context. The literature review also explores foundational technology adoption models introduced by Davis (1989) and Venkatesh et al. (2003), which examine the reasons a particular technology may be selected and used.

The Case for Technology Use in Higher Education

Technology has become an ever-increasing component of everyday life. Not only is technology critical for everyday functions at a university, it is key in engaging students. Students today have dramatically more choices than they did before, and students expect engagement. Prensky (2005) noted, “All the students we teach have something in their lives that’s really engaging—something that they do and that they are good at, something that has an engaging, creative component to it” (p. 60), adding that [we must] “engage them at their level” (p. 64). As a result, and in response, active, engaging student-centered technology-based learning is increasing in practice (Prince, 2004). As mentioned before, effective technology use represents a “wicked” problem (Mishra & Koehler, 2006).

In addition, the landscape within higher education is rapidly evolving and changing. College costs are dramatically increasing, and educational access for all is an increasing concern.
In fact, Kelly and Carey (2013) suggested that cost is “a complex but tractable problem” (pp. 205–206). Moreover, according to Huber (2014), “advances in technology,” “new entrepreneurial energy,” and the “new political moment” (p. 20) of angst about completion and costs have created an environment where the time is right for dramatic change and innovation.

Integrating technology into education is complex and multifaceted; Brinkerhoff (2006) identified four key factors that impact technology use within an educational setting, as follows: (a) resources, (b) institutional and administrative support, (c) training and experience, and (d) attitudinal or personality factors. Although important, resources, training, and support can be addressed by appropriate policies, creating experiences and changing attitudes can be complex.

Marakas et al. (1998) suggested that greater knowledge and understanding of computer self-efficacy allow training programs to target enhancing self-efficacy and performance: “The applied community can realize significant benefits through improved and better targeted training mechanisms and, ultimately, through improved levels of performance in individual employees or group members” (p. 127). In addition to the benefits related to practical training, a better understanding of computer self-efficacy will also be of value to the research community by allowing more accurate measurement of computer self-efficacy changes.

Implementing technology is complex. According to Bandura’s (1977) model of self-efficacy, “unless people believe they can produce desired effects by their actions, they have little incentive to act . . . Perceived self-efficacy refers to beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainment” (pp. 2–3). The impact of agency or choice to take an action has powerful implications as it is considered within the context of the changes that are being experienced as a result of technology. Bandura (2012) suggested that technology has fundamentally changed the way society acts and interacts with
technology by allowing “people to exercise greater influence in how they communicate, educate themselves, carry out their work, relate to each other, and conduct their business and daily affairs” (p. 2). It is then critically important to understand the factors that impact the way individuals perceive and utilize technology.

The Concept of Self-Efficacy

Albert Bandura’s (2006) work on self-efficacy is frequently cited. Self-efficacy, according to Bandura (2006), “is concerned with people’s beliefs in their capabilities to produce given attainments” (p. 307). Related to impacting the way individuals act, efficacy expectations impact outcome expectations, and “outcome expectancy is defined as a person’s estimate that a given behavior will lead to certain outcomes. An efficacy expectation is the conviction that one can successfully execute the behavior required to produce the outcomes” (Bandura, 1977, p. 193). Further, Bandura (2006) suggested that self-efficacy is not generic—it “is not a global trait but a differentiated set of self-beliefs linked to distinct realms of functioning” (p. 307). More specifically, Bandura (1977, p. 1) proposed a model that introduces four key factors related to self-efficacy. These factors include performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal (Figure 2.1).
Performance accomplishments: Bandura (1977) introduced self-efficacy within the context of behavior, behavioral change, and persistence in continuing tasks that are difficult. Bandura (1977) suggested that, from a cognitive standpoint, past performance experiences have a lasting impact “by being coded and retained as symbols for memory representation” (p. 192). Bandura’s (1977) theory suggests that responses are not automatically dictated by stimuli; rather,
they are “predictive cues” (p. 192). Successful experiences help to create resilience and perseverance; these experiences must also be challenging and difficult if a real sense of self-efficacy is to be constructed (Bandura, 1997).

Emotional arousal: According to Bandura (1977), self-efficacy can influence future performance by “enhancing intensity and persistence of effort.” (p. 212). Psychological states or emotional arousal refers to what Bandura (1977) related to the feelings of anxiety that an individual may feel as well as biological responses. Examples of biological responses include sweating or an increased heart rate that the body exhibits during emotional states. Bandura (1977) suggested that managing stress and anxiety response can also result in enhanced self-efficacy. In addition, according to Bandura (1993),

Most courses of action are initially shaped in thought. People’s beliefs in their efficacy influence the types of anticipatory scenarios they construct and rehearse. Those who have a high sense of efficacy visualize success scenarios that provide positive guides and supports for performance. Those who doubt their efficacy visualize failure scenarios and dwell on the many things that can go wrong. (p. 118)

Vicarious experiences: Vicarious learning or modeling provides an opportunity to increase self-efficacy through observation or simulation modeling (Bandura, 1977). The more closely perceived the model is to reality, the greater the impact success or failure will have. Just as success typically adds to self-efficacy, so can failure detract from self-efficacy?

Verbal and social persuasion: Verbal and social persuasion, according to Bandura (1977), is an emotional and physiological component: “People who are socially persuaded that they possess the capabilities to master difficult situations and are provided with provisional aids for effective action are likely to mobilize greater effort than those who receive only the performance
Verbal persuasion is most effective when the focus is on challenges that are actually possible with some work, rather than on ones that are not possible at all.

Building on these four key factors related to self-efficacy, Bandura (1977) suggested that self-efficacy is not fixed and varies based on “efficacy-altering experiences” (p. 212). Wood and Bandura (1989) argued that self-efficacy can be taught in four key ways. First, actual experiences of mastery enhance perceived ability; however if quick wins are experienced, learners come to expect quick results and can be easily discouraged. The second way in which efficacy is taught is through modeling, whereby “people partly judge their capabilities in comparison with others. Seeing similar others succeed by sustained effort raises observers’ beliefs” (Wood & Bandura, 1989, p. 365). Third, persuasion and encouragement can cause students to “be more likely to exert greater effort and to become successful than if they are troubled by self-doubts” (Wood & Bandura, 1989, p. 365). The fourth way involves an inward look to reduce stress and fatigue and to enhance physiological states to improve capability. Bandura (1977) suggested there is a social component to verbal persuasion: “People who are socially persuaded that they possess the capabilities to master difficult situations and are provided with provisional aids for effective action are likely to mobilize greater effort than those who receive only the performance aids” (p. 198).

As such, the four key factors that Bandura (1977) introduced as factors that influence self-efficacy serve as powerful elements that impact the way individuals view or perceive themselves. Each factor is a part of the composition that constructs individual self-efficacy. These factors have a powerful impact on persistence and performance.
**Extending Self-Efficacy**

Self-efficacy can fit into three key areas that are clearly identified in the literature; these areas include academic self-efficacy, computer self-efficacy, and also an exploration of the debates in the literature related to constructs of computer and general self-efficacy. When used without bounding, confidence as a general measure is not the same as self-efficacy. Instead, Bandura (1997) suggested “a self-efficacy assessment, therefore, includes both an affirmation of a capability level and the strength of that belief” (p. 382). Related to impacting the way individuals act, efficacy expectations impact outcome expectations. Self-efficacy differs from confidence in that self-efficacy is bounded by a specific task and includes a measure of the strength of confidence in performing that task. Extending self-efficacy, Compeau and Higgins (1995) and Compeau et al. (1999) measured computer self-efficacy using a similar technique. Although their study did examine confidence in using different technologies, the questions were bounded in a specific task (capability) as well as a strength tied to that, which was measured in the instrument.

**Academic Self-Efficacy**

Within the context of education, and more specifically, Bandura and Schunk (1981) found that, with children, a sense of personal self-efficacy could be developed resulting in intrinsic interest in “activities that initially held little attraction” (p. 586). More specifically, Bandura and Schunk found that setting attainable goals was key: “Children who set themselves attainable sub-goals progressed rapidly in self-directed learning” (p. 595). As such, the authors suggested that self-efficacy is not based just on past performance; it also is mediated by ongoing performances that are compared to a measured standard. Further, Bandura (1982) suggested that perceived performance rather than actual performance has been found to be a more salient
predictor of subsequent behavior. In fact, Schunk’s (1989) study suggested that, for cases in which measured cognitive skill is constant, intellectual performance is superior to cases in which perceived self-efficacy is enhanced by a supplemental program. Pintrich and De Groot (1990) similarly suggested that self-regulated learning “is closely tied to students’ efficacy beliefs about their capability to perform classroom tasks and to their beliefs that these classroom tasks are interesting and worth learning” (p. 38).

Self-efficacy also has proven to be another important factor related to both academic performance and student adjustment and retention within the university. According to Chemers, Hu, and Garcia (2001), “students who enter college with confidence in their ability to perform well academically do perform significantly better than do less confident students” (p. 61). Chemers et al. found that, in general, academic self-efficacy had a strong and positive relationship with expectations and performance: “As predicted, academic self-efficacy was significantly and directly related to academic expectations and academic performance” (p. 61). Also, academic expectations were related to performance. Students who enter college with confidence in their ability to perform well academically perform significantly better than do less confident students. Likewise, students who have higher expectations for academic success show higher performance. Further, it was suggested that confidence and perception of capacity also play a significant role:

Self-efficacy was strongly related to student perceptions of their capacities for responding to the demands of college life, and optimism also had a significant, although weaker, relationship. Confident and optimistic students were more likely to see the university experience as a challenge rather than a threat. (Chemers et al., 2001, p. 62)
Although self-efficacy is clearly mediated and constructed based on experience, there are two perspectives on intellect with which students come to identify: the fixed and growth mindsets (Yeager & Dweck, 2012). In the fixed mindset, intellect and abilities are fixed and cannot be learned; in the growth mindset, there is opportunity to grow and develop. In fact, Yeager and Dweck (2012) argued that students could be taught the growth principle.

Self-efficacy can even impact career choice, as high self-efficacy results in exploration of additional career options as well as time spent preparing in school for them (Betz, 2000). In fact, Dweck (1986) and Dweck and Legget (1988) suggested two key approaches and viewpoints students might have: an entity theory, by which intelligence is fixed, and an incremental theory, by which intelligence is malleable. These authors suggested that, for those with the fixed entity theory, the performance goal is to avoid negative consequences, whereas for those with the incremental theory, the objective is to develop competency. This scheme suggests that, in cases where there is a belief that intelligence is fixed and confidence is high, there is still a mastery-oriented behavior pattern by which individuals are highly persistent and challenges are sought. However, in cases where there is a belief that intelligence is fixed and confidence is low, individuals often feel helpless, avoid challenges, and are less likely to persist. Conversely, in cases of the growth mindset, individuals with both high and low confidence have mastery-oriented behavior patterns that are highly persistent when challenges are sought.

**Computer Self-Efficacy and General Computer Self-Efficacy**

Bandura’s (1977) concept of self-efficacy is especially relevant when working with technology. He suggested that development of self-regulatory capacity is directly dependent on self-efficacy. Specifically, he stated, “If people are not fully convinced of their personal efficacy
they rapidly abandon the skills they have been taught when they fail to get quick results or it requires bothersome effort” (Bandura, 1977, p. 733).

As computers became commercially available in the late 1980s, businesses began to purchase and use computers for day-to-day tasks. As a result, research around self-efficacy and computer usage also began to develop. Early on there was an interest in measuring how self-efficacy modifies the way individuals think about abilities and the impact that has on the way individuals act when learning about or using technology. According to Compeau and Higgins (1995),

Computer self-efficacy, then, refers to a judgment of one’s capability to use a computer. It is not concerned with what one has done in the past, but rather with judgments of what could be done in the future. Moreover, it does not refer to simple component sub skills, like formatting diskettes or entering formulas in a spreadsheet. Rather, it incorporates judgments of the ability to apply those skills to broader tasks (e.g., preparing written reports or analyzing financial data). (p. 192)

Within the literature there is some ambiguity and fragmentation between general and task-specific computer self-efficacy. In fact, according to Marakas et al. (1998), two models of computer self-efficacy exist: task specific and application specific. Marakas et al. (1998) suggested that task specific self-efficacy is most closely aligned to Bandura’s (1977) original concept of self-efficacy. General computer self-efficacy is less specific and tends to encompass multiple computer application domains. Marakas et al. (1998) suggested that general computer self-efficacy “can be thought of as a collection of all [computer self-efficacies] accumulated over time” (p. 129). As a result, general computer self-efficacy is not particularly useful for measuring short-term changes, however “its long term usefulness may be as a predictor of future
levels of general performance within the diverse domain of computer-related tasks” (p. 129). In some cases, general computer self-efficacy is also referred to as technology self-efficacy and, as the name suggests, refers to technology more generally. In fact, McDonald and Siegall (1992) defined computer self-efficacy as “the belief in one’s ability to successfully perform a technologically sophisticated new task” (p. 467).

Another important concept to consider in the existing body of work related to self-efficacy is technology self-efficacy. As mentioned above, self-efficacy has been examined within the use of specific tools and the use of technology for work tasks (Compeau & Higgins, 1995) or teaching with technology (Albion 1999). The line of inquiry related to computer self-efficacy is very valuable, but also so is a focus on overall technology use satisfaction in today’s world that transcends computers as the main form of technology used. More generic technology tasks are now related to social media and practical everyday use, as technology has become pervasive and necessary for everyday functioning in a university setting.

**Debates in Computer Self-Efficacy**

Compeau and Higgins’s (1995) study explored computer use in the workplace in using a software package to complete a specific task. This study has been widely cited and includes one of the most frequently adapted constructs to measure general computer self-efficacy (Marakas, Johnson, & Clay, 2007). However, there is some debate within the literature about the relationship between computer self-efficacy and performance, and one of the challenges of developing computer self-efficacy scales is that technology advances and changes to rapidly. As technology has become increasingly commonplace, computer self-efficacy scales have been adapted to fit particular contexts, and in some cases technology self-efficacy is used to include technologies that go beyond a traditional computer (Laver et al., 2012).
Exploring one of the other commonly used scales that is often used to measure application-specific computer self-efficacy, published by Murphy, Coover, and Owen (1989), Marakas et al. (2007) suggested that “a quick review of several of the advanced skills items contained in the Murphy et al. (1989) scale suggests many of the remaining items are highly cross-domain in nature and no longer reflect a valid measure of what would be considered to be advanced computing skills in today’s increasingly networked environment” (p. 22), as shown in below in Table 2.1.

Table 2.1
*Advanced Skills Items: Measure of Computer Self-Efficacy in Murphy et al. (1989)*

<table>
<thead>
<tr>
<th>Advanced skills items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding terms/words relating to computer hardware</td>
</tr>
<tr>
<td>Understanding terms/words relating to computer software</td>
</tr>
<tr>
<td>Describing the function of computer hardware (keyboard, monitor, disk drives, computer processing unit)</td>
</tr>
<tr>
<td>Understanding the three stages of data process: input, processing, output</td>
</tr>
<tr>
<td>Learning to use a variety of programs (software)</td>
</tr>
<tr>
<td>Troubleshooting computer problems</td>
</tr>
<tr>
<td>Writing simple programs for the computer</td>
</tr>
<tr>
<td>Getting help for problems in the computer</td>
</tr>
<tr>
<td>Using the computer to organize information</td>
</tr>
<tr>
<td>Using the computer to organize information</td>
</tr>
<tr>
<td>Using the user’s guide when help is needed.</td>
</tr>
</tbody>
</table>

Computer self-efficacy is separated into two main constructs: general computer self-efficacy and task-specific computer self-efficacy (Marakas et al., 1998). Task-specific computer self-efficacy refers to self-efficacy related to performing a specific task bounded in one domain; general computer self-efficacy crosses domains and, as opposed to task-specific, tends to accumulate over time. Clearly then, there is an incentive to develop a more general measure that
can persist over time. However, Bandura (2006) cautioned, “There is no all-purpose measure of perceived self-efficacy. The ‘one-measure-fits-all’ approach usually has limited explanatory and predictive value” (p. 307). Yet, there have been efforts to develop a more general computer self-efficacy measure. Marakas et al. (2007) suggested that one key consideration is to ensure both that computer self-efficacy measures are aligned carefully to the task and that there are no cross-domain references to other skills needed to complete the identified task.

