RAPID E-LEARNING SIMULATION TRAINING AND USER RESPONSE

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A new trend in e-learning development is to have subject matter experts use rapid development tools to create training simulations. This type of training is called rapid e-learning simulation training. Though companies are using rapid development tools to create training quickly and cost effectively, there is little empirical research to indicate whether training created in this manner meets the needs of learners. The purpose of this study was to compare user responses to rapid e-learning simulation training to user responses receiving instructor-led training.

The target population for this study was employees of a medium size private company in North America. Employees were divided into two groups and either received instructor-led training (comparison group) or received rapid e-learning simulation training (experimental group). The instrument used to measure user response was an adaptation of the technology acceptance model. Three variables were measured: training satisfaction, perceived ease of use, and perceived usefulness.

Though no statistical significance was found between the two groups for training satisfaction and perceived usefulness, perceived ease of use was found to be statistically significant. Overall results fail to demonstrate the superiority of rapid e-learning simulation training over instructor-led training; however, this study indicates that rapid e-learning simulation training may be a viable substitute for classroom instruction based on user response.
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Now, our God, we give you thanks, and praise your glorious name.

- 1 Chronicles 29:13
# TABLE OF CONTENTS

ACKNOWLEDGEMENTS........................................................................................................ iii

LIST OF TABLES ................................................................................................................ vii

CHAPTER 1: INTRODUCTION .............................................................................................. 1

Need for Study ..................................................................................................................... 1

Theoretical Framework ...................................................................................................... 4

Purpose of the Study ......................................................................................................... 5

Research Questions and Hypotheses .............................................................................. 5

Limitations .......................................................................................................................... 6

Delimitations ...................................................................................................................... 7

Definitions of Terms ......................................................................................................... 7

Summary ............................................................................................................................. 8

CHAPTER 2: LITERATURE REVIEW .................................................................................. 9

Andragogical Principles and E-learning Simulation ...................................................... 9

The Importance of User Response .................................................................................. 12

Rapid E-learning and Simulation Training .................................................................. 14

Summary .......................................................................................................................... 16

CHAPTER 3: METHODS AND PROCEDURES ............................................................... 17

Research Design .............................................................................................................. 17

Population ......................................................................................................................... 18

Sample and Power Analysis .......................................................................................... 18
<table>
<thead>
<tr>
<th>Chapter and Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrumentation</td>
<td>19</td>
</tr>
<tr>
<td>Data Collection Procedures</td>
<td>20</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>21</td>
</tr>
<tr>
<td>Summary</td>
<td>22</td>
</tr>
<tr>
<td>CHAPTER 4: FINDINGS</td>
<td>23</td>
</tr>
<tr>
<td>Overview</td>
<td>23</td>
</tr>
<tr>
<td>Descriptive Statistics and Statistical Assumptions</td>
<td>23</td>
</tr>
<tr>
<td>Data Analyses</td>
<td>27</td>
</tr>
<tr>
<td>Summary</td>
<td>29</td>
</tr>
<tr>
<td>CHAPTER 5: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS</td>
<td>30</td>
</tr>
<tr>
<td>Overview</td>
<td>30</td>
</tr>
<tr>
<td>Synthesis of Findings</td>
<td>30</td>
</tr>
<tr>
<td>Conclusions</td>
<td>31</td>
</tr>
<tr>
<td>Implications and Recommendations</td>
<td>34</td>
</tr>
<tr>
<td>Summary</td>
<td>36</td>
</tr>
<tr>
<td>APPENDIX: SURVEY INSTRUMENT</td>
<td>37</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>39</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 1. Research Design per Group ................................................................................. 17

Table 2. Kurtosis and Skew per Group per Variable ............................................................ 24

Table 3. Mean Scores per Group per Variable .................................................................... 25

Table 4. Levene’s Test for Equality of Variance ................................................................. 27

Table 5. Independent t-Test Results .................................................................................... 27
CHAPTER 1
INTRODUCTION

Companies are increasingly using rapid development tools to quickly create internal training for their employees. These rapid development tools not only provide for quick creation of training, but they also have the ability to create simulation training using screen capturing techniques. With a rapid development tool, even novice users are able to create a computer simulation of tasks being performed on the computer which may then be turned into training. There are several reported benefits of using computer simulations as a part of training; however, existing studies of simulation training often depend on outsourced, or professionally produced, simulations.

This study examined the user response to simulation training that was not produced by professionals. Instead, production was performed in-house by internal staff using a rapid development tool. This type of training is called rapid e-learning simulation training. This chapter explains the need for the study. Additionally, this section provides a theoretical framework for rapid e-learning development, the purpose of the study, the research hypothesis, and the limitations and delimitations which formed the basis of this study.

Need for Study

In 2009, it is estimated that $20 billion was spent on e-learning and that this figure could possibly double by 2012 (Garavan, Carbery, O'Malley, & O'Donnell, 2010). Results from the American Society for Training and Development (ASTD) 2009 State of the Industry report indicated that though the use of self-paced e-learning was even with the previous year, outsourcing to training vendors continued to decline. In contrast, the increase in efficiency and
responsibility of learning department staff has grown (ASTD, 2009). Additionally, nearly half of the participants in the ASTD survey indicated that their organizations should use technology-based simulations “to a high or very high extent” (ASTD, 2009, p. 28).

The economic impact on training is also noted in ASTD’s T+D magazine. According to ASTD, there are “several low-cost options for training and development, such as mentoring, online classes, and peer-to-peer learning” (Nancherla, 2009, p. 18). New, less-expensive methods of e-learning are being sought, while classroom training is being cut (Anonymous, 2009). In a separate study of 300 organizations, a breakdown is given of the specific technologies within e-learning that are growing. According to Overton (2008), the top five technologies that are increasing in use include podcasting, rapid development, video conferencing, virtual classroom, and blogs/wikis.

It is estimated that “rapid development,” also known as “rapid e-learning,” may grow to encompass 50% of all e-learning produced (Unneberg, 2007). Rapid e-learning occurs when the creation of e-learning content is done by subject matter experts (SMEs) who are not trained in e-learning production (Alcock, 2008). The use of rapid e-learning authoring tools allows subject matter experts and trainers to create customized web-based training quickly and cost-effectively (Walters, 2009). Though faster development has been a long-standing desire for corporations, new rapid authoring tools are now what make rapid e-learning possible (Elearnity Limited, 2010). The quick turn-around of training materials is a driving force in the adoption of rapid e-learning use within corporations (Walters, 2009).

Rapid development has been listed as the top major trend in the learning industry, with simulation training created using rapid authoring tools at the number four spot (Chapman, 2008). In fact, the use of simulations in training is estimated to double in use by 2010 (Overton, 2008).
Simulations in training has several potential benefits and has been used throughout U.S. academia and industry; however, until recently companies often found custom simulation creation costly to produce and time consuming (Bell, Kanar, & Kozlowski, 2008). The increase in use of simulations in training may be due in part to the ability to generate simulations using rapid e-learning authoring tools, such as Macromedia Captivate (Chapman, 2008). However, with the recent advances in rapid e-learning authoring tools, companies are now able to create in-house training simulations using little or no budget (Ward, 2007).

E-learning simulation training is of interest to organizations because simulations allow trainees to solve real-world problems, and it provides an opportunity to explore newly acquired skills without risk (Slotte & Herbert, 2008). E-learning training using simulations can improve workplace efficiency while increasing knowledge and skill (Rhude, 2009). It has been linked to improved recruitment (Polimeni, Burke, & Benyaminy, 2009), increased performance and competence (McElroy & Pan, 2009), and an improvement in work levels (Murthy, Challagalla, Vincent, and Shervani, 2008).

Existing research regarding e-learning simulations training primarily pertains to outsourced training material. Studies within corporate settings often utilize “state-of-the-art” simulation software from acclaimed simulation training software firms (Murthy, Challagalla, Vincent, & Shervani’s, 2008; Slotte & Herbert, 2008). Research relating to e-learning simulation training from rapid e-learning authoring tools is very limited.

With the trend toward in-house training departments creating e-learning simulation training using rapid e-learning authoring tools, research is needed to validate how users respond to rapid e-learning simulations. Research indicates that trainees’ perception of the usefulness of
training have been linked to training transfer (Hutchins, 2009), and their satisfaction is linked to better learning achievement (Womble, 2008).

This study will inform researchers and practitioners of user response to e-learning simulation training produced by rapid e-learning tools. By having in-house staff record screen captures, using a rapid development tool, professional production of simulation development has been eliminated. User response post training therefore is more reflective of the current trends in simulation production than previous studies that rely on professionally produced simulation training.

Theoretical Framework

The theoretical framework for this study is grounded in the adult learning theory. Specifically, adult learning may be traced to Malcolm Knowles and his work on andragogy or adult learning. According to Knowles, adults learn differently than children. Adult learners tend to be focused, self-directed, and task-centered (Knowles, 1996). Traditional classroom training often follows a pedagogical model where trainees are recipients of content and instructions given by a teacher, or trainer. An andragogical model of training, on the other hand, may be structured as a series of “tasks, problems, or life situations” (Knowles, 1996, p. 257) in which the learner will need to respond. Knowles (1996) specifically recommended the use of simulation exercises in employer-provided training, which may be viewed by employees as compulsory, in order to show the relevancy of training to their daily lives.

Additional research regarding “in-house” training and education is foundational to this study. According to Fragoulis, Valkanos, & Florou (2008), in-house training differs from other types of adult education in that it not only focuses on improving the employee’s knowledge,
skills, and abilities; but it also tries to improve the organization’s performance. Key drivers of in-house training include: (1) a change in the workplace, (2) quality improvement, or (3) a new technology. In-house training may be defined as “the process of learning that leads employees to the desirable model of work performance, through guidance and practice” (Valkanos & Fragouli, 2007).

This study supports the assumption that rapid e-learning simulation training may be a good instrument for training adult learners due to its task-oriented nature, its accessibility when and as needed, and its self-directed pacing. Rapid e-learning simulation training is also a relevant method within the workplace that allows for practice of new technology that may improve overall organizational performance.

Purpose of the Study

The purpose of this study was to compare user responses to e-learning simulation training that was produced using rapid development tools to user responses to traditional instructor-led training in a corporate environment. In this study, computer simulation was a new technology that was being introduced to all employees. The production of the e-learning simulation training was done by subject matter experts using a rapid e-learning development tool. User response to the training event was measured using the following variables: user satisfaction, perception of usefulness, and perceived ease of use.

Research Questions and Hypotheses

1. Will employees who are trained using rapid e-learning simulations (experimental group) report a higher level of satisfaction with their training
experience than employees who receive the instructor led training (comparison group)?)

H₁: There is no statistically significant difference between the satisfaction level of the experimental group and the comparison group.

2. Will employees who are trained using rapid e-learning simulations (experimental group) report a higher perception of usefulness of their training experience than employees who receive the instructor led training (comparison group)?

H₂: There is no statistically significant difference between the perception of usefulness of the experimental group and the comparison group.

3. Will employees who are trained using rapid e-learning simulations (experimental group) report a higher ease of use of the new tool than employees who receive the instructor led training (comparison group)?

H₃: There is no statistically significant difference in the perception of ease of use between the experimental group and the comparison group.

Limitations

Restrictions outside the control of the researcher include the following:

- The traditional training method used for this research was the existing method used by the participating organization.

- The number of surveys analyzed in this study was determined by the number of respondents.
A tool to measure the effectiveness of training is not already in place and available that can measure the transfer of training to work behavior. Due to timing, organizational leaders discouraged the development and implementation of a formal measurement tool.

Delimitations

- Demographics were not considered as variables in this study.
- The type of knowledge transferred was limited to the topic of training.
- This study focused on U.S.-based individuals within a medium sized business.
- This study was limited to self-report measures completed by training participants.
- The time period of this study prevented the testing of long-term knowledge retention.

Definitions of Terms

Andragogy – “the art and science of helping adults learn” (Blaylock, Wiggs & Lachowicz, 2008, p.9).

In-house training – training offered within the workplace (Fragoulis, Valkanos, & Florou, 2008).

Rapid e-learning – “the rapid creation of e-learning content, usually by someone who understands the topic of the intended material, yet not necessarily an expert in e-learning production themselves” (Unneberg, 2007, p. 201).

Self-help console – In this study, the self-help console was the subject of this training event. It was the technology being introduced in the corporate environment.
E-learning simulation training – Training that offers students the ability “to solve real-world problems in work-related scenarios” (Slotte & Herbert, 2008, p.165).