The Compeau and Higgins (1995) scale has been used frequently within the computer self-efficacy literature. The results for some studies using this scale have not shown significant relationships between computer self-efficacy and performance (Bolt, Killough, & Koh, 2001); however a relationship between past performance and computer self-efficacy was found. Yet, Shapka and Ferrari (2003) found that there was no relationship between computer self-efficacy and prior experiences or past performances. Marakas et al. (2007) suggested that some reasons for these differences include:

1. The model under investigation may have been theoretically miss specified,
2. The subjects used may have had a high level of baseline computer self-efficacy prior to manipulation,
3. The methodology employed may not have completely captured the robustness of the phenomena under investigation, and/or
4. The constructs contained within the model may not have been adequately isolated from other related constructs in their measurement. (p. 19)

A subsequent follow-up study completed by Johnson and Marakas (2000) replicated, but also expanded, the work of Compeau and Higgins (1995). In this follow-up study, additional measures were added to capture incremental changes throughout the experiment, which allowed
prior knowledge to be controlled for. In this case it was evident that general computer self-efficacy “is focused at a more general level with little or no task or application alignment or specificity” (p. 20), whereas computer self-efficacy is focused much more at the task level.

Computer anxiety also has been shown in some studies to be tied to computer use (Compeau & Higgins, 1995; Igbaria & Iivari, 1995; Igbaria & Parasuraman, 1989). However, Fagan, Neil, and Wooldridge (2003) found the inverse, that “computer anxiety had a positive and significant relationship with usage” (p. 101). The authors suggested that one possible explanation is that more anxious students actually spend more time with computers, especially in cases when it was required that students use a computer for coursework.

Although there is tension between a generic and reusable scale versus a more task-specific scale, Bandura (2006) made it relatively clear that measures of self-efficacy do not need to be bounded to a specific task. According to Bandura (2006), the “efficacy belief system is not a global trait but a differentiated set of self-beliefs linked to distinct realms of functioning. Multi-domain measures reveal the patterning and degree of generality of people’s sense of personal efficacy” (p. 307).

**Technology Adoption Models and Computer Self-Efficacy**

Research studies have suggested that low or high self-efficacy can impact the ways in which technology is adopted (Compeau & Higgins, 1995). Similarly, the technology acceptance model suggests that adoption is driven by two key characteristics: perceived usefulness and perceived ease of use. Likewise, expectancy theory (Vroom, 1964) also suggests that individuals are motivated when there is a belief that actions result in specific outcomes.

Because technology skills are most often new skills that need to be taught, an exploration of the extant literature related to self-efficacy is useful. Albion (1999) suggested that self-
efficacy is key to the preparation of new teachers: “As community expectations for integration of information technology into the daily practices of teaching grow, it will become increasingly important that all teachers are adequately prepared for this dimension of their professional practice” (p. 4). Technology integration and effective use remains a popular topic and a continued struggle. In fact, Ertmer (2005) suggested that pedagogical beliefs might be a factor in technology use. Interestingly, Ertmer noted that pedagogical beliefs are constructed socially and in similar ways that other social beliefs are constructed. More specifically, Ertmer (2005) commented, “Because few current teachers have experienced, or even observed, the use of technology in their own K–12 schooling, they are unlikely to have many preconceived ideas about how technology should be used to achieve student learning” (p. 30).

Clearly, beliefs in and an understanding of particular pedagogical practices are of key importance, and there is a need for additional teacher support related to pedagogically centered technology integration. Zhao, Pugh, Sheldon, & Byers (2002) suggested that to integrate technology effectively “teachers need to know the affordances and constraints of various technologies and how specific technologies might support their own teaching practices and curricular goals” (p. 511). Technology integration also is dependent on situational and contextual factors, such as technology availability and support resources. Zhao et al. (2002) also noted that the way teachers are prepared and trained is seriously lacking:

The findings from this study point out serious problems with the current efforts to prepare teachers to use technology. Most of the current efforts take a very narrow view of what teachers need to use technology—some technical skills and good attitude. . . . Few pay much attention to the pedagogical or curricular connection. (p. 511)
One of the most frequently cited studies that looked at computer self-efficacy in the workplace primarily focused on the use of specific tools or use of technology for work tasks (Compeau & Higgins, 1995). Computer self-efficacy in the workplace tends to be more focused on task performance within the context of a particular job. Self-efficacy related to computers has been shown to be a powerful factor of behavioral intention (Hill et al., 1987). The construct of technology self-efficacy has developed with the goal of understanding the factors that influence technology selection and use (Compeau & Higgins, 1995). It has been shown that self-efficacy does intersect with technology (Compeau & Higgins, 1995; Compeau et al., 1999). In cases for which low efficacy exists, technology training is suggested as one possible solution (Compeau et al., 1999). As technology has become increasingly pervasive, it would be easy to conclude that concerns over low self-efficacy may be unfounded; however, studies show that efficacy still does influence use (Compeau et al., 1999). Further, individuals with high learning self-efficacy also can serve as champions during times of technology change and, in fact, are more satisfied and perform better at work in their own right (McDonald & Siegall, 1992).

Further exploring reasons for technology use, there are two models that are closely aligned. First, expectancy theory connects effort, performance, and outcomes (Vroom, 1964). More specifically, expectancy theory suggests, first, that there must be a belief that the effort will result in performance, then, that the performance will result in and outcome, and finally, that the outcome is valuable. Similarly, but more focused on technology, Davis (1989) suggested that perceptions are powerful and can have a dramatic impact on how technology is used. Davis introduced one of the first technology acceptance models, which suggests that technology use can be influenced by intent, perception of utility, as well as but to a lesser extent perceived ease of use. Davis suggested that, within the context of business productivity, there are two key
characteristics that determine technology use: perceived usefulness and perceived ease of use.

Further refining the model, Venkatesh et al. (2003) included four key characteristics, which include performance expectancy but also a social influence construct and a facilitation condition.

More recently, Venkatesh et al. (2003) evaluated and validated some of the most prominent models using a longitudinal study at four organizations and developed a new unified theory of acceptance and use of technology. The models that were evaluated included the theory of reasoned action, the technology acceptance model, the motivational model, the theory of planned behavior, a combined model that includes the theory of planned behavior and the technology acceptance model, the model of personal computer utilization, the innovation diffusion theory, and the social cognitive theory. A result of this analysis, Venkatesh et al. found four significant factors, which were developed into the unified theory of acceptance and use of technology. Within this model there are four key components: performance expectancy (improving job performance), effort expectancy (ease of use), social influence (impact of what others say about the system and how it should be used), and facilitating conditions (support). Venkatesh et al. suggested that self-efficacy is encompassed by and a part of effort expectancy. In fact, in an earlier study Venkatesh (2000) found that self-efficacy did factor into perceived ease of use, which is a component of effort expectancy.

This is a very powerful result because it suggests that long-term perceived ease of use of a specific system is strongly anchored to general beliefs about computers that are system independent and can be measured without much experience with the target system. (p. 357)

In addition to the technology adoption and technology acceptance models, TPACK is a well-established framework for technology integration that maps out ways for instructors to
integrate technology in deliberate and effective ways. This framework is relevant since it provides a structure around technology selection; if technologies are selected carefully then this has the potential to impact the perceived usefulness. According to Koehler and Mishra (2009), TPACK is the basis of effective teaching with technology, requiring an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students’ prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge to develop new epistemologies or strengthen old ones. (p. 66)

Models such as TPACK serve as frameworks to help map out technology solutions, and technology adoption and technology acceptance models explain why particular tools may be selected.

**Conclusion**

Although the Compeau and Higgins (1995) computer self-efficacy study is one of the most commonly cited works on computer self-efficacy, it is task-specific in that it asks participants if they could complete a specific task using different support resources available in a work environment. The Compeau and Higgins instrument also is focused on using computers in the workplace for workplace-related tasks. More generically, McDonald and Siegall (1992) suggest a more generic computer self-efficacy construct, which they defined as “the belief in one’s ability to successfully perform a technologically sophisticated new task” (p. 467). Although this study was published prior to the Compeau and Higgins work, it represents a more generic line of work, although still focused on self-efficacy in the workplace. An analysis and
review of the computer self-efficacy and general computer self-efficacy literature revealed that Marakas et al. (1998) suggested that, although task specific explorations have been more commonly researched, an exploration of more general computer self-efficacy constructs is also warranted. For the context of this study, self-efficacy was viewed as task specific and bounded as Bandura (1997) recommended when measuring the strength of confidence bounded in a specific defined task. This study also utilized an open-ended response section that allowed participants to write in responses from a more generic perspective how they felt about the prospect of learning a new technology.
CHAPTER 3. RESEARCH METHODS

Introduction

As discussed, there is a relative lack of literature and understanding related to computer self-efficacy, technology tool selection, and individuals’ desire to learn more about technology. The purpose of this study was to examine instructor and student computer self-efficacy related to learning about, and using computer technologies that are used within a university setting. Feelings and frustrations related to using and learning about new technologies were explored related to the use of specific support resources.

As technology becomes part of everyday life, understanding self-efficacy related to use of specific types of technologies, such as teaching and learning, entertainment, presentations, smart phones/mobile devices, as well as using the Internet to conduct research, is of increasing importance. A task specific computer self-efficacy scale modified from that of Laver et al. (2012) was used in this study. Laver et al. introduced a modified computer self-efficacy instrument that is focused on general “everyday technologies” (p. 221). Even so, the everyday tasks are bounded as recommended by Bandura (2006) in specific support resources as well as by a scale. Laver et al. (2012) modified the popular Compeau and Higgins (1995) instrument because “neither of the self-efficacy scales described above appears directly transferable to a clinical setting in their current format as their terminology refers specifically to use of a computer or the Internet for work purposes” (p. 221). More specifically the Compeau and Higgins instrument was modified to “ensure applicability to everyday technology use” (Laver et al., 2012, p. 222). This study sought to extend the work of Laver et al. (2012) by examining groups of participants that include a wider range of ages and experiences (instructors and students) and sought to provide additional insight and data related to how a participants’ self-
efficacy impacts technology use and satisfaction in a university context. Similarly to Compeau and Higgins (1995) and Compeau et al. (1999), for the context of this study, self-efficacy is viewed as bounded to specific tasks (capability) and does examine the confidence in using different technologies. As Bandura (1997) argues, self-efficacy can translate into the strength of confidence when bounded to a specific defined task.

**Research Approach**

This study used a survey methodology, which uses a sample to understand the population. This approach is effective since it is efficient in that it allows the exploration of many factors in the population through a survey instrument (Russel, 2011). A survey instrument that includes open and close-ended questions was utilized for data collection in this study. The data for this study were collected using a web-based data collection strategy utilizing Qualtrics survey software. The closed-ended self-efficacy section (12 questions) of the survey instrument was a modified self-efficacy scale that Laver et al. (2012) created. This instrument is an evolution of the Compeau and Higgins (1995) instrument, adapted by Laver et al. such that it is more applicable to everyday technology use and measures participants’ confidence in their ability to use a new technology with different support resources. The open-ended section (7 questions) allows participants to write in their own responses related to computer self-efficacy and their feelings and frustrations related to learning to use a new technology.

**Instrument for Data Collection**

This study extends the work of Compeau and Higgins (1995) and Compeau et al. (1999) and uses a modified self-efficacy measure introduced by Laver et al. (2012). This modified instrument uses an updated measure of computer self-efficacy that was designed to be more relevant to the ways in which technology is used today. Both of these instruments were
validated and published in peer-reviewed journals (Compeau & Higgins, 1995; Compeau, Higgins & Huff, 1999). The reliability of the Laver et al. instrument was checked, and it passed this scrutiny with a Cronbach’s alpha coefficient of 0.7; analyzing the instrument to ensure that removal of individual questions did not improve the coefficient. Permission was requested and granted by Laver et al. to utilize the instrument (see Appendix A for the permission letter).

The survey instrument examines instructor and student computer self-efficacy related to learning about and using different computer technologies that are utilized within a university setting. Both the instructor instrument (Appendix B) and the student instruments (Appendix C) are comprised of 19 items including demographic questions as well as 12 closed-ended and seven open-ended questions. The instructor and student versions of the instruments are very similar with only changes in wording to address differences between instructors and students. First, the student version includes an age choice for 17 years old and under as well as 18 to 24 years old as, opposed to the instructor version, for which the lowest age choice is 24 or under. Related to role, the instructor version includes two options, full time and adjunct, whereas the student version includes an option for graduate students as well as undergraduate class rank (first year, sophomore, junior, senior).

Within the computer self-efficacy section, a 0–100 self-efficacy scale with graduated increments of 10 is utilized. This scale is in alignment with what Bandura (2006) suggested: “Efficacy items should accurately reflect the construct. Self-efficacy is concerned with perceived capability. The items should be phrased in terms of can do rather than will do. Can is a judgment of capability; will is a statement of intention” (p. 308). As such, the primary self-efficacy scales were carefully adapted from the Laver et al.’s (2012) computer self-efficacy scale. As mentioned before, the computer self-efficacy scale related to using technology with
specific support resources was used with permission by the authors with this in mind and with a
specific item: “Rate your degree of confidence in using this new and unfamiliar technology by
recording a number from 0 to 100 using the scale given below: I could use the new technology”
(followed by choices; Figure 3.1).

As mentioned previously, Bandura (1997) suggested that general confidence is not the
same as self-efficacy and that to measure self-efficacy the questions should be bounded in a
specific task (capability) as well as strengths tied to that, which is measured with the instrument.
In this case, the task was using a new technology with specific support resources. Also, as was
suggested, a scale from 0 to 100 is provided for participants to select. This 10-point scale and
construction aligns to what Bandura (2006) recommended related to self-efficacy scale
construction:

Scales that use only a few steps should be avoided because they are less sensitive and less
reliable. People usually avoid the extreme positions so a scale with only a few steps may,
in actual use, shrink to one or two points. (p. 312).

**Instrument Design and Development**

Following best practice, careful instrument design was conducted (Figure 3.1). Survey
questions were refined through a careful review process. In order to develop the instrument, an
expert review was conducted with instructors, senior administration, and experts. Instructor
review included four full-time education instructors that teach at Middle Western University as
well as one adjunct instructor. Administration review included three provosts, five deans, and
two directors. The instrument was also presented to the dean’s council, which is the leadership
group on campus for review and feedback. The group reviewed the instrument and brought
suggestions for discussion at the deans council meeting. Suggestions included adding a clear
definition of the context of this study, which was defined in the introduction letter as
encompassing both the physical and virtual learning spaces and their supporting technologies. These are both critical components to the teaching and learning experiences and additions to the Laver et al. (2012) survey. At the same time, an expert review by the researcher’s doctoral committee members was conducted. An audit trail of these modifications was kept within the Qualtrics survey tool, which is another strategy to promote validity and reliability (Merriam, 2002).
Imagine you have found a new technology product that you have previously not used. You believe this product will make your life better. It doesn’t matter specifically what this technology product does, only that it is intended to make your life easier and that you have never used it before.

Rate your degree of confidence in using this new and unfamiliar technology by recording a number from 0 to 100 using the scale given below:

**I could use the new technology...**

<table>
<thead>
<tr>
<th>Not at all confident</th>
<th>Completely confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 10 20 30 40 50 60 70 80 90 100</td>
<td></td>
</tr>
</tbody>
</table>

1. If there was no one around to tell me what to do as I go
2. If I had never used a product like it before
3. If I had only the product manuals for reference
4. If I had seen someone else using it before trying it myself
5. If I could call someone for help if I got stuck
6. If someone else had helped me get started
7. If I had a lot of time to complete the job for which the product was provided
8. If I had just the built-in help facility for assistance
9. If someone showed me how to do it first
10. If I had used similar products before this one to do the same job

*Figure 3.1. Computer self-efficacy scale, sample 1.*
In addition, a review of the instrument’s questions was conducted with a class of 15 undergraduate and five graduate education students. Feedback from this group debriefing indicated that students felt empowered by being able to use the slider scale from 0–100 to indicate their self-efficacy related to different tasks. However, feedback suggested that an N/A option would be of benefit to differentiate between a participant being not at all confident and simply not using a type of technology. The result of these modifications is shown in Figure 3.2.

![Computer self-efficacy scale, sample 2.](image)

To avoid confusion and increase clarity, the context and scope of the study and survey instrument was made clear in the introductory paragraph:
The Learning Ecosystem (Teaching and Learning Technology Environment) at Middle Western University encompasses both the physical and virtual learning spaces and their supporting technologies, both critical components to teaching and learning experiences.

The purpose of this survey is to gather your thoughts and opinions about the Middle Western University Learning Ecosystem.

Further, within the survey instrument as an additional helpful reminder, the context was further clarified by defining what the survey was focused around asking: “The Learning Ecosystem includes the technology that you use for teaching, learning, outreach, engagement and other university purposes. In the subsequent sections you will be asked questions about technology within the learning ecosystem.” Care also was taken to ensure the design and layout was easy to follow and visually pleasing. The instrument utilized a layout that included Middle Western University logos and colors. Length was limited to 19 questions.