Traditional training – In this study, traditional training includes those training methods already being implemented by the participating organization. This training of a new technology used by the organization was typically conducted as an instructor-led training held in a lunch-and-learn setting. Instruction consisted of users receiving a job aid pertaining to the topic which they followed while an instructor demonstrated the use of the new technology.

Summary

This chapter provided background about the usage of e-learning simulation training within the corporate environment and identified a need to examine user response to the trend in developing rapid e-learning simulation training. It also provided the theoretical framework used as a basis for this study and presented the purpose of the study. Finally, the chapter outlined research questions in the form of hypotheses. Chapter 2 reviews the existing literature related to this study.
CHAPTER 2

LITERATURE REVIEW

This literature review begins with an overview of andragogy and how andragogical principles apply to the development of e-learning simulation training. The importance of user response to e-learning simulation training is then examined, and examples are given as to how user response has been measured. This chapter also reviews usage of rapid e-learning and how it relates to simulation creation.

Andragogical Principles and E-learning Simulation

Much of what is known about adult learning and how it differs from childhood learning was made popular by Malcolm Knowles. Knowles stated that instructing adults should be approached differently than instructing children. According to Knowles, adult learners have the following characteristics: adults (1) like to be self-directed, (2) want to be involved in the learning process, (3) learn best when they have a need to know, (4) connect new learning with past experiences, and (5) need to apply their learning to the real world (Blaylock, Wiggs, & Lachowicz, 2008).

Knowles also stated that in order to appeal to the adult learner, certain characteristics need to be present within the learning environment. These environmental characteristics are tied to the characteristics found in the adult learner. For example, Knowles stated that transfer of learning occurs best when the adult learner is “actively involved in the learning experience, not a passive recipient of information” (Blaylock, Wiggs, & Lachowicz, 2008, p. 10). In this case, the learning environment that involves learners may be tied to the adult learner characteristic of self-direction.
According to Fragoulis, Valkanos, & Florou (2008, p. 48), “in-house training belongs to the field of adult education, but often the nature and principles of adult learning are not taken into consideration in in-house training.” When adult learning principles are taken into consideration, the training is perceived as effective. E-learning design supports this assertion. According to Allen (2003, p. 22-23), “learners can make virtual contributions when asked to review prototypes and interact with evolving e-learning applications.”

In his book, Michael Allen’s Guide to e-Learning, Allen describes the need for including the learner in the design process to create learner centric e-learning simulations. When training does not include the learner’s input and is focused only on content, the e-learning simulation risks becoming boring and not useful. When e-learning simulation training is thought of in this light, it is not referenced and becomes ineffective (Allen, 2003).

Other learning environment characteristics proffered by Knowles include “problems and examples must be realistic and relevant” (Blaylock, Wiggs, & Lachowicz, 2008, p. 10). For adult training to be effective, examples used within the training environment must be real. This theory is seen practically within in-house training. In a survey regarding blended learning in the workplace, respondents were asked to report current usage of blended learning and also predict future usage. The survey data was drawn from multiple organizations from several business types (Kim, Bonk, & Oh, 2008). Survey respondents reported an increase within their organizations of blended learning and predicted an increase in use of instructional strategies that offered authentic learning environments and problem-based approaches. Of the 13 emerging technologies that would be used in the workplace, e-learning simulation training was listed as fourth under webcasting, digital libraries, and knowledge management tools (Kim, Bonk, & Oh, 2008).
Knowles also stated that “adults learn by doing” (Blaylock, Wiggs, & Lachowicz, 2008, p. 10). According to Knowles, the adult learner wants to be involved in the learning process. If the learner is simply told a procedure without the opportunity to participate, he or she is less interested. Training using a “learn by doing” approach is a common practice in in-house training. Research conducted by O’Connor, Sperl-Hillen, Johnson, Rush, Asche, Dutta, and Biltz (2009) indicated that physicians who accessed computer simulations of diabetic patients significantly reduced risky prescribing events of actual patients over physicians that did not access computer simulations. Physician simulations included “‘learning by doing’ feedback in the form of patient responses to actions taken in previous encounters” (O’Connor, Sperl-Hillen, Johnson, Rush, Asche, Dutta, & Biltz, 2009, p. 586).

The concept of “learning by doing” is an important aspect of e-learning and of simulations in particular (Allen, 2003). According to Allen (2003, p. 290), “the simulation itself provides intrinsic feedback – the most valuable feedback for learning.” By simulating an actual environment, the learner can safely learn what might happen based on his actions. Research supports the assertions that people trained using e-learning simulations improve their performance and increases their skill (Hermens & Clarke, 2009; Slotte & Herbert, 2008).

Research also indicates the importance of Knowles’ adult characteristic of self direction (Pollitt, 2007). In a case study of Office Depot, a training program for its technicians included adult learning attributes like “learn by doing” and realistic scenarios; however, the dropout rate for the training was at a high 9.6% (Pollitt, 2007). The Office Depot managers later discovered that the training program lacked self-direction. The learning program was altered so that employees were able to set their own pace using blended e-learning simulation training. When this was done, the training was successful and overall employee turnover declined (Pollitt, 2007).
Self-directed learning was discussed by Knowles in 1975 as one of the five characteristics of the adult learner. It is Knowles’ contention that “as people mature they transition from having a dependent personality toward having a self-directed personality” (Snyder, 2009, p. 50). As Office Depot managers have found, effective training required integration of learning environment characteristics and the inclusion of self-direction. This same principle can be applied to e-learning.

In e-learning, self-direction can be obtained using interactivity and simulations. Without interactive content, e-learning will provide little transfer of training and application of knowledge (Smith, 2007). Often trainers mistake interaction and self-direction as having navigational controls (Allen, 2003). However, to achieve true interactivity within e-learning, the learner should be able to control not only the navigation, but also the experience of training (Allen, 2003). E-learning that includes simulations allows the learner to practice workplace learning in a variety of situations. Feedback from e-learning simulations gives the learner the freedom to fail in a safe environment (Slotte & Herbert, 2008; Trybus, 2008). Thus, simulations allow students to be self-directed in their learning while exploring the results of their decisions.

The Importance of User Response

The effectiveness of simulation training has been well-documented (Murthy, Challagalla, Vincent, & Shervani, 2008; Slotte & Herbert, 2008; Trybus, 2008). In fact, the military has used computer simulation to mirror closely the real-world for over 20 years (Polimeni, Burke, & Benyaminy, 2009). However, measuring the effectiveness of training has differed throughout research.
For example, Murthy, Challagalla, Vincent, and Shervani (2008) in their research comparing e-learning simulation training to classroom training measured effectiveness using actual business measures like call resolution times. Other studies, however, rely on survey data capturing user responses to measure the perceived effectiveness of the e-learning simulation training (Slotte & Herbert, 2008; Wang & Braman, 2009). Research has shown that employees’ perception of training effectiveness is positively correlated with employee motivation, job satisfaction and commitment. These in turn impact organizational performance (Sahinidis & Bouris, 2008).

User response has also been used as a proxy for gauging the success of a technology implementation. Often in corporations, the success of a new technology is viewed in terms of its system utilization (Ali, Anbari, & Money, 2008). User acceptance of the new technology is therefore thought of as key to increasing the utilization of the system. User response to new technology has been measured using the technology acceptance model (TAM). The TAM is widely recognized as a powerful model used to examine the acceptance of new information technology (Shen & Eder, 2009). The original two factors of the technology acceptance model proposed by Davis in 1989 include both Perceived Usefulness (PU) and Perceived Ease of Use (PEU) (Adobor & Daneshfar, 2006). These two factors have been used as predictors of a person’s use of new technology, and indirectly the success of the technology implementation. It is theorized that if the user believes that the technology will help them perform their job better and that the technology is not difficult to use, they are more apt to use the new technology (Bradley & Lee, 2007).

In a study of approximately 3000 trainees of over 300 training courses, Giangreco, Sebastiano, and Peccei (2009) also found that perceived usefulness is also a key indicator of
training satisfaction. According to their study, “the perceived usefulness of training is the strongest predictor of training satisfaction” and should be monitored by organizations to ensure training effectiveness (Giangreco, Sebastiano, & Peccei, 2009, p. 107). Chen, Chen, and Chen (2009) conducted a study specifically concerning the usage of and intention to use self service technologies (SST). In their study, they found that both perceived usefulness and perceived ease of use both significantly influenced training satisfaction (Chen, Chen, & Chen, 2009). Additionally, the study found that user satisfaction significantly and positively influences the intention to continually use a self service technology (Chen, Chen, & Chen, 2009).

The technology acceptance model has also been used to measure success in e-learning simulation training. In Adobor and Daneshfar’s (2006) study, the employee’s perception of ease of use and the perception of realism or usefulness was positively linked to the perception of training effectiveness. In their study of e-learning simulation training for managers, a variation of the technology acceptance model (TAM) was used to measure both ease of use and usefulness (Adobor & Daneshfar, 2006). Adobor and Daneshfar (2006) found that ease of use had a positive effect on a management team’s performance and that realism was linked to user learning. In Fisher, Wasserman, and Orvis’ study (2010) of learner control in e-learning suggests that training that offers a higher level of learner control positively influences a learner’s overall satisfaction. Additionally, Fisher, Wasserman, and Orvis (2010) contend that the trainees’ overall satisfaction influences his or her actual learning of the instructional content.

Rapid E-learning and Simulation Training

Many studies containing e-learning simulation training use simulations that are produced professionally and not within the organization (Bell, Kanar, & Kozlowski, 2008; Murthy,
Challagalla, Vincent, & Shervani, 2008). Now, technological advances allow for the “creation of simulation that closely represents a real-world situation” (Polimeni, Burke, & Benyaminy, 2009). Training can be easily created using rapid e-learning tools to create interactive video. Using rapid e-learning tools is not only cost-effective, but it is also typically quicker to implement (McNeill, 2008).

The rapid development tools offer varying degrees of functionality for the courseware creator including the ability to create multimedia demonstrations and interactive simulations (Frauenheim, 2007). Rapid e-learning development tools also “typically don’t require great technical skill, allowing subject-matter experts throughout the company to generate learning content” (Frauenheim, 2007, p. 20). With the advantages of speed, ease of use, and cost-effectiveness, rapid e-learning development is becoming more common (Walters, 2009).

New software products like Macromedia Captivate enable subject-matter experts to create demonstrations and application simulations in a fraction of time that it used to take with other products (Frauenheim, 2007). Qualitative accounts show Macromedia Captivate to be accepted and used as a rapid e-learning tool for the production of e-learning simulation training. Macromedia Captivate has been used along with Lectora in the United Kingdom to successfully train 8000 government employees (Carruth, 2007). It has also been used by Beneficial Bank in Philadelphia, to produce job-specific training that contains interactive simulations (Scarborough, 2008). However, at the time of this writing no known quantitative studies have been conducted to validate its use.
Summary

This chapter reviewed three underlying concepts of this study: adult learning and e-learning simulation training, user response to e-learning simulation training, and the use of rapid e-learning tools. Andragogy established a foundation for training design. When applied to in-house training, andragogical principals can boost training effectiveness. Principles included being actively involved in the learning experience, learning by doing, and applying realistic examples. E-learning simulation training offered a means to achieve these principles while also providing self-direction. User response to e-learning simulation training can be used as a means of gauging the training effectiveness. As rapid e-learning tools have allowed for more affordable and easier production of e-learning simulations, user response to the new type of e-learning simulation is important. Empirical evidence is needed to confirm the user acceptance of e-learning simulation training produced by novices. Chapter 3 discusses the proposed methodology to execute this study.
CHAPTER 3

METHODS AND PROCEDURES

Research Design

This study implemented a randomized post-test only experimental design (see Table 1). Participants were randomly drawn from the population for inclusion in the study. A random number generator was used to choose which participants were to be included in the experimental group and which were to be in the comparison group. The comparison group underwent the traditional training method, which was an instructor led training in a “lunch and learn” format. The experimental group received an email directing them to the rapid e-learning simulation training. Both training methods were implemented over the same time frame.

Table 1

<table>
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<th>Group</th>
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<tr>
<td>Experimental Group</td>
<td>R X₁ O₁</td>
</tr>
<tr>
<td>Comparison Group</td>
<td>R X₂ O₂</td>
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*Note. X = Experimental treatment; O = post-implementation observation. Notation is consistent with Gall, Gall, & Borg (2007) experimental design nomenclature.*

Three-weeks following training, a post-test was sent via email in survey form. The survey was conducted using Survey Monkey, an online survey instrument. Data from the instrument was gathered and three separate t-tests were used to determine whether a statistically significant difference existed in user responses between the two groups.
Population

The target population for this study was a medium-sized U.S.-based company providing Information Technology services to other firms. The company has slightly over 1500 employees with eight offices: six offices are in the continental United States, and two are off-shore offices in Panama and India. All employees are English speaking.