Cronbach’s alpha internal consistency checks were run for the two key self-efficacy items: self-efficacy learning to use technology and self-efficacy using technology for specific tasks (Table 3.1). The Cronbach’s alpha values indicate that there was a high level of internal consistency among instructors and students for both self-efficacy related items that examine use with specific support resources as well as using technology for specific tasks.
Table 3.1.
*Cronbach’s Alpha Internal Consistency Reliability Statistics*

<table>
<thead>
<tr>
<th>Item</th>
<th>Cronbach’s alpha</th>
<th>Number of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Self-efficacy related to using technology with specific support resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students</td>
<td>.925</td>
<td>10</td>
</tr>
<tr>
<td>Instructors</td>
<td>.943</td>
<td>10</td>
</tr>
<tr>
<td>Computer Self-efficacy using technology for specific tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students</td>
<td>.852</td>
<td>5</td>
</tr>
<tr>
<td>Instructors</td>
<td>.815</td>
<td>5</td>
</tr>
</tbody>
</table>

As result of the reviews conducted, two versions of the survey instrument were created: one that has language targeted for instructors and one that has language targeted for students. For example, the instructor’s version item 12 reads: “Think about a course you have taught where technology was used for teaching, learning, outreach or engagement. How would you rate the learning experience compared to a course where it was not used?” In comparison, the student version of the same item reads: “Think about a course where technology was used for teaching, learning, outreach, or engagement. How would you rate the learning experience compared to a course where it was not used?” These customizations were done to demonstrate that thought was put into each instrument to align it properly to each group. Care was also taken to generalize and refer to “the university” rather than referring to it by name to allow for the possibility of using the instrument at other universities.

**Survey Administration and Context of the Study**

The data for this study were collected at Middle Western University between April 16, 2014 and May 16, 2014. Middle Western university is a North Central Association of Colleges and Schools Higher Learning Commission accredited, masters-granting Carnegie Class...
University in the Midwest. The university has a traditional focus on liberal arts education but also has professional schools, including a pharmacy school, an education school, a law school, and a business school. These professional schools focus on professional practice but also integrate a liberal arts education. Although the university is well known for its liberal arts education, it is also well known for its professional programs both regionally and, in some cases, nationally.

The participants for this study included instructors and students. Institutional research indicated there were 451 instructors and 5270 students enrolled for the spring semester of 2013. The data were collected using the campus student and instructor e-mail lists. In order to increase the response rate, reminder e-mails were sent to both students and instructors throughout the study.

The overall response rate for instructors was 56.98% \((n = 257\) surveys) and for students was 12.39% \((n = 653\) surveys). Within some of the schools and colleges of the university there were a smaller number of responders. There also were a number of incomplete surveys; however, per the informed consent, these data were included in the analysis. For most of the schools within the university, the number of responders roughly aligned to school size: Arts and Sciences was the largest school on campus and had the largest number of responders: students, \(n = 226\); instructors \(n = 75\). Even with reminder e-mails, the number of responders from the law school remained relatively low: students, \(n = 23\); instructors \(n = 12\).

**Participant Demographics Data Collection**

An instructor version and student version of the survey were created in Qualtrics, a survey creation software package available at the university. Constituents on campus were engaged to coordinate timing and enhance response rate. The provost approved access to the
instructors and student e-mail lists, and the researcher met with the institutional research office to coordinate the timing to ensure it was not sent out at times when other surveys were in process. The researcher also was asked by the institutional research office to not include an incentive in the survey, as that would set a precedent and expectation for other campus-wide surveys. Through coordination with the institutional research office, the survey instrument was carefully sequenced later in the spring semester between two campus events; the time leading up to the campus celebration is relatively busy, and end of semester activity with final exam prep commences a few weeks after the celebration. Personal Qualtrics data were de-identified at entry and were stored on an encrypted, password-protected laptop. Demographic data for students and for instructors were collected, and included student age, gender, role, and school.

**Data Analysis**

For the data analysis both instructor and students were explored, comparison between groups was conducted where appropriate. Analyzing the data in this manner allowed fine examination of the tasks that are typically performed aligning to these roles: instructors teach students, and students are learning from the instructors. The quantitative data were analyzed using SPSS version 22; descriptive statistics were computed, and t-test and correlation analyses were conducted. Because it was not mandatory to respond to all of the items, numbers of responses on individual items varied; for cases in which correlation and t tests were conducted, SPSS matching algorithms were used to exclude pairs-wise list that did not match up. Syntax was saved for review and double-checking. Answers to the open-ended questions were analyzed with NVIVO 10.
Researcher’s Role and Positionality

Within the context of this study, the researcher was both an insider and an outsider. The researcher had worked at the university where the study was conducted for more than nine years and had held the roles of student, instructor, and staff member. Still, in many senses, the researcher also was an outsider, as the researcher was not currently a student at Middle Western University where the data were being collected, nor was the researcher teaching any classes. The researcher also was many years older than a traditional undergraduate, and as such, the researcher’s perspectives and life situation was different than that of a traditional undergraduate student.

The researcher was a full-time member of the senior staff within the IT office and reported to the CIO, who reports to the Vice President of Business and Administration. The researcher had been a staff member at Middle Western University for the previous nine years, the first five years in the School of Education and the last four years working centrally as the Director of Client Services. The researcher’s team is responsible for all aspects of client support services and communication including: academic technology, training, academic technology support, multimedia production, desktop computing, classrooms, and web development. In addition, the team is responsible for client support process improvement, strategic planning, budgeting, and technology roadmaps for academic and client support areas.

As a long-time employee of Middle Western University, many instructors know the researcher, and they knew about the study that was being conducted. The researcher was clear about positionality and role, both related to research as well as graduate studies. The researcher received considerable support from instructors, staff, and senior administration. In addition, the Institutional Review Board and introduction letters were clear that this work was positioned as
research to learn about technology use rather than to make management decisions at that particular institution. Given the researcher’s dual role, the researcher felt it was important to be clear that this study was focused on contributing to a body of research.

The researcher’s epistemological perspective was constructivist; the researcher’s personal experience with teaching, technology, and administration clearly demonstrated that meaning and use of technologies is constructed based on each individual’s perspective. Specifically, one dramatic change the researcher observed was when cell phones moved from single-task “dumb” devices to minicomputers at the point when the iPhone was introduced. The iPhone was not just an iPod and phone; it was also had an Internet browser. The researcher had one of these devices early on, even waiting in line to get one of the first phones in June 2007. At that time, it was a very niche device, and that was clearly evident based on the other individuals in line. It was clear there was great promise in the device, but that promise had yet to be realized by the greater society. In fact, as a professional providing support, the researcher was frequently in the position to recommend a first smart phone and then offer training and advice about the best ways to use it.

Now, most people have a smart phone that can be used to play music, browse the Internet, and run applications. The meaning of, use of, and interaction with phones have dramatically changed, as have the norms around social interaction. Widespread smart-phone adoption has even dramatically changed the shopping experience; traditional stores such as Target, Wal-Mart, and Best Buy are dealing with an entirely new phenomenon called “showrooming.” Customers visit with their smart phones that have Internet access, check out the device in the store, then check prices with their phones, and buy from the cheapest place on the Internet.
Clearly, there are many such examples, but both the 1:1 laptop rollout and smart phone introduction dramatically impacted the way that the researcher viewed the world. It is for these reasons that the researcher’s worldview, both for this study and more generally, is that reality is constructed based on individual experiences, and it changes and is interpreted based on meaning and interaction. As such, being deliberate and clear about the researcher’s individual positionality was an important component in ensuring there was rigor behind this study.

**Ethical Considerations**

As a researcher, ethical issues were of key importance and concern in this study. The name of the university where the research was conducted was not explicitly identified, and instead the pseudonym Middle Western University was used. Furthermore, the demographic section was carefully designed to ensure that individual instructors and students could not be identified. Although instructor rank would have presented an interesting set of data, in some schools the number of instructors was small enough that, if school, rank, and age were combined, it would have been potentially possibly to identify individual instructors. The survey instruments (both instructor and student versions) were classified and approved by the Institutional Review Board as exempt (Appendix D). Qualtrics was the survey tool that was utilized to collect the data. In particular, this tool allowed for easy data collection from across campus, and it also was a tool frequently used on campus by other researchers; as a result, there was a relatively high level of trust in the protection Qualtrics could provide. The researcher felt it was important for participants to be able to provide personal information and trust that their feedback was truly anonymous.

From a positionality standpoint, as a member of the senior staff in IT, and as the primary investigator sending out the study, it was important to be clear that the primary purpose of this
instrument was a study designed to contribute to a body of academic literature rather an IT survey. In the introduction letter, it was made clear that, although the data would be useful in making improvements, the research was contributing to and extending the body of literature on computer self-efficacy.

A clear informed consent section was included on the introduction page of the instrument. A promise was made to not share individual responses. Although this did limit the ability to include rich, thick descriptions, it was an important decision particularly in preventing the identification of instructors and in making them feel comfortable that they could be honest about how they felt about technology use at Middle Western University. The promise that no individual responses and only aggregate data would be shared added an additional level of protection to participants.
CHAPTER 4. RESEARCH FINDINGS

Introduction

This chapter explores the survey administration and response rate and then reports on the research findings. The research questions for this study included three main questions:

1. What is the computer self-efficacy as related to using a new technology with specific support resources?
2. What is the computer self-efficacy related to using technology to complete specific tasks?
3. What feelings are associated with the prospect of learning to use a new technology?

Within each research question there were also secondary questions, which allowed for additional depth and insight. These questions included:

1a. What is the level of interest in learning more about technology?
2a. What correlation, if any, is there between computer self-efficacy related to using a new technology with specific support resources and computer self-efficacy related to using technology to complete specific tasks?
2b. What correlation, if any, is there between the computer self-efficacy of using technology to complete specific tasks and interest in learning more about technology?
3a. What support providers are utilized when help is needed with a technology problem?
3b. What correlation, if any, is there between satisfaction with one support provider or another?

Instructor Survey Administration and Demographics

A link to the instructor version of the survey instrument was sent via e-mail to instructors on April 17, 2014 at 6:45 a.m., and two subsequent reminders were sent on April 29, 2014 at
6:37 a.m. and May 9, 2014 at 8:40 a.m. The distribution time was intentional with the goal of ensuring that the survey was as near to the top of the inbox as possible at a time when instructors would be able to complete the survey. As a staff member who had regularly interacted with the instructors, the researcher knew that instructors tended to check their e-mail in the morning as they prepared for the day, and this schedule of notices was designed to help procure a high rate of return. The median response time for the instructors was between 8:00 and 9:00 a.m., with 55 (21.4%) being completed during that time period.

In total, 257 instructors responded to the survey instrument. Due to question responses being optional some individual questions had fewer responses. With a total university population of 451 instructors during that semester, the response rate was 56.98%. As shown in Table 3.1, Arts & Sciences, the largest school on campus, had the largest number of instructors responding (n = 75); this was followed by the School of Education with 35 instructors responding, the College of Pharmacy Health Sciences with 30 instructors responding, the College of Business & Public Administration with 24 instructors responding, the School of Law with 12 instructors responding, the School of Journalism & Mass Communication with nine instructors responding, and the Library with seven instructors responding. This indicates a relatively strong response from most areas. The School of Law had a low rate of return; although some areas, such as the School of Journalism & Mass Communication and the Library, also had a low overall total number of responses, but those are smaller schools from a faculty and enrollment standpoint. Discussions with the School of Law leadership suggested that the low response rate could possibly be explained by final exam preparation, which began earlier than the rest of campus.
Table 4.1
Number and Percentage of Instructor Responses by School/Area

<table>
<thead>
<tr>
<th>University school/area</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>School of Education</td>
<td>35</td>
<td>16.99</td>
</tr>
<tr>
<td>College of Pharmacy &amp; Health Sciences</td>
<td>30</td>
<td>14.56</td>
</tr>
<tr>
<td>School of Journalism &amp; Mass Communication</td>
<td>9</td>
<td>4.37</td>
</tr>
<tr>
<td>College of Business &amp; Public Administration</td>
<td>24</td>
<td>11.65</td>
</tr>
<tr>
<td>School of Law</td>
<td>12</td>
<td>5.83</td>
</tr>
<tr>
<td>Library</td>
<td>7</td>
<td>3.40</td>
</tr>
<tr>
<td>College of Arts &amp; Sciences</td>
<td>75</td>
<td>36.41</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td>6.80</td>
</tr>
</tbody>
</table>

As a part of the survey instrument, demographic information was collected. For instructors, age was well distributed and well represented: 33 respondents were between the ages of 25 and 34 years, 69 were between the ages of 35 and 44 years, 60 were between the ages of 45 and 54 years, 40 were between the ages of 55 and 64 years, and 12 were between the ages of 65 and 74 years. There were 91 instructors who self-identified as male and 117 instructors who self-identified as female, resulting in a relatively evenly distribution of 42.3% identifying as male and 54.4% identifying as female.

**Student Survey Administration and Demographics**

A link to the student survey instrument was sent via e-mail to students on April 16, 2014 at 3:16 p.m., and a follow-up reminder was sent on April 29, 2014 at 3:43 p.m. As with the instructors, the student e-mail time was intentionally selected with the goal to ensure that the instrument was as near to the top of the inbox as possible at a time when students would be able to successfully complete the instrument. As a former student and a current staff member at the university, the researcher could easily ascertain that most day classes were completed by 4:00 p.m. and that evening graduate classes typically did not start until 5:30 p.m. As such, there was
an opportune window of time when daytime students were heading home and getting ready for
dinner but had not yet begun their evening study or recreation activities. This timing was also
ideal for graduate students; graduate students typically are employed and are usually also
heading home and getting ready for evening activities such as class. The median response time
for students was between 3:00 and 4:00 p.m. with 179 (27.41%) surveys being completed during
that time.

In total, 653 students responded to the survey instrument. Due to question responses
being optional some individual questions had fewer responses. With 5,270 students enrolled for
the spring semester, the response rate was 12.39%. As shown in Table 4.2, Arts & Sciences, the
largest school on campus had the largest number of responders with 226 students responding;
this was followed by the College of Business & Public Administration with 193 students
responding, the School of Education with 138 students responding, the College of Pharmacy
Health Sciences with 114 students responding, the School of Law with 23 students responding,
the School of Journalism & Mass Communication with 49 students responding, and the Library
with three students responding. These relative responses numbers roughly matched school or
college size with the exception of School of Law student responses. Although some areas, such
as the School of Journalism & Mass Communication and the Library also had low numbers of
responses, those are smaller schools from an enrolled student standpoint. Discussions with the
School of Law leadership suggested that, as with the instructor responses, the low student
response rate could possibly be explained by law school final exam preparation on the part of the
students.
Table 4.2

*Number and Percentage of Student Responses by School/Area*

<table>
<thead>
<tr>
<th>University school/area</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>School of Education</td>
<td>138</td>
<td>18.47</td>
</tr>
<tr>
<td>College of Pharmacy &amp; Health Sciences</td>
<td>114</td>
<td>15.26</td>
</tr>
<tr>
<td>School of Journalism &amp; Mass Communication</td>
<td>48</td>
<td>6.43</td>
</tr>
<tr>
<td>College of Business &amp; Public Administration</td>
<td>193</td>
<td>25.84</td>
</tr>
<tr>
<td>School of Law</td>
<td>23</td>
<td>3.08</td>
</tr>
<tr>
<td>Library</td>
<td>3</td>
<td>0.40</td>
</tr>
<tr>
<td>College of Arts &amp; Sciences</td>
<td>225</td>
<td>30.12</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Additional demographic information also was collected from student responders. In this study there were 494 traditional students between the ages of 18 and 24. However, there also were a fair number of nontraditional students who responded: 81 students between the ages of 25 and 34 years, 33 students between the ages of 35 and 44 years, 26 between the ages of 45 and 54 years, and eight between the ages of 55 and 64 years. There were 216 students who self-identified as male, 407 who self-identified as female students, and nine who preferred to not answer or identify a traditional gender. Related to the student role, graduate students had a strong representation with 165 total respondents; for undergraduate students, each class of students was well represented: 151 first-year students, 96 sophomores, 100 juniors, and 103 seniors.

**Major Research Findings**

The findings of this study are presented followed by the research questions as an effort to establish a clear flow of evidence by exposing the relationships between the research questions.
Research Question 1: What is the Computer Self-Efficacy as Related to Using a New Technology with Specific Support Resources?