Each employee in the firm required training on a new helpdesk system. Specifically, a self-help console was rolled out that enables the employee to create service desk tickets without calling in the ticket via the phone system. Once a ticket is entered, the employee may also edit, update, and track their service desk request using the same self-help console.

Traditional training within the company was informal and was conducted within a “lunch and learn” environment, where employees were asked to attend training at 11 a.m. Lunch was provided during a two hour training session. During the training, employees listened to an instructor overview and demonstrate the new self-help console. The traditional training sessions utilized both demonstration and job aids to introduce learners to new technology. All employees participating in training were considered part of the target population.

Sample and Power Analysis

A simple random sampling method was used to ensure that the experimental and comparison groups were comprised of roughly the same mix of employees each. To create the simple random sample, all participants were randomly assigned to either the experimental group or the comparison group. To ensure randomization, each person was entered as a line on an Excel spreadsheet. Using a random number generator, the researcher then randomly picked
someone for group 1, and then randomly picked someone for group 2, until both groups were filled.

To obtain the optimum sample size for this study, a power analysis was conducted by using G*Power 3. According to Faul, Erdfelder, Lang, and Buchner (2007), G*Power 3 is a widely used statistical tool used for power analysis. Through the use of G*Power 3, it was determined that in order to achieve a power greater than or equal to .80 for a one-tailed t-test, the sample size necessary is 310 persons in each group. The power calculation is based on an alpha level of .05 and a small effect size of \( d = .2 \). Therefore, testing the hypotheses required a total sample of 620. To achieve this sample size, a return rate of 41% of the surveyed participants was needed. A cash incentive in the form of a drawing for one of three $50 gift cards was used to help increase survey responses. To control the treatment effect, training sessions provided the same training material to all participants.

Instrumentation

The instrument that was used in this study is an adaptation from the original technology acceptance model (TAM) used by Davis. This adaptation also used by Bradley and Lee (2007) incorporated a measure for training satisfaction in addition to perceived usefulness and perceived ease of use. Perceived ease of use, perceived usefulness, and employee attitude have been positively linked to intention to use (Alshare, Freeze, & Kwun, 2009). System usage, in turn, is often linked to successful implementation of a new technology (Ali, Anbari, & Money, 2008).

In Bradley and Lee’s (2007) study, the authors found that training satisfaction was a key factor in employee’s perception. Previous studies have also shown that training is able to impact an employee’s perception of how useful new technology is and how easy it is to use (Bradley&
Lee, 2007). The instrument from their study contains two items measuring perceived usefulness (PU), one item measuring perceived ease of use (PEU), and three items measuring training satisfaction (TS) (Bradley & Lee, 2007). Bradley and Lee calculated the reliability at $a = .838$, which “exceeds the customary lower limit of 0.70” (Bradley & Lee, 2007, p. 39).

Bradley and Lee’s (2007) original instrument was adapted slightly to better fit the subject of this study. The original study used the term “People Soft system.” For this study, the term “People Soft system” was replaced with the study specific term “Self-Help Console.” To ensure that the validity of the instrument is not greatly altered, items were evaluated by a 3-member panel of subject matter experts to verify face validity prior to the study. The Cronbach alpha was also calculated on the survey results.

**Data Collection Procedures**

Three-weeks following training, all training participants received an email containing a link to the post-test survey. The survey was hosted on an online survey service. This same survey service was also used to tabulate the results. A notice of study participation preceded the survey and included the notice of informed consent. Participants indicated their agreement to participate in the survey by clicking on the link that took them to the questionnaire. Survey questions were in a 5-point Likert scale, ranging from 1 – *strongly disagree* to 5 – *strongly agree* (see Appendix A). Radio buttons were used to indicate their responses. Submitted data were logged in the survey service’s database, which I later downloaded. The entire survey process took between 5 to 10 minutes.
Data Analysis

Responses from the surveys were transferred to Statistical Package for the Social Sciences (SPSS) version 19.0 for analysis. Three separate t-tests were conducted to compare group differences. Statistical calculation was conducted specifically to address the following research questions.

Research Question 1

Research Question 1 tested whether employees using the rapid e-learning simulation reported higher satisfaction than employees who received the instructor led training. To answer this question a comparison of the experimental group and the comparison group’s mean satisfaction scores was analyzed using an independent t-test. The hypothesis being tested is as follows:

\[ H_1: \text{There is no statistically significant difference between the satisfaction level of the experimental group and the comparison group.} \]

Research Questions 2

Research Question 2 tested whether employees who are trained using rapid e-learning simulations perceived that the self-help console was more useful than employees who received instructor led training. To answer this question a comparison of the experimental group and the comparison group’s mean perceived usefulness (PU) scores were analyzed using an independent t-test. The hypothesis being tested is as follows:

\[ H_2: \text{There is no statistically significant difference between the perception of usefulness of the experimental group and the comparison group.} \]
Research Questions 3

Research Questions 3 tested whether employees who were trained using the rapid e-learning simulation reported a higher usage than employees who were taught using instructor led training. To answer this question the effectiveness measures and perceived ease of use (PEU) were analyzed for both groups. The perceived ease of use was analyzed using an independent t-test. The hypothesis being tested is as follows:

\[ H_3: \text{There is no statistically significant difference in the perception of ease of use between the experimental group and the comparison group.} \]

To determine support for these hypotheses, the item responses for each category were summed for each participant. The mean score for the experimental group was then compared to the mean score of the comparison group to see if there is a statistically significant difference between the means of both groups.

Statistical assumptions. Before conducting the statistical procedures, the data were analyzed to determine their level of compliance with associated statistical assumptions. The statistical assumptions common to testing a \( t \)-test include normality and homogeneity of variance. The assumption of normality was tested by examining kurtosis values. A Levene’s test was used to assess homogeneity of variance.

Summary

This chapter discussed the research design, population sample, instrumentation, data collection and analysis procedures. Chapter 4 contains the findings from this study.
CHAPTER 4

FINDINGS

Overview

As reported earlier, this study examined user response to simulation training that was produced internally by in-house staff using a rapid development tool. This type of training is also known as rapid e-learning simulation training. The rapid e-learning simulation training was compared to the traditional training method used by the participating company. The traditional training method was a two-hour instructor-led presentation and demonstration of a new software tool. User response was gathered from participants who underwent instructor led training, the comparison group, and from participants who took rapid e-learning simulation training, the experimental group. This chapter reports the study’s findings and is divided into the following sections: (a) Introduction, (b) Descriptive Statistics and Statistical Assumptions, (c) Data Analyses, and (d) Summary.