This research question explored computer self-efficacy determining at what level of computer self-efficacy participants have related to using a new and unknown technology with specific support resources. The following instrument item was used to collect data regarding this research question:

Imagine you have found a new technology product that you have previously not used. You believe this product will make your life better. It doesn’t matter specifically what this technology product does, only that it is intended to make your life easier and that you have never used it before. Rate your degree of confidence in using this new and unfamiliar technology by recording a number from 0 (not at all confident) to 100 (completely confident) using the scale given below: I could use the new technology

1. If there was no one around to tell me what to do as I go
2. If I had never used a product like it before
3. If I had only the product manuals for reference
4. If I had seen someone else using it before trying it myself
5. If I could call someone for help if I got stuck
6. If someone else had helped me get started
7. If I had a lot of time to complete the job for which the product was provided
8. If I had just the built-in help facility for assistance
9. If someone showed me how to do it first
10. If I had used similar products before this one to do the same job

Instructors. Descriptive statistical analyses related to computer self-efficacy related to computer self-efficacy were run using SPSS 22 (Table 4.3). There was some variation in the
number of responses for each item; these missing responses are explained by the optional nature of each question in the survey instrument. All responses were given on a 100-point scale. The mean scores of the 10 possible responses related to computer self-efficacy associated with using a new and unknown technology with specific support resources are as follows. The 176 instructor responses to “if there was no one around to tell me what to do as I go” had a mean value of 64.09 ($SD = 25.46$, $Mdn = 70$). The 176 instructor responses to “if I had never used a product like it before” had a mean value of 59.03 ($SD = 26.00$, $Mdn = 60$). The 176 instructor responses to “if I only had the product manual for reference” had a mean value of 66.97 ($SD = 26.18$, $Mdn = 70$). The 175 instructor responses to “if I had seen someone else using it before trying it myself” had a mean value of 75.49 ($SD = 20.42$, $Mdn = 80$). The 175 instructor responses to “if I could call someone for help if I got stuck” had a mean value of 80.74 ($SD = 20.65$, $Mdn = 90$). The 175 instructor responses to “if someone else had helped me get started” had a mean value of 84.06 ($SD = 17.12$, $Mdn = 90$). The 175 instructor responses to “if I had a lot of time to complete the job for which the product was provided” had a mean value of 83.03 ($SD = 20.27$, $Mdn = 90$). The 174 instructor responses to “if I had just the built-in help facility for assistance” had a mean value of 69.31 ($SD = 26.98$, $Mdn = 80$). The 175 instructor responses to “if someone showed me how to do it first” had a mean value of 87.14 ($SD = 16.15$, $Mdn = 90$). The 175 instructor responses to “if I had used similar products before this one to do the same job” had a mean value of 87.14 ($SD = 14.85$, $Mdn = 90$).

Most notably, the lowest instructor scores were related to self-help indirect resources, such as using manuals and or using the built-in help features, scoring only slightly higher than the response “learning if I had never used a product like it before” (no help resources at all). Conversely, the highest instructor scores were related to direct experiences, including if someone
would show them how to do it first, if they had used similar product before this one to do the same job, and if someone else would help them get started.

Table 4.3
Computer Self-Efficacy of Instructors

<table>
<thead>
<tr>
<th>Item response</th>
<th>Number of responses</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. If there was no one around to tell me what to do as I go</td>
<td>176</td>
<td>64.09</td>
<td>70.00</td>
<td>25.46</td>
</tr>
<tr>
<td>2. If I had never used a product like it before</td>
<td>176</td>
<td>59.03</td>
<td>60.00</td>
<td>26.00</td>
</tr>
<tr>
<td>3. If I had only the product manuals for reference</td>
<td>175</td>
<td>66.97</td>
<td>70.00</td>
<td>26.18</td>
</tr>
<tr>
<td>4. If I had seen someone else using it before trying it myself</td>
<td>175</td>
<td>75.49</td>
<td>80.00</td>
<td>20.42</td>
</tr>
<tr>
<td>5. If I could call someone for help if I got stuck</td>
<td>175</td>
<td>80.74</td>
<td>90.00</td>
<td>20.65</td>
</tr>
<tr>
<td>6. If someone else had helped me get started</td>
<td>175</td>
<td>84.06</td>
<td>90.00</td>
<td>17.12</td>
</tr>
<tr>
<td>7. If I had a lot of time to complete the job for which the product was provided</td>
<td>175</td>
<td>83.03</td>
<td>90.00</td>
<td>20.27</td>
</tr>
<tr>
<td>8. If I had just the built-in help facility for assistance</td>
<td>174</td>
<td>69.31</td>
<td>80.00</td>
<td>26.98</td>
</tr>
<tr>
<td>9. If someone showed me how to do it first</td>
<td>175</td>
<td>87.14</td>
<td>90.00</td>
<td>16.15</td>
</tr>
<tr>
<td>10. If I had used similar products before this one to do the same job</td>
<td>175</td>
<td>87.14</td>
<td>90.00</td>
<td>14.85</td>
</tr>
</tbody>
</table>

**Students.** Descriptive statistical analyses related to computer self-efficacy related to using a new technology for students also were run using SPSS 22 (Table 4.4). There was some variation in the number of responses for each item; these missing responses are explained by the optional nature of each question in the survey instrument. All responses were given on a 100-point scale: 0 (not at all confident) to 100 (completely confident). The mean scores of the 10 possible responses related to computer self-efficacy associated with using a new and unknown technology with specific support resources are as follows. There were 489 student responses to
“if there was no one around to tell me what to do as I go” had a mean value of 67.81 ($SD = 24.08$, $Md = 70$). The 488 student responses to “if I had never used a product like it before” had a mean value of 58.71 ($SD = 24.87$, $Md = 60$). The 489 student responses to “if I only had the product manual for” had a mean value of 74.23 ($SD = 23.80$, $Md = 80$). The 490 student responses to “if I had seen someone else using it before trying it” had a mean value of 79.41 ($SD = 18.86$, $Md = 80$). The 490 student responses to “if I could call someone for help if I got” had a mean value of 81.47 ($SD = 20.63$, $Md = 90$). The 489 student responses to “if someone else had helped me get” had a mean value of 83.60 ($SD = 18.90$, $Md = 90$). The 489 student responses to “if I had a lot of time to complete the job for which the product was provided” had a mean value of 83.93 ($SD = 18.88$, $Md = 90$). The 488 student responses to “if I had just the built-in help facility for assistance” had a mean value of 72.11 ($SD = 24.00$, $Md = 80$). The 489 student responses to “if someone showed me how to do it first” had a mean value of 88.71 ($SD = 15.67$, $Md = 90$). The 489 student responses to “if I had used similar products before this one to do the same job” had a mean value of 88.55 ($SD = 15.40$, $Md = 90$).

The lowest student scores were related to self-help indirect resources, such as using manuals and or the built-in help feature, scoring only slightly higher than “learning if I had never used a product like it before” (no help resources at all). Conversely, the highest student scores were related to direct experiences including if someone showed them how to do it first, if they had used a similar product before this one to do the same job, and if someone else had helped them get started.
Table 4.4

Computer Self-Efficacy of Students

<table>
<thead>
<tr>
<th>Item response</th>
<th>Number of responses</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. If there was no one around to tell me what to do as I go</td>
<td>489</td>
<td>67.81</td>
<td>70.00</td>
<td>24.08</td>
</tr>
<tr>
<td>2. If I had never used a product like it before</td>
<td>488</td>
<td>58.71</td>
<td>60.00</td>
<td>24.87</td>
</tr>
<tr>
<td>3. If I had only the product manuals for reference</td>
<td>489</td>
<td>74.23</td>
<td>80.00</td>
<td>23.80</td>
</tr>
<tr>
<td>4. If I had seen someone else using it before trying it myself</td>
<td>490</td>
<td>79.41</td>
<td>80.00</td>
<td>18.86</td>
</tr>
<tr>
<td>5. If I could call someone for help if I got stuck</td>
<td>489</td>
<td>81.47</td>
<td>90.00</td>
<td>20.63</td>
</tr>
<tr>
<td>6. If someone else had helped me get started</td>
<td>489</td>
<td>83.60</td>
<td>90.00</td>
<td>18.90</td>
</tr>
<tr>
<td>7. If I had a lot of time to complete the job for which the product was provided</td>
<td>489</td>
<td>83.93</td>
<td>90.00</td>
<td>18.88</td>
</tr>
<tr>
<td>8. If I had just the built-in help facility for assistance</td>
<td>488</td>
<td>72.11</td>
<td>80.00</td>
<td>24.00</td>
</tr>
<tr>
<td>9. If someone showed me how to do it first</td>
<td>489</td>
<td>88.71</td>
<td>90.00</td>
<td>15.67</td>
</tr>
<tr>
<td>10. If I had used similar products before this one to do the same job</td>
<td>489</td>
<td>88.55</td>
<td>90.00</td>
<td>15.40</td>
</tr>
</tbody>
</table>

Statistically significant differences between instructors and students. Although instructor and student groups are reported here separately, they were using technology within the same university context. As such, an exploration of differences between each group adds depth to this study as it illuminates differences between each group at the university, as they existed at the time of the survey. Although indirect self-help resources were scored low by both instructors and students, there was much less of a gap for students; students felt more confident than instructors did using product manuals as a reference.

For the item “if I had only the product manuals for reference” (item 3) the mean for students was 74.23 ($SD = 23.80$), higher than the mean for instructors ($M = 66.97$, $SD = 26.18$).
There was a statistically significant difference between the means with the effect of role (student versus instructor), \( t(662) = 3.372, p < .001 \). These results indicate a statistically significant difference between the perceived self-efficacy of instructors and the perceived self-efficacy of the students related to using product manuals as a tool to learn to use new technology (Table 4.5).

Similarly for item 4 (if I had seen someone else using it before trying it myself), the mean for students was 79.40 (\( SD = 18.86 \)) and the mean for instructors was 75.49 (\( SD = 20.41716 \)). However, there was a statistically significant difference between the means, with the effect of role (student versus instructor), \( t(663) = 2.310, p < .05 \). These results indicate a statistically significant difference between the perceived self-efficacy of instructors and students as related to learning to use a new technology through watching someone else to use the technology (Table 4.5).

Table 4.5

<table>
<thead>
<tr>
<th>Survey item response</th>
<th>( F )</th>
<th>Sig.</th>
<th>( t )</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. If I had only the product manuals for reference</td>
<td>3.214</td>
<td>.073</td>
<td>3.372</td>
<td>662</td>
<td>.001</td>
</tr>
<tr>
<td>4. If I had seen someone else using it before trying it myself</td>
<td>2.233</td>
<td>.136</td>
<td>2.310</td>
<td>663</td>
<td>.021</td>
</tr>
</tbody>
</table>

**Research Question 1a: What is the Level of Interest in Learning more about Technology?**

This research question explored participants’ level of interest in learning about new technology. The following survey item was used to collect data regarding this research question: “Please indicate below how you feel about the following statement: In general I am interested in
learning more about technology.” Responses were structured on a Likert-type scale with response choices of strongly disagree (1), disagree (2), agree (3), strongly agree (4).

**Instructors.** A total of 176 instructors responded to this question, and descriptive statistics related to interest in learning more about technology were run using SPSS 22. Instructors indicated a strong level of interest in learning more about technology ($M = 3.37, SD = 0.655$), which relates with a response that falls between agree and strongly agree (Table 4.6).

**Students.** A total of 479 students responded to this question. Students indicated a strong level of interest in learning more about technology ($M = 3.17, SD = 0.696$), which relates with a response that falls between agree and strongly agree (Table 4.6).

<table>
<thead>
<tr>
<th>Table 4.6</th>
<th>Interest in Learning more about Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument item: In general I am interested in learning more about technology</td>
<td>Number of responses</td>
</tr>
<tr>
<td>Instructors</td>
<td>176</td>
</tr>
<tr>
<td>Students</td>
<td>479</td>
</tr>
</tbody>
</table>

**Research Question 2: What is the Computer Self-Efficacy Related to Using Technology to Complete Specific Tasks?**

This research question explored confidence in using technologies to perform specific tasks. The following instrument item was used to collect data:

Please indicate how confident you feel in your ability to use each of the following technologies. Rate your degree of confidence by recording a number from 0 (not at all confident) to 100 (completely confident) using the scale given below: I feel confident in my ability to

1. Use social media to have meaningful interaction
2. Use technology for entertainment
3. Use Internet tools to conduct research and find journal articles on a topic

4. Use technology to create an engaging presentation

5. Use new applications on my smart phone or tablet

**Instructors.** Descriptive statistical analyses related to computer self-efficacy of instructors performing specific technology were run using SPSS 22 (Table 4.7). There was some variation in the number of responses for each statement; these missing responses are explained by the optional nature of each question in the survey instrument. All responses were given on a 100-point scale. The mean scores of the responses related to how confident participants felt in their ability to use each of the five technologies are as follows. The 164 instructor responses related to computer self-efficacy associated with using social media to have meaningful interactions had a mean value of 67.32 ($SD = 30.11$, $Mdn = 70$). The 176 instructor responses related to using technology for entertainment had a mean value of 82.27 ($SD = 21.55$, $Mdn = 90$). The 176 instructor responses related to using Internet tools to conduct research and find journal articles on a topic had a mean value of 91.08 ($SD = 15.21$, $Mdn = 100$). The 177 instructor responses related to using technology to create engaging presentations had a mean value of 77.06 ($SD = 22.01$, $Mdn = 80.00$). The 160 instructor responses related to using new applications on my smart phone or tablet had a mean value of 77.31 ($SD = 24.72$, $Mdn = 90$).
Table 4.7  

*Instructor Computer Self-Efficacy Related to Using Technology to Perform Specific Tasks*

<table>
<thead>
<tr>
<th>Item responses</th>
<th>Number of responses</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use social media to have meaningful interactions</td>
<td>164</td>
<td>67.32</td>
<td>70.00</td>
<td>30.11</td>
</tr>
<tr>
<td>2. Use technology for entertainment</td>
<td>176</td>
<td>82.27</td>
<td>90.00</td>
<td>21.55</td>
</tr>
<tr>
<td>3. Use Internet tools to conduct research and find journal articles on a topic</td>
<td>176</td>
<td>91.08</td>
<td>100.00</td>
<td>15.21</td>
</tr>
<tr>
<td>4. Use technology to create an engaging presentation</td>
<td>177</td>
<td>77.06</td>
<td>80.00</td>
<td>22.01</td>
</tr>
<tr>
<td>5. Use new applications on my smart phone or tablet</td>
<td>160</td>
<td>77.31</td>
<td>90.00</td>
<td>24.72</td>
</tr>
</tbody>
</table>

**Students.** Descriptive statistical analyses related to computer self-efficacy of students performing specific technology were run using SPSS 22 (Table 4.8). There was some variation in the number of responses for each item; these missing responses are explained by the optional nature of each question in the survey instrument. All responses were given on a 100-point scale. The mean scores of the responses related to how confident participants felt in their ability to use each of the five technologies are as follows. The 451 student responses related to computer self-efficacy associated with using social media to have meaningful interactions had a mean value of 80.51 (SD = 22.92, Mdn = 90). The 463 student responses related to using technology for entertainment had a mean value of 90.30 (SD = 16.06, Mdn = 100). The 463 student responses related to using Internet tools to conduct research and find journal articles on a topic had a mean value of 87.02 (SD = 16.79, Mdn = 90). The 464 student responses related to using technology to create engaging presentations had a mean value of 83.28 (SD = 19.13, Mdn = 90). The 437 student responses related to using new applications on their smart phone or tablet had a mean value of 83.75 (SD = 21.55, Mdn = 90).
Table 4.8

**Instructor Computer Self-Efficacy Related to Using Technology to Perform Specific Tasks**

<table>
<thead>
<tr>
<th>Item responses</th>
<th>Number of responses</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use social media to have meaningful interactions</td>
<td>451</td>
<td>80.51</td>
<td>90.00</td>
<td>22.92</td>
</tr>
<tr>
<td>2. Use technology for entertainment</td>
<td>463</td>
<td>90.30</td>
<td>100.00</td>
<td>16.06</td>
</tr>
<tr>
<td>3. Use Internet tools to conduct research and find journal articles on a topic</td>
<td>463</td>
<td>87.02</td>
<td>90.00</td>
<td>16.79</td>
</tr>
<tr>
<td>4. Use technology to create an engaging presentation</td>
<td>464</td>
<td>83.28</td>
<td>90.00</td>
<td>19.13</td>
</tr>
<tr>
<td>5. Use new applications on my smart phone or tablet</td>
<td>437</td>
<td>83.7529</td>
<td>90.00</td>
<td>21.55</td>
</tr>
</tbody>
</table>

**Statistically significant differences between instructors and students.** For statements 1 through 5, there was a moderate gap between instructor and student responses. In most cases, the mean levels of confidence were higher for students; however, instructors were more confident using Internet tools to conduct research and find journal articles on a topic (Tables 4.7 and 4.8). Specifically, instructors reported a higher level of computer self-efficacy ($M = 91.08, SD = 15.21$) than did students ($M = 87.02, SD = 16.80$). The difference in the means was statistically significant; $t$-tests were conducted, $t(637) = 5.112, p < .001$ (Table 4.9).

Conversely, students felt more confident in using technology to create engaging presentations ($M = 83.28, SD = 19.13$) than did instructors ($M = 77.07, SD = 22.01$). The difference in the means also was statistically significant; $t$-tests were conducted, $t(283.088) = 3.309, p < .001$. 
Table 4.9

Independent Samples t-test of Instructor and Student Self-Efficacy Related to Using Technology to Perform Specific Tasks

<table>
<thead>
<tr>
<th>Survey item response</th>
<th>$F$</th>
<th>Sig.</th>
<th>$t$</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use social media to have meaningful interactions</td>
<td>36.229</td>
<td>.001</td>
<td>5.779</td>
<td>613</td>
<td>.000</td>
</tr>
<tr>
<td>2. Use technology for entertainment</td>
<td>30.565</td>
<td>.001</td>
<td>5.112</td>
<td>637</td>
<td>.000</td>
</tr>
<tr>
<td>3. Use Internet tools to conduct research and find journal articles on a topic</td>
<td>5.606</td>
<td>.018</td>
<td>-2.800</td>
<td>637</td>
<td>.005</td>
</tr>
<tr>
<td>4. Use technology to create an engaging presentation</td>
<td>3.854</td>
<td>.050</td>
<td>3.523</td>
<td>639</td>
<td>.000</td>
</tr>
<tr>
<td>5. Use new applications on my smart phone or tablet</td>
<td>6.880</td>
<td>.009</td>
<td>3.106</td>
<td>595</td>
<td>.002</td>
</tr>
</tbody>
</table>

The largest gap between the students and instructors responses was in using social media to have meaningful interactions, with students having a higher mean ($M = 80.51, SD = 22.92$) than instructors ($M = 67.32, SD = 30.11$). The difference in the means was statistically significant; t-tests were conducted, $t(613) = 5.779, p < .001$ (Table 4.9).

**Research Question 2a: What Correlation, if any, is there between Computer Self-Efficacy Related to Using a New Technology with Specific Support Resources and Computer Self-Efficacy Related to Using Technology to Complete Specific Tasks?**

This research question explores the correlation between computer self-efficacy related to using a new technology with specific support resources and computer self-efficacy related to using technology to complete specific tasks. The following instrument items were used to collect data regarding this research question:

Imagine you have found a new technology product that you have previously not used. You believe this product will make your life better. It doesn’t matter specifically what this technology product does, only that it is intended to make your life easier and that you
have never used it before. Rate your degree of confidence in using this new and unfamiliar technology by recording a number from 0 (not at all confident) to 100 (completely confident) using the scale given below: I could use the new technology.

1. If there was no one around to tell me what to do as I go
2. If I had never used a product like it before
3. If I had only the product manuals for reference
4. If I had seen someone else using it before trying it myself
5. If I could call someone for help if I got stuck
6. If someone else had helped me get started
7. If I had a lot of time to complete the job for which the product was provided
8. If I had just the built-in help facility for assistance
9. If someone showed me how to do it first
10. If I had used similar products before this one to do the same job

Please indicate how confident you feel in your ability to use each of the following technologies. Rate your degree of confidence by recording a number from 0 (not at all confident) to 100 (completely confident) using the scale given below: I feel confident in my ability to

1. Use social media to have meaningful interaction
2. Use technology for entertainment
3. Use Internet tools to conduct research and find journal articles on a topic
4. Use technology to create an engaging presentation
5. Use new applications on my smart phone or tablet
Spearman’s correlations were conducted, as responses for both the instructor and students groups were not normally distributed. Correlations between computer self-efficacy related to using a new technology with specific support resources and self-efficacy related to specific technology tasks were calculated. Most of the correlations were statistically significant, however they were weak correlations. Yet, there were strong correlations related to using new applications on a smart phone or tablet and learning to use new technology.

**Instructors.** For instructors, the strongest correlation was between “if I had seen someone else using it before trying it myself” and “using new applications on my smart phone or tablet,” $r(156) = .538, p < .001$. There also was a strong correlations between “if there was no one around to tell me what to do as I go” and “using new applications on my smart phone or tablet,” $r(157) = .627, p < .001$, and between “not having used a product before” and “using new applications on my smart phone or tablet,” $r(157) = .609, p < .001$ (Table 4.10).

**Students.** For students, the strongest correlation, which was moderate, was between “if I had seen someone else using it before trying it myself” and “using new applications on my smart phone or tablet,” $r(434) = .529, p < .001$. Students also felt confident in solving problems on their own, as there was a moderate correlation between “if there was no one around to tell me what to do as I go” and “using new applications on my smart phone or tablet,” $r(434) = .521, p < .001$. Likewise, there was a moderate correlation between “if I had never used a product like it before” and “using new applications on my smart phone or tablet” (Table 4.11).
Table 4.10

Instructor Correlations between Using Technology with Specific Support Resources and Using Technology to Perform Specific Tasks

<table>
<thead>
<tr>
<th>I feel confident in my ability to</th>
<th>1. If there was no one around to tell me what to do as I go</th>
<th>2. If I had never used a product like it before</th>
<th>3. If I had only the product manuals for reference</th>
<th>4. If I had seen someone else using it before trying it myself</th>
<th>5. If I could call someone for help if I got stuck</th>
<th>6. If someone else had helped me get started</th>
<th>7. If I had a lot of time to complete the job for which the product was provided</th>
<th>8. If I had just the built-in help facility for assistance</th>
<th>9. If someone showed me how to do it first</th>
<th>10. If I had used similar products before this one to do the same job</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use social media to have meaningful interactions</td>
<td>Correlation coefficient</td>
<td>.373**</td>
<td>.349**</td>
<td>.346**</td>
<td>.367**</td>
<td>.318**</td>
<td>.330**</td>
<td>.321**</td>
<td>.356**</td>
<td>.384**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>163</td>
<td>163</td>
<td>163</td>
<td>163</td>
<td>163</td>
<td>163</td>
<td>163</td>
<td>163</td>
<td>162</td>
</tr>
<tr>
<td>2. Use technology for entertainment</td>
<td>Correlation coefficient</td>
<td>.570**</td>
<td>.537**</td>
<td>.523**</td>
<td>.480**</td>
<td>.465**</td>
<td>.458**</td>
<td>.395**</td>
<td>.538**</td>
<td>.476**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>176</td>
<td>176</td>
<td>175</td>
<td>175</td>
<td>175</td>
<td>175</td>
<td>175</td>
<td>175</td>
<td>174</td>
</tr>
<tr>
<td>3. Use Internet tools to conduct research and find journal articles on a topic</td>
<td>Correlation coefficient</td>
<td>.384**</td>
<td>.380**</td>
<td>.408**</td>
<td>.324**</td>
<td>.294**</td>
<td>.309**</td>
<td>.323**</td>
<td>.324**</td>
<td>.306**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>175</td>
<td>175</td>
<td>174</td>
<td>174</td>
<td>174</td>
<td>174</td>
<td>174</td>
<td>174</td>
<td>173</td>
</tr>
<tr>
<td>4. Use technology to create an engaging presentation</td>
<td>Correlation coefficient</td>
<td>.457**</td>
<td>.467**</td>
<td>.501**</td>
<td>.413**</td>
<td>.302**</td>
<td>.364**</td>
<td>.310**</td>
<td>.325**</td>
<td>.410**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>176</td>
<td>176</td>
<td>175</td>
<td>175</td>
<td>175</td>
<td>175</td>
<td>175</td>
<td>175</td>
<td>175</td>
</tr>
<tr>
<td>5. Use new applications on my smart phone or tablet</td>
<td>Correlation coefficient</td>
<td>.627**</td>
<td>.609**</td>
<td>.513**</td>
<td>.538**</td>
<td>.408**</td>
<td>.458**</td>
<td>.471**</td>
<td>.485**</td>
<td>.470**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
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<tr>
<td></td>
<td>n</td>
<td>159</td>
<td>159</td>
<td>158</td>
<td>158</td>
<td>158</td>
<td>158</td>
<td>158</td>
<td>158</td>
<td>158</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).
<table>
<thead>
<tr>
<th>I feel confident in my ability to</th>
<th>Correlation coefficient</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use social media to have meaningful interactions</td>
<td>.337**</td>
<td>.001</td>
</tr>
<tr>
<td>2. Use technology for entertainment</td>
<td>.406**</td>
<td>.001</td>
</tr>
<tr>
<td>3. Use Internet tools to conduct research and find journal articles on a topic</td>
<td>.401**</td>
<td>.001</td>
</tr>
<tr>
<td>4. Use technology to create an engaging presentation</td>
<td>.459**</td>
<td>.001</td>
</tr>
<tr>
<td>5. Use new applications on my smart phone or tablet</td>
<td>.521**</td>
<td>.000</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).
Research Question 2b: What Correlation, if any, is there between the Computer Self-Efficacy of Using Technology to Complete Specific Tasks and Interest in Learning More About Technology?

This research question explored participants’ computer self-efficacy using technologies to perform specific tasks and interest in learning about technology. The following two instrument items were used to collect data regarding this research question: “Please indicate below how you feel about the following statement: In general I am interested in learning more about technology” and

Please indicate how confident you feel in your ability to use each of the following technologies. Rate your degree of confidence by recording a number from 0 (not at all confident) to 100 (completely confident) using the scale given below: I feel confident in my ability to

1. Use social media to have meaningful interaction
2. Use technology for entertainment
3. Use Internet tools to conduct research and find journal articles on a topic
4. Use technology to create an engaging presentation
5. Use new applications on my smart phone or tablet

Instructors. For instructors, in most cases, there was a moderate but positive correlation between their interest in learning more about technology and their confidence in their ability in the five technologies listed (Table 4.12). The one notable instance for which there was no statistically significant correlation was between instructors’ interest in learning more about technology and their confidence in their ability to use Internet tools to conduct research and find journal articles on a topic. This finding will be further explored in chapter 5. The highest correlation, although still mild, was between interest in learning more about technology and
confidence in using new applications on smart phones or tablets ($r(157) = .315$, $p < .001$) (Table 4.12).

Table 4.12

Instructor Correlations between Computer Self-Efficacy and Learning about Technology

<table>
<thead>
<tr>
<th>I feel confident in my ability to:</th>
<th>Correlation coefficient</th>
<th>Sig. (2-tailed)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use social media to have meaningful interactions</td>
<td>.237**</td>
<td>.002</td>
<td>163</td>
</tr>
<tr>
<td>2. Use technology for entertainment</td>
<td>.249**</td>
<td>.001</td>
<td>175</td>
</tr>
<tr>
<td>3. Use Internet tools to conduct research and find journal articles on a topic</td>
<td>.022</td>
<td>.778</td>
<td>175</td>
</tr>
<tr>
<td>4. Use technology to create an engaging presentation</td>
<td>.164*</td>
<td>.030</td>
<td>176</td>
</tr>
<tr>
<td>5. Use new applications on my smart phone or tablet</td>
<td>.315**</td>
<td>.001</td>
<td>159</td>
</tr>
</tbody>
</table>

Students. For students, there was a moderate but positive correlation between their interest in learning more about technology and their confidence in their ability in the five choices listed (Table 4.13). However, there was a statistically significant correlation between student interest in learning more about technology and using Internet tools to conduct research and find journal articles on a topic, $r(459) = .223$, $p < .01$. The highest correlation, although still mild, was between interest in learning more about technology and confidence in using new applications on smart phones or tablets ($r(434) = .327$, $p < .001$) and use of technology for entertainment ($r(461) = .325$, $p < .001$) (Table 4.13).
Table 4.13

Student Correlations between Computer Self-Efficacy and Learning about Technology

Please indicate below how you feel about the following statement: In general I am interested in learning more about technology.

<table>
<thead>
<tr>
<th>I feel confident in my ability to:</th>
<th>Correlation coefficient</th>
<th>Sig. (2-tailed)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use social media to have meaningful interactions</td>
<td>.164**</td>
<td>.001</td>
<td>451</td>
</tr>
<tr>
<td>2. Use technology for entertainment</td>
<td>.325**</td>
<td>.001</td>
<td>463</td>
</tr>
<tr>
<td>3. Use Internet tools to conduct research and find journal articles on a topic</td>
<td>.223**</td>
<td>.001</td>
<td>463</td>
</tr>
<tr>
<td>4. Use technology to create an engaging presentation</td>
<td>.269**</td>
<td>.001</td>
<td>464</td>
</tr>
<tr>
<td>5. Use new applications on my smart phone or tablet</td>
<td>.327**</td>
<td>.001</td>
<td>437</td>
</tr>
</tbody>
</table>

Research Question 3: What Feelings are Associated with the Prospect of Learning to Use a New Technology?

To address this research question, an open-ended prompt, which explores feelings of instructors and students related to learning about a new technology, was utilized on the survey.

The following open-ended survey item was used to collect data for this research question:

You have decided you want to learn to use a new technology tool that you have previously not used. You believe this technology will make your life better. It doesn’t matter specifically what this technology does, only that it is intended to make your life easier and that you have never used it before. As you think about learning how to use this new tool, in a few words please describe the emotions you feel.

Data were analyzed using the NVIVO 10 word search algorithm utilizing the same stop words list for both instructors and students. The NVIVO 10 word search analysis counted instructor and student direct responses including words and similar words as defined by the default stem word list within NVIVO 10. Words were sorted first by count, then by weighted
percentage. Weighted percentage includes the frequency of words related to the total percentage within each response group. The default stop word list (words that were excluded) was used in conducting the word search.

**Instructors.** For instructors, the first word that was identified was that of excitement at the prospect of learning a new technology. Within their top 10 words instructors noted five positive and five negative themes. The five positive words for instructors included excitement, curiosity, curious, easier, and optimistic. The five negative words instructors indicated included nervous, frustrated, anxious, worried, and anxiety (Table 4.14).

<table>
<thead>
<tr>
<th>Words</th>
<th>Count</th>
<th>Weighted percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excited</td>
<td>69</td>
<td>6.69</td>
</tr>
<tr>
<td>Curious</td>
<td>17</td>
<td>1.65</td>
</tr>
<tr>
<td>Nervous</td>
<td>13</td>
<td>1.26</td>
</tr>
<tr>
<td>Frustrated</td>
<td>10</td>
<td>0.97</td>
</tr>
<tr>
<td>Anxious</td>
<td>8</td>
<td>0.78</td>
</tr>
<tr>
<td>Worried</td>
<td>7</td>
<td>0.68</td>
</tr>
<tr>
<td>Curiosity</td>
<td>7</td>
<td>0.68</td>
</tr>
<tr>
<td>Easier</td>
<td>7</td>
<td>0.68</td>
</tr>
<tr>
<td>Optimistic</td>
<td>6</td>
<td>0.58</td>
</tr>
<tr>
<td>Anxiety</td>
<td>5</td>
<td>0.48</td>
</tr>
</tbody>
</table>

**Students.** For students, the first word that was identified was that of excitement at the prospect of learning a new technology. Within the top 10 words, students noted six positive and four negative feelings. The six positive words for students included excitement, curious, easier,
better, eager, and confident. The four negative emotions indicated for students include frustrated, anxious, nervous, and confused (Table 4.15).

Table 4.15  
Top 10 Student Feelings and Frustrations Related to the Prospect of Learning a New Technology

<table>
<thead>
<tr>
<th>Words</th>
<th>Count</th>
<th>Weighted percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excited</td>
<td>199</td>
<td>11.20</td>
</tr>
<tr>
<td>Frustrated</td>
<td>67</td>
<td>3.77</td>
</tr>
<tr>
<td>Easier</td>
<td>37</td>
<td>2.08</td>
</tr>
<tr>
<td>Curious</td>
<td>33</td>
<td>1.86</td>
</tr>
<tr>
<td>Anxious</td>
<td>30</td>
<td>1.69</td>
</tr>
<tr>
<td>Nervous</td>
<td>29</td>
<td>1.63</td>
</tr>
<tr>
<td>Better</td>
<td>27</td>
<td>1.52</td>
</tr>
<tr>
<td>Confused</td>
<td>24</td>
<td>1.35</td>
</tr>
<tr>
<td>Eager</td>
<td>16</td>
<td>0.90</td>
</tr>
<tr>
<td>Optimistic</td>
<td>13</td>
<td>0.73</td>
</tr>
</tbody>
</table>

**Summary.** Students indicated frustration earlier and more frequently than instructors did, suggesting that student persistence might not be as high as that of instructors. The highest weighted percentage was for “excited,” which for instructors was 6.69% and for students was 11.2%. The second highest weighted percentage for instructors was “curiosity” at 1.86%, and for students the second highest weighted percentage was that of “frustration” at 3.77%.

Secondary negative words for instructors included nervous, frustrated, anxious, and anxiety, and secondary positive emotions for instructors included curiosity, easier, and optimistic. Secondary negative words for students included anxiousness, nervousness, and confusion, and secondary positive feelings for students included easier, curious, better, eager and confident.
Research Question 3a: What Support Providers are utilized when Help is needed with a Technology Problem?

This research question explored the support resources and satisfaction of instructors and students when they encounter a technology problem. There were two instrument items related to this question, participants were first asked what support providers they utilized, then they were asked to rate only support providers which they used.

The following instrument item was used to collect data regarding survey question: “When you need assistance with technology for university work, which of the following sources do you use? Check all that apply.” Respondents could check a maximum of six listed sources and could also add a seventh source under the category “Other.”