Descriptive Statistics and Statistical Assumptions

A total of 401 employees returned survey results; however, ten surveys were incomplete and had to be discarded. A total of 205 surveys were obtained from the experimental group and 186 were from received from the comparison group. The survey results included responses from 328 females and 63 males. This 84% and 16% respectively is slightly different from the general population of the company which has a 70% to 30% ratio. This indicates that female employees were more apt to return survey results than male employees and that the results of this study may be slightly biased toward this gender. Respondents indicated that 78.8% were regular employees,
16.6% were managers, and 4.6% were executives or attorneys. These figures are approximate to the total population of the participating company.

Though the targeted return rate of completed surveys was to acquire a sample of 620, only 391 employees returned survey results, resulting in a 26% return rate. Therefore, the power achieved for a one-tailed $t$-test with sample sizes of 205 and 186 was .63 based on an alpha level of .05 and an effect size of $d = .2$. This is below the generally accepted .80 (Battle, 2000). More data on effect size is included in the data analysis section. The study’s survey used a Likert scale and was coded from 1 (strongly disagree) to 5 (strongly agree).

Since the survey instrument was altered from Bradley and Lee’s (2007) original instrument, Cronbach alpha was used to measure the internal consistency reliability. Cronbach alpha reliability for this administration of the survey is .73, which is lower than Bradley and Lee’s (2007) study’s .838, but was still above the generally accepted .70 (Bradley & Lee, 2007).

Normality. Table 2 shows the kurtosis and skewness values used to evaluate the normality of both groups for all variables. Table 3 summarizes the mean for each group for all variables.

Table 2

<table>
<thead>
<tr>
<th>Group</th>
<th>TS Statistic</th>
<th>SE</th>
<th>PEU Statistic</th>
<th>SE</th>
<th>PU Statistic</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kurtosis</td>
<td>.135</td>
<td>.338</td>
<td>-.550</td>
<td>.338</td>
<td>-.407</td>
<td>.338</td>
</tr>
<tr>
<td>Skewness</td>
<td>.054</td>
<td>.170</td>
<td>-.093</td>
<td>.170</td>
<td>-.150</td>
<td>.170</td>
</tr>
</tbody>
</table>

*(table continues)*
Table 2 (continued).

<table>
<thead>
<tr>
<th>Group</th>
<th>TS Statistic</th>
<th>PEU Statistic</th>
<th>PU Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
</tr>
<tr>
<td>Comparison Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kurtosis</td>
<td>.749</td>
<td>-.261</td>
<td>-.197</td>
</tr>
<tr>
<td>Skewness</td>
<td>.055</td>
<td>-.050</td>
<td>-.326</td>
</tr>
</tbody>
</table>

Table 3

Mean Scores per Group per Variable

<table>
<thead>
<tr>
<th>Group</th>
<th>TS Mean</th>
<th>TS SD</th>
<th>PEU Mean</th>
<th>PEU SD</th>
<th>PU Mean</th>
<th>PU SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>3.80</td>
<td>.468</td>
<td>4.29</td>
<td>.571</td>
<td>3.93</td>
<td>.701</td>
</tr>
<tr>
<td>Comparison Group</td>
<td>3.75</td>
<td>.433</td>
<td>4.13</td>
<td>.596</td>
<td>3.89</td>
<td>.769</td>
</tr>
</tbody>
</table>

Training satisfaction (TS) scores for the experimental group ranged from 2.5 to 5.0 ($M = 3.80, SD = 0.47$). Scores were normally distributed, with skewness of 0.05 ($SE = 0.17$) and kurtosis of 0.14 ($SE = 0.34$). TS scores in the comparison group also ranged from 2.5 to 5.0 ($M = 3.75, SD = .43$). Scores were normally distributed, with skewness of 0.06 ($SE = 0.18$) and kurtosis of 0.75 ($SE = 0.34$). Both the experimental group and comparison group measuring training satisfaction met the requirement for normality.

Perceived Ease of Use (PEU) scores for the experimental group ranged from 3.0 to 5.0 ($M = 4.29, SD = .57$). Scores were normally distributed, with skewness of -0.09 ($SE = 0.17$) and kurtosis of 0.05 ($SE = 0.17$).
kurtosis of -0.55 (SE = 0.34). PEU scores in the comparison group also ranged from 3.0 to 5.0 (M = 4.13, SD = .60). Scores were normally distributed, with skewness of -0.50 (SE = 0.18) and kurtosis of -.26 (SE = 0.36). Both the experimental group and comparison group measuring perceived ease of use met the requirement for normality.

Perceived Usefulness (PU) scores for the experimental group ranged from 2.0 to 5.0 (M = 3.93, SD = .70). Scores were normally distributed, with skewness of -0.15 (SE = 0.17) and kurtosis of -0.41 (SE = 0.34). PU scores in the comparison group also ranged from 2.0 to 5.0 (M = 3.89, SD = .77). Scores were normally distributed, with skewness of -0.33 (SE = 0.18) and kurtosis of -0.197 (SE = 0.36). Both the experimental group and comparison group measuring perceived ease of use met the requirement for normality.

Table 3 shows that the mean scores for training satisfaction (TS), perceived ease of use (PEU), and perceived usefulness (PU) were rated higher by the experimental group than by the comparison group. The higher mean of the experimental group over the comparison group for training satisfaction was expected. According to Fisher, Wasserman, and Orvis (2010), environments that allow for more learner control of the training are associated with higher levels of learner satisfaction.

Homogeneity of variance. Table 4 shows the results of Levene’s Test for Equality of Variance. Levene’s test indicated equal variances for training satisfaction, perceived ease of use, and perceived usefulness (F = 1.36, p = .245), (F = 2.92, p = .088), and (F = 1.11, p = .292) respectively. Having addressed the requirement for normality and homogeneity of variance, three independent t-tests were performed.
Table 4

Levene’s Test for Equality of Variance

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS</td>
<td>1.356</td>
<td>.245</td>
</tr>
<tr>
<td>PEU</td>
<td>2.917</td>
<td>.088</td>
</tr>
<tr>
<td>PU</td>
<td>1.112</td>
<td>.292</td>
</tr>
</tbody>
</table>

Data Analyses

Each of the study’s three hypotheses was analyzed using independent sample t-tests to compare the mean scores of the experimental group with the mean score of the comparison group. Table 5 reflects the analysis for a 95% confidence rating.

Table 5

Independent t-Test Results

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>p</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS Experimental</td>
<td>3.81</td>
<td>.468</td>
<td>1.29</td>
<td>389</td>
<td>.099</td>
<td>.13</td>
</tr>
<tr>
<td>Comparison</td>
<td>3.75</td>
<td>.433</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEU Experimental</td>
<td>4.29</td>
<td>.571</td>
<td>-2.68</td>
<td>389</td>
<td>.004</td>
<td>.28</td>
</tr>
<tr>
<td>Comparison</td>
<td>4.13</td>
<td>.596</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PU Experimental</td>
<td>3.93</td>
<td>.701</td>
<td>-0.60</td>
<td>389</td>
<td>.276</td>
<td>.05</td>
</tr>
<tr>
<td>Comparison</td>
<td>3.89</td>
<td>.769</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: p values are reported for 1-tailed data analysis.
H₁: There is no statistically significant difference between the satisfaction level of the experimental group and the comparison group.

The t-test revealed that though employees using the rapid e-learning simulation reported higher satisfaction than employees who received the instructor led training, the scores for the experimental group were not significantly higher than the comparison group, \( t(389) = -1.29, p < 0.05 \). Cohen’s \( d \) was computed to be 0.13, which indicates a small effect size. The power achieved was 0.36 based on an alpha level of .05 and an effect size of \( d = .13 \).

H₂: There is no statistically significant difference between the perception of usefulness of the experimental group and the comparison group.

The t-test revealed that employees who are trained using rapid e-learning simulations perceived that the self-help console was more useful than employees who received instructor led training. However, the scores for the experimental group were not significantly different, \( t(389) = -0.60, p < 0.05 \). Cohen’s \( d \) was computed to be 0.05, which indicates a very small effect size. The power achieved was 0.12 based on an alpha level of .05 and an effect size of \( d = .05 \).

H₃: There is no statistically significant difference in the perception of ease of use between the experimental group and the comparison group.

The t-test revealed that employees who were trained using the rapid e-learning simulation perceived that the self-help console was easier to use than employees who were taught using instructor led training. The scores for the experimental group were significantly higher than the comparison group, \( t(389) = -2.68, p < 0.05 \). Cohen’s \( d \) was computed to be 0.27, which indicates
a moderately small effect size. The power achieved was .85 based on an alpha level of .05 and an effect size of $d = .27$. This is above the generally accepted .80 (Battle, 2000).

**Summary**

This chapter addressed the data collected and the statistical tests performed. This included a series of $t$-tests and measures of effect size used to substantiate the hypotheses. Of the three hypotheses examined, two ($H_1$ and $H_2$) found no statistically significant difference between the experimental and the comparison group. One hypothesis ($H_3$) did find a statistically significant difference between the experimental group and the comparison group. Analysis of hypothesis three indicated a statistically significant difference in the perception of ease of use between the two groups. Chapter 5 provides a summary of the study, a discussion of the significance of the findings, and recommendations for future research.
CHAPTER 5
SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Overview

This chapter includes four sections: (a) Synthesis of Findings, (b) Conclusions, (c) Implications and Recommendations, and (d) Summary. The Synthesis of Findings includes the results of the hypotheses findings to answer the study’s three research questions. The Conclusion section draws inferences from the results and relates the findings to the existing literature. The Recommendations section provides areas for further research. The Implications section discusses the study’s findings to the field of performance improvement.

Synthesis of Findings

The purpose of this study was to compare user responses to e-learning simulation training that was produced using rapid e-learning tools to user responses to traditional instructor-led training. The target population for this study was employees of a medium size private company in North America. Employees of a medium-size U.S.-based company that provides Information Technology services to other firms were divided into two groups and either received instructor-led training (comparison group) or received rapid e-learning simulation training (experimental group). Though the participating company has six offices are in the continental United States, and two are off-shore offices, the largest population were in Texas and Michigan.

The method chosen for this study was survey research. The study used a post-test only experimental design. Employees were surveyed three weeks following the conclusion of training using an online survey questionnaire. Randomization was obtained using a random number generator. A total sample size of 391 individuals was obtained.
Independent samples *t*-tests with an alpha level of .05 were used, assuming a small effect size and a statistical power of .80. These tests were used to compare the mean survey scores of the experimental group to the comparison group for three different measures: Training Satisfaction, Perceived Ease of Use, and Perceived Usefulness. Cohen’s *d* was used to measure effect size. SPSS 19.0 statistical analysis software was used for all analyses. For all three hypotheses, the experimental group showed higher scores than the comparison group. However, statistical significance was only found between the experimental and control group for one measure, Perceived Ease of Use. No statistically significant differences were found for Training Satisfaction or Perceived Usefulness.

Conclusions

Because corporate learning trends support the increased usage of simulation training created from rapid e-learning tools and the decrease in instructor-led training, this study focused on comparing user response from rapid e-learning to instructor-led training to verify the appropriateness of this trend. One commonly used measurement for gauging user response is the technology acceptance model (TAM), which has three measures: Training Satisfaction, Perceived Ease of Use, and Perceived Usefulness. The results of the comparison of these measures are as follows.

H<sub>1</sub>: There is no statistically significant difference between the satisfaction level of the experimental group and the comparison group.

Training Satisfaction (TS) scores for individuals who took rapid e-learning simulation training were higher than the satisfaction scores for individuals who took instructor led training; however, the difference was not statistically significantly (*p* = .10, *p* > .05). Higher scores for e-
learning participants were expected based on the increased ability to self pace and interact with
the learning content. According to Orvis, Fisher, and Wasserman (2009), by increasing the
learner’s ability to control his learning environment, satisfaction with training is enhanced. This
corresponds to Knowles (1996) suggestion that adult learners prefer learning environments that
allow for self-direction.

Although the analysis for this hypothesis was not statistically significant, the fact that
there is not a statistically significant difference between the mean of the experimental group and
that of the comparison group supports the current trend of using rapid e-learning. According to
the results of this study, users were equally satisfied with training that was delivered using rapid
e-learning as they were with instructor-led training. Thus, the trend of increasing the use of rapid
e-learning as the method of training delivery, while reducing instructor-led training, may be
considered acceptable based on user response.