The following survey item was used to collect data regarding this research question: Rate your satisfaction (Very dissatisfied (1); Dissatisfied (2); Satisfied (3) and Very Satisfied (4) with the technology support you receive from these sources:

1. Student
2. Instructor
3. Friend or colleague
4. Professional university IT support
5. Professional IT support (non-university)
6. Search Google, YouTube, lynda.com, etc.
7. Other (write-in option)

Instructors. As shown in Table 4.16, instructors most frequently utilized university-provided professional information technology support \((n = 156, M = 3.21, SD = .679)\), but also strongly indicated using friends or colleagues for support \((n = 111, M = 3.15, SD = .543)\). Instructors also frequently used online resources, such as searching Google, YouTube, and/or
Lynda.com (a resource that is site licensed at Middle Western University), for support ($n = 90, M = 3.07, SD = .557$). Instructors infrequently used professional (non-university) information technology support ($n = 20, M = 3.07, SD = .557$), other instructors (who were not necessarily friends or colleagues; $n = 19, M = 3.16, SD = .375$), and other students ($n = 39, M = 3.03, SD = .362$).

**Table 4.16**

*Support Provider Use and satisfaction of Instructors*

<table>
<thead>
<tr>
<th>Source of support</th>
<th>Number of responses</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>39</td>
<td>3.03</td>
<td>.362</td>
</tr>
<tr>
<td>Instructor</td>
<td>19</td>
<td>3.16</td>
<td>.375</td>
</tr>
<tr>
<td>Online resources (Google search, YouTube, lynda.com, etc.)</td>
<td>90</td>
<td>3.07</td>
<td>.557</td>
</tr>
<tr>
<td>Professional university IT support</td>
<td>156</td>
<td>3.21</td>
<td>.679</td>
</tr>
<tr>
<td>Friend or colleague</td>
<td>111</td>
<td>3.15</td>
<td>.543</td>
</tr>
<tr>
<td>Professional IT support (non-university)</td>
<td>20</td>
<td>3.05</td>
<td>.686</td>
</tr>
</tbody>
</table>

**Students**. As shown in Table 4.17, students most frequently used friends or colleagues for support ($n = 303, M = 3.10, SD = .482$), followed by other students for support ($n = 280, M = 3.07, SD = .426$). Students also frequently used online resources such as searching Google, YouTube, or Lynda.com ($n = 268, M = 3.16, SD = .548$), professional university-provided IT support ($n = 241, M = 3.25, SD = .662$), as well as instructors ($n = 211, M = 2.95, SD = .579$).
Table 4.17

*Support Provider Use and satisfaction of Students*

<table>
<thead>
<tr>
<th>Source of support</th>
<th>Number of responses</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>280</td>
<td>3.07</td>
<td>.426</td>
</tr>
<tr>
<td>Instructor</td>
<td>211</td>
<td>2.95</td>
<td>.579</td>
</tr>
<tr>
<td>Online resources (Google search, YouTube, Lynda.com, etc.)</td>
<td>268</td>
<td>3.16</td>
<td>.548</td>
</tr>
<tr>
<td>Professional university IT support</td>
<td>241</td>
<td>3.25</td>
<td>.662</td>
</tr>
<tr>
<td>Friend or colleague</td>
<td>303</td>
<td>3.10</td>
<td>.482</td>
</tr>
</tbody>
</table>

Research Question 3b: What Correlation, if any, is there Between Satisfactions with One Support Provider or Another?

This research question explored the relationship between user satisfaction and different instances of technology support. Spearman’s correlation between the indicated level of satisfaction and technology support providers was conducted because the samples were positively skewed, and as such, were not normally distributed. Due to the limited number of instructor responses, data from both students and instructors were combined for this question.

For most cases in which personal interactions were involved, support was rated higher (Table 4.18). Most notable were the strong correlations between satisfaction with instructor-provided support and students, $r(170) = .470, p < .001$, friends or colleagues $r(182) = .414, p < .001$, and professional university IT support $r(142) = .401, p < .001$. Satisfaction with online resources had mild correlations with instructors, $r(154) = .190, p < .05$, and friend- or colleague-provided support, $r(269) = .252, p < .001$. There was no statistically significant correlation between online resources and satisfaction with professional university IT support.
Table 4.18

*Correlation between Different Support Providers*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tbody>
<tr>
<td><strong>1. Student</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient</td>
<td>—</td>
<td>.470**</td>
<td>.637**</td>
<td>.107</td>
<td>.137</td>
<td>.131</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.001</td>
<td>.001</td>
<td>.129</td>
<td>.413</td>
<td>.054</td>
</tr>
<tr>
<td>n</td>
<td>319</td>
<td>172</td>
<td>253</td>
<td>203</td>
<td>38</td>
<td>216</td>
</tr>
<tr>
<td><strong>2. Instructor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient</td>
<td>.470**</td>
<td>—</td>
<td>.414**</td>
<td>.401**</td>
<td>—.187</td>
<td>.190*</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.382</td>
<td>.018</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>172</td>
<td>230</td>
<td>183</td>
<td>144</td>
<td>24</td>
<td>156</td>
</tr>
<tr>
<td><strong>3. Friend or colleague</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient</td>
<td>.637***</td>
<td>.414**</td>
<td>—</td>
<td>.114</td>
<td>—.032</td>
<td>.252**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.001</td>
<td>.064</td>
<td>.834</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>253</td>
<td>183</td>
<td>414</td>
<td>262</td>
<td>45</td>
<td>271</td>
</tr>
<tr>
<td><strong>4. Professional university IT Support</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient</td>
<td>.107</td>
<td>.401**</td>
<td>.114</td>
<td>—</td>
<td>.551**</td>
<td>.081</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.129</td>
<td>.001</td>
<td>.064</td>
<td>.001</td>
<td>.209</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>203</td>
<td>144</td>
<td>262</td>
<td>397</td>
<td>53</td>
<td>239</td>
</tr>
<tr>
<td><strong>5. Professional IT support (non-university)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient</td>
<td>.137</td>
<td>—.187</td>
<td>-.032</td>
<td>.551**</td>
<td>—</td>
<td>.290</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.413</td>
<td>.382</td>
<td>.834</td>
<td>.001</td>
<td>.051</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>38</td>
<td>24</td>
<td>45</td>
<td>53</td>
<td>61</td>
<td>46</td>
</tr>
<tr>
<td><strong>6. Online resources (search Google, YouTube, lynda.com, etc.)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation coefficient</td>
<td>.131</td>
<td>.190*</td>
<td>.252**</td>
<td>.081</td>
<td>.290</td>
<td>—</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.054</td>
<td>.018</td>
<td>.001</td>
<td>.209</td>
<td>.051</td>
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<tr>
<td>n</td>
<td>216</td>
<td>156</td>
<td>271</td>
<td>239</td>
<td>46</td>
<td>358</td>
</tr>
</tbody>
</table>

**p < .05.**

**Summary of the Research Findings**

As far as a summary of research findings, key thematic areas related to using a new technology with specific support resources, computer self-efficacy when using technology to complete specific tasks, and feelings associated with the prospect of learning to use a new technology.
Computer Self-Efficacy as Related to Using a New Technology with Specific Support Resources

Both students and instructors had high levels of computer self-efficacy related to using a new technology with specific support resources. Based on statistically significant differences, students felt more confident when using product manuals to learn about a new and unfamiliar technology than instructors did. The highest scores on computer self-efficacy were related to direct experiences, including if someone would show participants how to do it first, if they had used similar product before this one to do the same job, and if someone else would help them get started. The level of interest in learning about new technology was high on both instructors and students, alike.

When looking at the correlations between computer self-efficacy related to using a new technology with specific support resources and computer self-efficacy related to using technology to complete specific tasks, the highest correlation, although still mild, was between an interest in learning more about technology and confidence in using new applications on smart phones or tablets, for both instructors and students.

Computer Self-Efficacy and Using Technology to Complete Specific Tasks

In relation to confidence in using technologies to perform specific tasks, instructors exhibited high levels of confidence in using Internet tools to conduct research and find journal articles on a topic. Students showed high levels of confidence on using technology for entertainment. Statistically significant differences were exposed between instructors and students. Instructors expressed more confidence on using Internet tools to conduct research and find journal articles on a topic; conversely, students felt more confident in using technology to create engaging presentations. The largest gap between students and instructors was on using social media to have meaningful interactions.
There were also statistically significant correlations between learning about and using technology for specific tasks. For instructors, the highest correlation coefficient was between the use of new applications on their smart phone and tablets and if they had someone around to tell them what to do as they go. For students, the strongest correlation was between using new applications on their smart phone or tablet and if they had seen someone else using it before or trying it themselves.

Feelings Associated with the Prospect of Learning to Use a New Technology

Both instructors and students reported a high level of interest in learning more about technology and feelings of excitement. Instructors’ second most used word was “curious” while students used the word “frustrated.” Nervousness and anxiety were words shared by instructors and students. Surprisingly instructors used the word “anxiety” the least number of times while students used “optimistic.”

Technology Support Utilization

For both students and instructors, by far the first thing that participants indicated they would do when they encountered a technology problem was to troubleshoot and try to self-solve the problem. Instructors tended to more frequently utilize university-provided professional support. Both students and instructors relied relatively heavily on peers for technology support. In most cases, when personal interactions were involved support was rated higher. Most notably, there were strong correlations between satisfaction with instructor-provided support and students, friends or colleagues, and professional university IT. There was no statistically significant correlation between online resources and satisfaction with professional university IT support. Also a relatively large number of students reported using instructors for IT support, yet they were rated the lowest in terms of satisfaction.
CHAPTER 5. DISCUSSION AND CONCLUSIONS

Implementing technology in an educational context is a complex challenge. This is especially true in a university setting where instructors are hired for their subject matter expertise rather than their technology prowess. The ability to secure desired outcomes and to prevent undesired ones provides a powerful incentive for the development and exercise of personal control. The more people bring their influence to bear on events in their lives, the more they can shape them to their liking. Bandura (2012) suggested that technology has fundamentally changed the way individuals act and interact. With these challenges and pressures upon both the faculty and students, surprisingly, there have been a limited number of studies of computer-self-efficacy within a university context that focus on exploring instructor and student perspectives.

Research has suggested that low or high self-efficacy can impact the ways in which technology is adopted (Compeau & Higgins, 1995; Compeau & Higgings 1999). The technology acceptance model (Davis, 1989) suggests that adoption is driven by two key characteristics: perceived usefulness and perceived ease of use. The findings of the study suggest that there are significant differences in the ways in which instructors and students adopt and utilize technology.

The purpose of this study was to examine the instructors and students computer self-efficacy related to utilizing and learning about technology within the context of a university setting. This study provides an in-depth exploration of the ways in which instructors and students report computer self-efficacy related to using a new technology with specific support resources, computer self-efficacy in using specific technologies, and use of technology support resources.
In examining computer self-efficacy related to using a new technology with specific support resources, responses were remarkably consistent between the instructors and the students with two notable exceptions. For cases in which product manuals were used for references, students felt more confident using them to use the new technology than instructors did. For cases in which participants saw someone using the new technology before trying it, students felt more confident using a new technology in this manner than instructors did. Although this is not surprising, given that students have had the most recent experience with learning, based upon these two differences there are implications for practice that will be addressed in a later section of this chapter.

In examining computer self-efficacy related to using specific technologies, there was a fair gap found between instructors and students. Specifically related to using social media to have meaningful interactions, using technology for entertainment, using technology to create engaging presentations, and using new applications on a smart phone or tablet, students felt very confident. Conversely, instructors felt very confident using Internet tools to conduct research and find journal articles on a topic. Another interesting finding of this study is that students looked to faculty members for technology support, even though students, in many areas, reported higher computer self-efficacy than instructors did. In examining technology support use, it was found that students indicated they use instructors for technology support quite frequently while instructors relied more on professional university IT support.

**Discussion**

This section explores computer self-efficacy related to learning and using technology. Further, this section also examines the correlation between satisfaction and different types of
technology support as well as positive feelings and frustrations when learning to use a new technology.

**Computer Self-Efficacy: Using New Technology with Specific Support Resources**

Bandura (1977) suggested that self-efficacy could influence future performance as well as enhance “intensity and persistence of effort” (p. 211). In this study, both instructors and students had a strong desire to learn more about technology. In the responses to open-ended questions, the most frequently described feeling as related to learning to use a new technology was excitement, which clearly reflects a strong desire to learn more about technology. These findings would then logically suggest that the responses of instructors and students should be relatively consistent between interest in learning about technology and computer self-efficacy related to using new technology. For the most part, the responses were consistent and, as Bandura (1977) suggested, showed a connection between persistence in learning and self-efficacy. One line of research has explored self-efficacy related to learning to use technology to perform specific tasks (Compeau & Higgins, 1995, Compeau et al., 1999, Laver et al., 2012), and another line of research has explored self-efficacy related to adopting or using specific technologies (Davis, 1989; Venkatesh et al., 2003). None of these studies explored both instructor and student groups in a university context.

As a part of the computer self-efficacy section of this study, participants were asked questions about particular statements related to computer self-efficacy using specific support resources. The mean computer self-efficacy scores related to using technology were similar for most of the statements in the computer self-efficacy section of the survey. Interestingly, there were two statements for which there was a statistically significant difference: “If I had seen someone else using it before trying it myself,” and “If I had only the product manuals for reference.” One possible explanation of these differences is encompassed within Bandura’s
(1977) model of self-efficacy. Previous work (Compeau & Higgins 1995; Compeau et al., 1999; Laver et al., 2012) focused on cohesive groups and did not explore the similarities and differences between instructors and students. As such, there is merit in exploring the results by overlaying the foundational theory introduced by Bandura (1977), whose prior studies served as a foundation for this study. Students, in the course of their academic training, are provided much in the way of performance accomplishments and mastery experiences, vicarious experiences, verbal/social persuasion, and psychological stress which align to Bandura’s (1977) self-efficacy model (see Figure 2.1). The university creates a community that provides learning opportunities that align with these contexts very clearly for students as a natural part of their academic journey. Instructors do not have a formal course of study, so their context is different; technology training for instructors at Middle Western University is more focused on performance accomplishment than other more social aspects of learning.

As mentioned earlier, Bandura (1977) claimed that past performance experiences have a lasting impact. Students regularly learn from instructors and textbooks, and continued class attendance and instructor evaluation provide positive or negative enforcement, all of which have a lasting impact. Conversely, instructors also often refer to textbooks. However, in their case the use of these materials is different, as instructors tend to use books as reference material to look up content either for research or as resources for their classes and professional development. As such, it is logical to conclude that, for instructors, a textbook is retained in memory representation as a reference, whereas for students the textbook is a learning guide that takes them through the material. Further, instructors and students bring different past experiences. Students are more likely to have learned about, and used, technology in their high school and have other recent past experiences with similar technology. On the other hand, instructors may
have opportunities for learning at a conference or from a peer and the experience is less structured and not tied to a grade or specific evaluation. At best, instructors receive feedback on end-of-semester course evaluations; however at Middle Western University, course evaluations are not standardized and do not specifically measure technology use. The difference between instructor and student computer self-efficacy possibly can be explained by different past experiences and having different types of evaluation due to different types of evaluation. Further, these outcomes can be aligned with expectancy theory, which suggests that efforts need to be tied to a specific outcome (Vroom, 1964). For students, learning about technology helps enable the outcome of better grades; in the case of instructors, however, the outcome is less clear seeing as there is not a specific outcome.

Vicarious learning or modeling provides an opportunity to increase self-efficacy through observation or simulation modeling (Bandura, 1977). The more closely perceived the model is to reality, the greater the impact success or failure will have. Just as success typically adds to self-efficacy, so can failure detract from self-efficacy in modeling. Within a university context, experiential learning regularly takes place whereby students use technology that models real world experiential scenarios; for example, students are often required to work together in groups to create reports or presentations. Such projects benefit greatly by the adoption of collaborative editing and social media technologies, which make it easier for students to work together. The advantage that technology affords creates an environment where students have incentives to practice and model behavior.

Two key differences between instructor and student computer self-efficacy related to using a technology with specific support resources were that students exhibited a higher level of confidence in learning about technology from a manual as well as watching someone else show
them how to use the technology. A student’s learning environment related to computer self-efficacy is constructed differently and interpreted through different situational factors. Students regularly learn about topics through manuals and through demonstration of instructors, so they are likely to interpret their own self-efficacy related to learning about technology in similar ways that they learn about other subjects. Conversely, instructors do not regularly learn through these methods; the constructed learning environment does not regularly include others showing them how to learn particular tasks. In fact, their constructed reality is that they are the experts that are teaching others how to perform tasks. This also aligns with Zhao and Frank’s (2003) ecological model, which suggests that in a constructed environment peers may play a critical role in the ways in which teachers consider technology.

In summary, the two key differences between instructors and students self-efficacy related to using technology with specific support resources can be explained first by differences in the ways in which instructors and students experience the four factors related to self-efficacy that Bandura (1977) introduced. The findings are further supported by expectancy theory as introduced by Vroom (1964), which suggests that efforts must be tied to an outcome. Finally, the differences, which were identified, are also supported by Zhao and Frank’s (2003) ecological model that suggests the constructed environment can impact the ways in which learning about technology is perceived.

**Computer Self-Efficacy: Using Specific Technologies**

In exploring computer self-efficacy for using specific technologies, in all but one of the five measured categories: (1) Using social media to have meaningful interactions (2) Using technology for entertainment (3) Using internet tools to conduct research and find journal articles on a topic (4) Using technology to create engaging presentations (5) Using new applications on a smart phone or tablet students felt more confident than instructors did. There was also a fair gap
between instructors and students responses. In most cases, the mean levels of confidence were higher for students; however instructors were more confident using Internet tools to conduct research and find journal articles on a topic. Conversely, students felt more confident in using technology to create engaging presentations. These differences found between instructors and students were statistically significant. The largest gap between students and instructors was using social media to have meaningful interactions, and the differences were also statistically significant. Students felt more confident in using technology to create engaging presentations.

There are a few potential explanations for such a finding. First, as technology use increases, many students have spent time using presentation technologies early in their educational experience and experiencing all four of the key factors that support self-efficacy: performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal. In fact, both Bandura’s (1977) theory of self-efficacy and the technology acceptance model (Davis, 1989) support this finding. Given their role, students are much more likely as a part of their coursework to have had structured experiences that create opportunities for presentations, including performance mastery, vicarious experiences, emotional arousal, and verbal/social persuasion. Further, given these experiences and the connection to coursework students have indicated (level of perceived usefulness), students are required to, and graded on their ability to, create engaging presentations. Also, because students have a high level of computer self-efficacy, this suggests that students already have a high-perceived ease of use. In comparison, the environmental factors and interaction patterns of instructors do not create structured opportunities to experience Bandura’s (1977) four key factors (Figure 2.1). Instructors are not required, and are also not evaluated on, the ways in which they use technology to create presentations, and there is also no regular measure of performance mastery. Further, because
using technology as a part of teaching is not a formal part of faculty evaluation, either by administration or by students, there is no social persuasion to use it. Without persuasion to use technology, instructors logically have fewer opportunities for vicarious experiences using technology.

Similarly, the technology acceptance model (Davis, 1989) offers a potential explanation for why instructors feel significantly less confident using social media to have meaningful interactions. According to Davis (1989), there are two key characteristics that determine technology use: perceived usefulness and perceived ease of use. In the case of social media, given their role at the university, instructors have a different contextual use than students do, as an instructor’s role is teaching and a student’s primary role is learning. As such, perceptions about the usefulness are then clearly different for instructors and students. Combined with this study’s finding that instructors have lower self-efficacy related to using social media, which logically translates to ease of use, this can potentially explain the reasons why instructors do not have as high a level of computer self-efficacy related to using social media to have meaningful interactions.

The Compeau and Higgins (1995) study found a connection between confidence in using a new technology with specific support resources and actual use. The present study replicates this finding; for students the strongest correlation was between, “if I had seen someone else using it before trying it myself,” and, “using new applications on my smart phone or tablet,” and for instructors the strongest correlation was between “if there was no one around to tell me what to do as I go” and “use new applications on my smart phone or tablet.” There also was a similarly strong correlation for instructors between “not having used a product before” and “using new applications on my smart phone or tablet.” All of the responses were statistically significant and
moderate but positive, which suggests there is a connection between computer self-efficacy and computer self-efficacy related to specific tasks.

These findings can be used to increase computer self-efficacy and ensure that it translates from confidence in learning about technology to confidence in using technology (Bandura, 1977; Laver et al., 2012). More specifically, these findings illuminate the connection between mastery experience (confidence in using technology) and modeling. Further, it is evident that these experiences are different for instructors and students. Each student brings different experiences and, as a result, has different interpreted construction and brings a different understanding and meaning to computer self-efficacy.

**Use of Various Technology Support Providers**

In examining technology support use, students indicated that they use instructors for technology support quite frequently, as opposed to instructors asking other instructors. In spite of both a higher level of computer self-efficacy, and rating instructors the lowest in terms of support satisfaction a large number of students still indicated they used instructors for support. These findings reinforce the power of the socially constructed values, meanings, and expectations associated with the instructor role, as in spite of articulating specific frustrations; students still largely use instructors for support. An explanation for this finding is possible if one examines the roles through the typical interaction patterns of students. The typical interaction patterns between students and instructors on campus are that of learner and teacher/subject matter expert. The role of instructor is that of expert, and student role is that of learner, and interaction patterns are clearly influenced by these socially constructed roles.

When faced with the prospect of learning about a new technology, both students and instructors first felt excitement. The second emotion, however, was that of frustration for students, whereas for instructors the subsequent emotions were curiosity, then nervousness and
frustration. This gap between students and instructors is possibly explained by the performance accomplishments and mastery experience factor that Bandura (1977) introduced. More specifically, instructors spend many years in academic pursuits and training, and they are conditioned to persist even in the face of difficulty. Instructor persistence is reinforced early in academic coursework that is a part of earning an advanced degree. Thus, instructors continually are in situations where they must rise to the challenge and do what is necessary to succeed, even when there is a dramatic amount of work or unfavorable odds. This continued practice over many years requires determination and persistence if an instructor is to be successful. Success is constructed individually based on discipline-specific traditions as well as each individual’s lived and interpreted meanings (Blumer, 1969).

**Feelings about Learning to Use a New and Unknown Technology**

Compeau and Higgins (1995) and Compeau et al. (1999) suggested that computer self-efficacy can impact expectations as well as feelings and frustrations when it comes to using computers. Both instructors and students indicated a strong interest in learning more about technology, and this was support by the fact that most instructors indicated they felt excitement before any other feeling related to learning a new technology. This agrees with the connection between computer self-efficacy and expected outcomes that Compeau and Higgins (1995) and Compeau et al. (1999) introduced.

Participants were asked about learning new technology: “As you think about learning how to use this new tool, in a few words please describe the emotions you feel.” Both instructors and students indicated they first were excited; however, the second response by instructors was curiosity, in contrast with students, for whom the second most common theme was that of frustration. These findings suggest that instructors had a more positive computer self-efficacy related to the ways they use technology at the university and also had a more positive view
related to that of learning new technology. Conversely, students had a less positive self-efficacy related to the ways in which they use technology in a university setting and also tended to report frustration earlier than instructors did. These findings are consistent with what Compeau and Higgins (1995) and Compeau et al. (1999) suggested— that there is a correlation between feelings, in this case frustration, and that of computer self-efficacy. These correlations ultimately impact the outcome expectations and behaviors related to using technology.

In sum, this study found that, in exploring computer self-efficacy there were statistically significant differences between instructors and students computer self-efficacy related to using a new technology with specific support resources. The study also found differences between computer self-efficacy of instructors and students related to using specific technologies. Even though both instructors and students had similar levels of interest in learning about technology there were also differences in support provider use as well as feelings related to using new technology. The implications for practice and further research identifies areas for further exploration and study of instructor and student computer self-efficacy.

**Implications for Practice**

The intersection between the interpersonal social persuasion and emotional arousal and sociology is also especially evident. This illuminates the fact that computer self-efficacy is social rather than mechanical. As such, a detailed exploration of implications from the perspective of students, instructors, and administrators will yield implications that are grounded in each constituent's situated reality.

**Implications for Students**

Students relied most heavily on other students, friends, or colleagues, whereas instructors relied most heavily on professional IT support. More than half of the students utilized online resources for support, and students exhibited a similar willingness to troubleshoot and resolve
technology problems. Further, in the open-ended responses, students indicated first excitement at the prospect of learning a new technology tool; however their second feeling was that of frustration. The feeling of frustration represents an opportunity for practice and experimentation, given that as technology has improved, it easy to retry an activity if at first it is not successful. One way to overcome this limitation is through modeling by which students work together to try different approaches, allowing practice and development. Wood and Bandura (1989) suggested that people tend to compare themselves with each other in terms of their capabilities. Similarly, there is an opportunity to focus on learning growth rather than simply performance accomplishments; as learners grow and learn from things that do not work, failure is an opportunity to improve. In the fixed mindset, intellect and abilities are fixed and cannot be learned; in the growth mindset, there is opportunity to grow and develop. In fact, Yeager and Dweck (2012) argued that students can be taught the growth principle. The process by which students learn to redefine their intellect aligns with the symbolic interactionist perspective that the way individuals act is based on their own internalized understanding as well as the socially constructed environment. The prominent theme of frustration by students suggests there is a need and opportunity to reconstruct the learning environment into one in which students are taught to experiment and focus on growth rather than failure. This practice should help reduce frustration and replace that with another positive feeling.

**Implications for Instructors**

Somewhat surprisingly, 211 students indicated that they frequently use instructors for IT support. This, combined with the fact that 39.8% of students indicated that the learning experience was better when technology was used, indicates the importance of implementing technology in meaningful ways. Further, instructors indicated that they first felt excited, then curious, when faced with the prospect of learning a new technology. Further, most instructors
indicated they would try to troubleshoot and solve problems themselves first. This creates a strong case for continued, coordinated, and deliberate integration of technology. Further, this suggests that increased support for instructors both in terms of their teaching as well as their support skills would be of benefit. Related to specific approaches, instructors indicated the highest level of computer self-efficacy using personal learning, i.e., “if someone showed me how to do it first.” Satisfaction with support providers also reinforces this level of personal support; in most cases where personal interactions were involved support was rated higher. Most notably, there were strong correlations between satisfaction with instructor-provided support and students.

With the exception of research tasks, instructors indicated a statistically significant and relatively low level of confidence in their abilities to use social media to have meaningful interactions. However, instructors indicated confidence in their ability to learn to use technology if someone showed them how to do it first. As such, there is an opportunity for training that is targeted toward increasing self-efficacy in this area. The computer self-efficacy (Compeau & Higgins, 1995) and technology acceptance models literature (Davis, 1989) suggests that there is a connection between past experiences, perceived ease of use, and perceived utility and future technology use. Such training might focus on the ecological and socially constructed university environment creating opportunities that align with Bandura’s (1977) four components of self-efficacy (Figure 2.1). Further, including training that addresses the social components can serve to reframe each individual’s self-efficacy and perception of technology and have a positive impact on future use.

**Implications for University Administrators**

Although Bandura’s (1977) work on the four factors that impact self-efficacy is often cited in academic literature, it is rarely used as a model for IT or staff development. There is an
opportunity build experiences that will positively impact computer self-efficacy. As technology becomes an increasingly critical component at universities, it is important to design programs that address the factors that impact self-efficacy rather than just the technical skills. Traditionally, technology training has singularly focused on the completion of differing task components of computer skills. Such computer skills are only a part of the big picture (e.g., Bandura’s performance accomplishment and mastery aspect of self-efficacy), and ignoring all the other components in Bandura’s (1977) model (Figure 2.1) would be a mistake. It is key for the administration to ensure that there is support and encouragement by creating opportunities that align with the experiential components of Bandura’s (1977) self-efficacy model, which include social persuasion, emotional arousal, and vicarious experiences.

The findings of this study also illustrate the differences between the ways in which instructors and students report self-efficacy related to learning about technology, confidence in using specific technologies, and use of technology support resources. Although self-efficacy is similar in most cases, a few significant differences exist in the ways in which instructors and students exhibit confidence in learning about technology as well as their confidence in using technologies to perform specific tasks. As technology becomes increasingly important and a larger part of an instructor’s academic life, it is vital to ensure that instructors receive adequate social persuasion from the academic community to use technology. Without persuasion, instructors have incentives to use technology, and as such, they do not have opportunities for vicarious experiences or emotional arousal. In fact, without recognition and measurement by university leadership, there is no performance accomplishment component either. Instructor evaluation in the higher education academy at many institutions, including Middle Western University, focuses on publications and teaching evaluations rather than technology innovation,
social media, or community outreach. In addition, the current model of evaluation of instructors by students through course evaluation surveys does not incentivize experimentation by instructors in the realms of either technologically or pedagogically driven changes to their curriculum. Without incentives and institutional support to incorporate technology across the institution, there is little social persuasion, and as a result, there are fewer instructors experimenting. This directly impacts the opportunities for the other critical components for building self-efficacy: emotional arousal and vicarious experience. Even within this study’s dataset this is evident, as frustrations were functional, instructor classroom and computer issues, and desiring more IT support and more training. This clearly indicates there is an opportunity to first address the concerns and then develop a program to enhance the computer self-efficacy of instructors.

**Limitations of the Study**

The data for this study were collected near the end of the spring semester, and although care was taken to ensure representation of all groups by sending the instrument to the entire instructor and student e-mail lists, there are still some groups that had a relatively small number of responses. In particular, the law school had a very low sample; in my discussions with the law school academic leadership it is likely that timing played a part in this response rate, as law school final exams are scheduled earlier than the rest of campus and this study overlapped with preparation and study for these exams. In an attempt to raise the response rate for the law school, reminders were sent by the law school administration and the student body president. However, when the data were aggregated there were an adequate number of responses for representative samples given the overall number of instructors and students. Because the
research questions focused on comparing students to instructors, the smaller sample sizes within particular schools were less of an issue.

This study was conducted using responses from both instructors and students at the same institution; however one limitation that is not possible to know is what personal factors were in play when the survey instrument was being taken that might have impacted responses. Past performance can impact self-efficacy (Bandura, 1977), and although the study attempted to control for this by asking about computer self-efficacy as well as task-based self-efficacy, it is not possible to know if someone had a technology interaction shortly before this study that impacted the responses positively or negatively.

This study did not collect educational capital or grade-related data about students. Bandura (1977) reaffirmed the impact that past performance experiences have on self-efficacy, and knowing the educational background and context students bring as well as their academic performance would be useful in determining if there is any correlation between GPA and computer self-efficacy. Even so, within the context of this study it was possible to compare computer self-efficacy related to using technology with specific support resources and self-efficacy related to performing specific tasks.

**Recommendation for Future Research**

One notable but surprising finding was the positive correlation between perceptions of different IT support providers. It is intriguing to find that those who are satisfied with one support provider are also somewhat likely to be satisfied with other support providers. This was not an anticipated result, and further exploration with a larger group would be of value. It is plausible that experiences with IT support overlap in individuals’ minds, helping them to construct either a positive or negative perception based on past interactions. Just as the self-
efficacy construct is mediated by past experiences, it is plausible that self-efficacy also overlaps into and has an effect on support satisfaction; however measuring that represents a unique challenge and is another area where further work is needed.

Within each role there may even be a variance in the perception of different tasks, as instructors and students may have very different conceptions of what an engaging presentation is and, further, may even define presentation differently. Given the results of this study, there is an opportunity for a follow-up study using open-ended qualitative questions to bracket these responses. Such a study would allow participants to describe what types of presentations they typically create and, further, to define what engaging means to them. For example, participants might be asked: “Think about a presentation you recently experienced that used technology which you felt was engaging. What made that presentation engaging and why? “

Both instructors and students in this study had relatively positive self-efficacy about technology; even the lowest self-efficacy measure, namely instructors using technology to have meaningful social interactions, had a mean response of 67.37. Even for cases in which participants were asked about learning a technology when nobody was around to tell them what to do, instructors had a mean response of 64.09 and students had a mean response of 67.81. It would be useful to conduct this study with more universities to see if technology self-efficacy is similarly positive.

Most of the work surrounding computer and computer self-efficacy has focused on the performance accomplishment aspect of self-efficacy rather than the social component. Although this study did attempt to extend and mitigate this weakness by including open-ended questions in the survey instrument, the depth and detail that is possible with a survey instrument is limited.
The data also were bounded by individuals’ own self-reflection about how they use technology; this study intentionally focused on self-reporting.

Although this study addressed the computer self-efficacy of instructors and students it did not measure action. It would be valuable in future studies to measure intent to use specific technologies and compare the correlation between confidence in using and use. One logical area of possible further study is exploring what participants actually do when they really have to learn a new technology: How do they go about it, and then, how do they feel both physiologically and verbally?
REFERENCES


Albion, P. R. (1999, February–March). *Self-efficacy beliefs as an indicator of teachers’ preparedness for teaching with technology.* Paper presented at the 10th International Conference of the Society for Information Technology & Teacher Education (SITE 1999), San Antonio, TX.


APPENDIX A. PERMISSION TO USE DATA COLLECTION INSTRUMENT

Dear Ken,

Thanks for your email. Yes – of course you can use it – please just make sure that you cite the paper when publishing your results and please send me a copy of related publications.

Good luck

Kate

Greetings!

I am a doctoral student at Iowa State University (I also work in IT at University) and am focusing my dissertation work on computer self efficacy. I found your 2011 research paper Measuring technology self efficacy: reliability and construct validity of a modified computer self efficacy scale in a clinical rehabilitation setting most insightful. I am wondering if you would be willing to grant me permission to adapt and use your modified computer self efficacy scale. I plan to use it with faculty, and with students, so my hope is that my work will help extend the utility of this instrument to college students.

Once my work is complete I would of course be willing to share my results.

Thank you very much for your consideration!

lk

Ken Kass
Director, Client Services
515 271 4007
APPENDIX B: FACULTY COMPUTER SELF-EFFICACY INSTRUMENT

Q1 Greetings,

This is a study about the Learning Ecosystem. The learning ecosystem encompasses both the physical and virtual learning spaces and their supporting technologies. These are both critical components to teaching and learning experiences. The purpose of this survey is to gather your thoughts and opinions about the Learning Ecosystem. This will help us understand your views on technology and how we can improve the technology experience for students and faculty. Faculty and students are receiving this survey. You must be 18 or older to participate in this study. This study will take about 15 minutes to complete.

By answering the survey questions, you will help us understand: Your perceptions of the current state of this learning ecosystem and the support provided. The aspects of the learning ecosystem you currently use and the aspects you would like to be using.

Your responses will be kept confidential. No personal identifiable information will be linked to your responses. When we report the data, we will report aggregate responses, and no one will have access to your individual responses. You may stop answering questions at any time during the survey; incomplete survey results may be used in the data analysis.

You are encouraged to ask questions at any time during this study. For further information about the study contact xxxxxxxxxxxxx.

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, xxxxxxxxxxxxx.

Statement of Consent: Clicking continue indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document, and that your questions have been satisfactorily answered. You may
keep a copy of this form for your records. Even after signing this form, please know that you may withdraw from the study at any time. Please print a copy of this form for your records.

Q2 Please select your age group
• 24 or under
• 25-34
• 35-44
• 45-54
• 55-64
• 65-74
• 75 or older

Q3 Please indicate your Gender
1. Male
2. Female
3. Prefer not to answer
4. Other

Q4 Please indicate your role. Note: If you have multiple roles please select your primary role. Please answer the subsequent survey based on this selected role.
• Full time Faculty
• Adjunct Faculty

Q5 Please indicate your academic affiliation(s). Check all that apply.
1. School of Education
2. College of Pharmacy & Health Sciences
3. School of Journalism & Mass Communication
4. College of Business & Public Administration
5. School of Law
6. Library
7. College of Arts & Sciences
8. Other
Q6 The Learning Ecosystem includes the technology that you use for teaching, learning, outreach, engagement and other university purposes. In the subsequent sections you will be asked questions about technology within the learning ecosystem.

Q7 Think of someone else at the university who knows about how you use technology. How would that person describe your relationship with technology that you use?

Q8 Imagine you have found a new technology product that you have previously not used. You believe this product will make your life better. It doesn’t matter specifically what this technology product does, only that it is intended to make your life easier and that you have never used it before. Rate your degree of confidence in using this new and unfamiliar technology by recording a number from 0 to 100 using the scale given below: I could use the new technology...

1. _____ 1. If there was no one around to tell me what to do as I go
2. _____ 2. If I had never used a product like it before
3. _____ 3. If I had only the product manuals for reference
4. _____ 4. If I had seen someone else using it before trying it myself
5. _____ 5. If I could call someone for help if I got stuck
6. _____ 6. If someone else had helped me get started
7. _____ 7. If I had a lot of time to complete the job for which the product was provided
8. _____ 8. If I had just the built-in help facility for assistance
9. _____ 9. If someone showed me how to do it first
10. _____ 10. If I had used similar products before this one to do the same job

Q9 Please indicate below how you feel about the following statement: In general I am interested in learning more about technology.

1. Strongly Disagree
2. Disagree
3. Agree
4. Strongly Agree
Q10 You have decided you want to learn to use a new technology tool that you have previously not used. You believe this technology will make your life better. It doesn’t matter specifically what this technology does, only that it is intended to make your life easier and that you have never used it before. As you think about learning how to use this new tool, in a few words please describe the emotions you feel.

Q11 Please indicate how confident you feel in your ability use each of the following technologies. Rate your degree of confidence by recording a number from 0 to 100 using the scale given below: I feel confident in my ability to . . .

1. _____ 1. Use Social Media to have meaningful interactions
2. _____ 2. Use technology for entertainment
3. _____ 3. Use Internet tools to conduct research and find journal articles on a topic
4. _____ 4. Use technology to create an engaging presentation
5. _____ 5. Use new applications on my smart phone or tablet

Q12 Think about a course you have taught where technology was used for teaching, learning, outreach or engagement. How would you rate the learning experience compared to a course where it is not used?

1. Worse
2. About the Same
3. Better
4. No Difference

Q13 Please describe any frustration(s) you have with technology in university classrooms and/or spaces.

Q14 Please describe your satisfaction(s) with technology in university classrooms and/or spaces.

Q15 Please check the types of technologies that you currently use or would like to use.
<table>
<thead>
<tr>
<th></th>
<th>Currently use</th>
<th>Would like to use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Projector and/or other audio-visual (AV) enhancements</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>2. Presentation software applications (e.g., PowerPoint, Prezi, Keynote)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>3. Learning Management System (e.g., Blackboard LMS, Moodle)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>4. Online or digital content resources provided by others (e.g., educational publishers or open education resources)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>5. Online library resources (e.g., databases)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>6. Classroom response systems (e.g., clickers, or polling software)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>7. Collaboration tools (e.g., Smart Board, Illuminator)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>8. Online discussion groups or group assignments</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>9. Document sharing (e.g., Google docs, Dropbox)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>10. Student and community writing tools (e.g., blogs, wikis)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>11. Social networking sites (e.g., Facebook, Twitter, Google+)</td>
<td>1.</td>
<td>2.</td>
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<tr>
<td>12. Social bookmarking sites (e.g., Diigo, Reddit)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>13. Live chat rooms</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>15. Computer labs (e.g., on campus, library, or academic buildings)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>16. In-class online testing</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>17. Out-of-class online testing</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>18. Pre-recorded video (e.g., lecture capture, instructor created, Panopto, lynda.com, or youtube)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>19. Live synchronous video systems (e.g., video conference)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>20. Smart phone or mobile devices (e.g., iPhone, iPad, or Android device)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>21. Other (Please describe)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>22. Other (Please describe)</td>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>22. Other (Please describe)</td>
<td>1.</td>
<td>2.</td>
</tr>
</tbody>
</table>

Q16 Generally speaking, what is the first thing you do when you encounter problems with technology you use at the university. Please select the first thing that you would do.

1. Troubleshoot and resolve myself
2. Ask a friend or colleague for help
3. Seek professional IT support
4. Other - Please indicate ____________________

Q17 When you need assistance with technology for university work, which of the following sources do you use? Check all that apply.

1. Student
2. Instructor
3. Friend or colleague
4. Professional University IT Support
5. Professional IT support (non-university)
6. Online resources (search google, youtube, lynda.com etc.)
7. Other ____________________

Q18 Rate your satisfaction with the technology support you receive from these sources.

<table>
<thead>
<tr>
<th>Source</th>
<th>Very dissatisfied</th>
<th>Dissatisfied</th>
<th>Satisfied</th>
<th>Very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>Instructor</td>
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<td>○</td>
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<td>○</td>
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<tr>
<td>Friend or colleague</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Professional University IT Support</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Professional IT support (non University)</td>
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<tr>
<td>Online resources (search google, youtube, lynda.com etc)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Other</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Q19 Please describe any frustration(s) you have with technology that is used for teaching, learning, outreach, engagement and other university purposes.

Q20 Please describe your satisfaction(s) with technology that is used for teaching, learning, outreach, engagement and other university purposes.

Q21 Please feel free provide any additional comments you wish to share below.

Q22 Thank you for your responses. Please submit your survey by clicking on the button below.
APPENDIX C: STUDENT SELF-EFFICACY INSTRUMENT

Q1 Greetings,

This is a study about the Learning Ecosystem. The learning ecosystem encompasses both the physical and virtual learning spaces and their supporting technologies. These are both critical components to teaching and learning experiences. The purpose of this survey is to gather your thoughts and opinions about the Learning Ecosystem. This will help us understand your views on technology and how we can improve the technology experience for students and faculty. Faculty and students are receiving this survey. You must be 18 or older to participate in this study. This study will take about 15 minutes to complete.

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keep a copy of this form for your records. Even after signing this form, please know that you may withdraw from the study at any time. Please print a copy of this form for your records.

Q2 Please select your age group

1. 17 or under
2. 18-24
3. 25-34
4. 35-44
5. 45-54
6. 55-64
7. 65-74
8. 75 or older

Q3 Please indicate your Gender

1. Male
2. Female
3. Prefer not to answer
4. Other

Q4 Please indicate your role. Note: If you have multiple roles please select your primary role.

Please answer the subsequent survey based on this selected role.

1. Graduate Student
2. Undergraduate Student (First Year)
3. Undergraduate Student (Sophomore)
4. Undergraduate Student (Junior)
5. Undergraduate Student (Senior)

Q5 Please indicate your academic affiliation(s). Check all that apply.

1. School of Education
2. College of Pharmacy & Health Sciences
3. School of Journalism & Mass Communication
4. College of Business & Public Administration
Q6 The Learning Ecosystem includes the technology that you use for teaching, learning, outreach, engagement and other university purposes. In the subsequent sections you will be asked questions about technology within the learning ecosystem.

Q7 Think of someone else at the university who knows about how you use technology. How would that person describe your relationship with technology that you use?

Q8 Imagine you have found a new technology product that you have previously not used. You believe this product will make your life better. It doesn’t matter specifically what this technology product does, only that it is intended to make your life easier and that you have never used it before. Rate your degree of confidence in using this new and unfamiliar technology by recording a number from 0 to 100 using the scale given below: I could use the new technology...

1. _____ 1. If there was no one around to tell me what to do as I go
2. _____ 2. If I had never used a product like it before
3. _____ 3. If I had only the product manuals for reference
4. _____ 4. If I had seen someone else using it before trying it myself
5. _____ 5. If I could call someone for help if I got stuck
6. _____ 6. If someone else had helped me get started
7. _____ 7. If I had a lot of time to complete the job for which the product was provided
8. _____ 8. If I had just the built-in help facility for assistance
9. _____ 9. If someone showed me how to do it first
10. _____ 10. If I had used similar products before this one to do the same job
Q9 Please indicate below how you feel about the following statement: In general I am interested in learning more about technology.

1. Strongly Disagree
2. Disagree
3. Agree
4. Strongly Agree

Q10 You have decided you want to learn to use a new technology tool that you have previously not used. You believe this technology will make your life better. It doesn’t matter specifically what this technology does, only that it is intended to make your life easier and that you have never used it before. As you think about learning how to use this new tool, in a few words please describe the emotions you feel.

Q11 Please indicate how confident you feel in your ability use each of the following technologies. Rate your degree of confidence by recording a number from 0 to 100 using the scale given below: I feel confident in my ability to . . .

1. _____ 1. Use Social Media to have meaningful interactions
2. _____ 2. Use technology for entertainment
3. _____ 3. Use Internet tools to conduct research and find journal articles on a topic
4. _____ 4. Use technology to create an engaging presentation
5. _____ 5. Use new applications on my smart phone or tablet

Q12 Think about a course where technology was used for teaching, learning, outreach or engagement. How would you rate the learning experience compared to a course where it is not used?

1. Worse
2. About the Same
3. Better
4. No Difference
Q13 Please describe any frustration(s) you have with technology in university classrooms and/or spaces.

Q14 Please describe your satisfaction(s) with technology in university classrooms and/or spaces.

Q15 Please check the types of technologies that you currently use or would like to use.

<table>
<thead>
<tr>
<th>Currently use</th>
<th>Would like to use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Projector and/or other audio-visual (AV) enhancements</td>
<td>1.</td>
</tr>
<tr>
<td>2. Presentation software applications (e.g., PowerPoint, Prezi, Keynote)</td>
<td>1.</td>
</tr>
<tr>
<td>3. Learning Management System (e.g., Blackboard LMS, Moodle)</td>
<td>1.</td>
</tr>
<tr>
<td>4. Online or digital content resources provided by others (e.g., educational publishers or open education resources)</td>
<td>1.</td>
</tr>
<tr>
<td>5. Online library resources (e.g., databases)</td>
<td>1.</td>
</tr>
<tr>
<td>6. Classroom response systems (e.g., clickers, or polling software)</td>
<td>1.</td>
</tr>
<tr>
<td>7. Collaboration tools (e.g., Smart Board, Illuminator)</td>
<td>1.</td>
</tr>
<tr>
<td>8. Online discussion groups or group assignments</td>
<td>1.</td>
</tr>
<tr>
<td>9. Document sharing (e.g., Google docs, Dropbox)</td>
<td>1.</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>10. Student and community writing tools (e.g., blogs, wikis)</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>11. Social networking sites (e.g., Facebook, Twitter, Google+)</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>12. Social bookmarking sites (e.g., Diigo, Reddit)</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>13. Live chat rooms</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>15. Computer labs (e.g., on campus, library, or academic buildings)</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>16. In-class online testing</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>17. Out-of-class online testing</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>18. Pre-recorded video (e.g. lecture capture, instructor created, Panopto, lynda.com, or youtube)</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>19. Live synchronous video systems (e.g., video conference)</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>20. Smart phone or mobile devices (e.g., iPhone, iPad, or Android device)</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>21. Other (Please describe)</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>22. Other (Please describe)</strong></td>
<td>1.</td>
</tr>
<tr>
<td><strong>22. Other (Please describe)</strong></td>
<td>1.</td>
</tr>
</tbody>
</table>
Q16 Generally speaking, what is the first thing you do when you encounter problems with technology you use at the university. Please select the first thing that you would do.

1. Troubleshoot and resolve myself
2. Ask a friend or colleague for help
3. Seek professional IT support
4. Other - Please indicate ____________________

Q17 When you need assistance with technology for university work, which of the following sources do you use? Check all that apply.

1. Student
2. Instructor
3. Friend or colleague
4. Professional University IT Support
5. Professional IT support (non-university)
6. Online resources (search google, youtube, lynda.com etc.)
7. Other ____________________

Q18 Rate your satisfaction with the technology support you receive from these sources.

<table>
<thead>
<tr>
<th>Rate your satisfaction with the technology support you receive from these sources.</th>
<th>Very dissatisfied</th>
<th>Dissatisfied</th>
<th>Satisfied</th>
<th>Very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Instructor</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Friend or colleague</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Professional University IT Support</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Professional IT support (non-university)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Online resources (search google, youtube, lynda.com etc.)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Other</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Q19 Please describe any frustration(s) you have with technology that is used for teaching, learning, outreach, engagement and other university purposes
Q20 Please describe your satisfaction(s) with technology that is used for teaching, learning, outreach, engagement and other university purposes.

Q21 Please feel free provide any additional comments you wish to share below.

Q22 Thank you for your responses. Please submit your survey by clicking on the button below.
APPENDIX D. INSTITUTIONAL REVIEW BOARD APPROVAL

Date: December 11, 2013
From: [Redacted], IRB Coordinator
To: Ken Kass
Re: 2013-14033

Your Exempt application for research titled “Learning Ecosystem Survey” has been reviewed and, as proposed, meets exempt criteria.

However, if any material changes are made to the protocol, informed consent, or other study-related processes after approval, the IRB must be notified.

Please feel free to contact me if you have any questions.

[Redacted]
IRB Coordinator

Name of Institution or Organization Providing IRB Review (Institution/Organization A): [Redacted]

IRB Registration #: ___IRB00005929___ Federalwide Assurance (FWA) #, if any: ___FWA00011321___

Name of Institution Relying on the Designated IRB (Institution B): Iowa State University

FWA #: 00002678

The Officials signing below agree that Iowa State University may rely on the designated IRB for review and continuing oversight of its human subjects research described below: (check one)

(_____) This agreement applies to all human subjects research covered by Institution B’s FWA.

(XX) This agreement is limited to the following specific protocol(s):

Name of Research Project: Learning Ecosystem Survey
Name of Principal Investigator: Ken Kass
Sponsor or Funding Agency: N/A Award Number, if any: N/A

(____) Other (describe): [Blank]

The review performed by the designated IRB will meet the human subject protection requirements of Institution B’s OHRP-approved FWA. The IRB at Institution/Organization A will follow written procedures for reporting its findings and actions to appropriate officials at Institution B. Relevant minutes of IRB meetings will be made available to Institution B upon request. Institution B remains responsible for ensuring compliance with the IRB’s determinations and with the Terms of its OHRP-approved FWA. This document must be kept on file by both parties and provided to OHRP upon request.

Signature of Signatory Official (Institution/Organization A): [Redacted] Date: 3/15/2014
Print Full Name: [Redacted] Institutional Title: [Redacted]

Signature of Signatory Official (Institution B): [Redacted] Date: 3/19/2014
Print Full Name: [Redacted] Institutional Title: Interim Director, Office for Responsible Research and IRB Co-Chair