H2: There is no statistically significant difference between the perception of usefulness of
the experimental group and the comparison group.

Perception of Usefulness (PU) scores for individuals who took rapid e-learning
simulation training were higher than the satisfaction scores for individuals who took instructor
led training; however, the difference was not statistically significantly different (p = . 276,
p>.05). Higher scores for e-learning participants were expected based on the ability to retake
training at will and practice the learning content in simulation form. According to Rhude (2009),
training using simulations can provide learners with “practical, hands-on experience that greatly
increases skill learning and understanding” (p. 34). Unlike some instructor-led training, computer
simulations can also provide immediate and continuous feedback that strengthens the perception
of utility.
Boothby, Dufour, and Tang (2010) proffer in the case of new technology adoption, different technologies require different skill sets and thereby different types of training. Boothby, Dufour, and Tang (2010) suggest companies engage in “strategic training,” where they provide training that is closely influenced by the technology in order to realize greater usage by trainees resulting in greater productivity. Since the training used in this study involved the introduction of a new technology, perception of usefulness may have been influenced by the close proximity of the simulation to the actual instrument.

Though the higher perception of usefulness was not found to be statistically significant, results of this study indicate that the trend toward increased rapid e-learning usage with simulations as a replacement for instructor-led training may be considered acceptable given that there is not a statistically significant difference in user response to the two methods of training.

In answer to some critics who have suggested that simulation training produced using rapid e-learning tools are less effective as a training solution because production was not performed by professionals (Hubbard, 2009), results from this study indicate that in-house production of e-learning simulation training using rapid development tools appear to be as effective as traditional instructor-led training based on user response.

H3: There is no statistically significant difference in the perception of ease of use between the experimental group and the comparison group.

The Perception of Ease of Use was the only measure that produced statistically significant results ($p = .004, p < .05$). Cohen’s $d$ was computed to be 0.27, which indicates a moderately small effect size. The power achieved was .85 based on an alpha level of .05 and an effect size of $d = .27$. Thus, the $t$-test revealed that employees who were trained using the rapid
e-learning simulation perceived that the self-help console was easier to use than employees who were taught via instructor led training.

Explanation for this result may be due to the realistic nature of the simulations produced. Rapid e-learning development tools use a process which involves taking screen captures of the software that is being recorded. By completing an audio enhanced simulation, the end user is able to complete a task that is very much like what would be encountered in the real world.

Another explanation for the higher Perception of Ease of Use scores for the experimental group when compared to the comparison group is the influence of “digital natives.” Cabanero-Johnson and Berge (2009) describe digital natives are younger individuals who have grown up with technology. This group of individuals prefers technology-based communication over “retro ways of content delivery” (Cabanero-Johnson & Berge, 2009, p. 292). Though age was not a part of the demographic data collected as a part of this study, anecdotal accounts support the presence of many younger workers.

Implications and Recommendations

While much research has been done in the area of e-learning in comparison to instructor-led training, little has concentrated on the use of rapid e-learning development. Many of the existing studies refer to professionally created e-learning and not rapid e-learning (Bell, Kanar, & Kozlowski, 2008; Murthy, Challagalla, Vincent, & Shervani, 2008). This study adds to the body of research by focusing on the new trend of using rapid development tools for the production of e-learning simulations. As such, this study helps to affirm the decision to implement rapid e-learning in medium size U.S. companies as the training may be viewed similar to instructor-led training. Current trends show that companies are moving toward rapid
e-learning in order to reduce the time needed to produce training and in order to reduce overall costs (Alcock, 2008).

Although this study has examined how rapid e-learning compares to instructor-led training, many more questions remain.

1. Is rapid e-learning suitable for different size organizations /different locations? The present study was conducted at a single medium size company predominantly in Texas and Michigan. For the results to have greater generalizability to the field of training, other studies should be conducted using larger and smaller organizations from different locales.

2. Power was achieved for the one statistically significant hypothesis (H3) in this study; however, because the difference in the means was so small with the other two variables, power was not achieved for H1 and H2. Future research should be conducted using a larger sample size.

3. The target population for this study had a higher percentage of female participants than male participants. Thus, the high percentage of female responses versus male responses may have biased the results of this study. This study should be repeated with a sample that is more evenly distributed male to female.

4. As the trend for in-house creation of simulation training has progressed, several rapid e-learning development tools are just now becoming available. This study was limited to the use of one rapid e-learning development tool, Adobe Captivate. Each tool has its own unique features that may influence user acceptance. Future research could be done to test user response to the different rapid e-learning outputs from these tools.

5. The focus of this study centered on the release of a new technology. Thus, the type of simulation involved screen captures of new software. Other types of simulation training used in organizations involve non-technically based training, such as management or “soft skills”
training. Future research could be done to see whether rapid e-learning development tools can effectively create simulations for this type of training.

Summary

This study provides a foundation for future research related to rapid e-learning. The study found that rapid e-learning participants perceived that training on a new technology was equivalent to training that was instructor-led. This is an important finding that affirms the usage of rapid e-learning simulation training as a viable form of training.

The results of this study indicate that rapid e-learning simulation training may be an acceptable substitution for instructor-led training because it found no statistically significant difference between the two types of training methods. This finding affirms the usage of rapid e-learning as a replacement for instructor-led training, and gives credence to the current trend. The relevance of this finding is solid in that little empirical research has been done around rapid e-learning.

This study also provides useful information to professionals in the field of training who may be considering new tools for creating training, or new methods of delivering training. Results of this study may also be found useful to managers looking at options to reduce travel or out-sourcing costs. As rapid e-learning tools become more integrated with other new technologies and users become more mobile and technologically savvy, training departments will need to evolve the tools that they use for training delivery as well as the methods in which training is delivered.
APPENDIX

SURVEY INSTRUMENT
Survey

In relation to the EMPLOYEE SELF-HELP CONSOLE of the service desk, please answer the following questions using this scale:

1 = strongly disagree  2 = disagree  3 = neutral  4 = agree  5 = strongly agree

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training Satisfaction</td>
<td>TS1 Your level of training for the use of the Self-Help Console is appropriate.</td>
</tr>
<tr>
<td></td>
<td>TS2 You have gained a complete understanding of the features, functions, and abilities of Self-Help Console.</td>
</tr>
<tr>
<td></td>
<td>TS3 More training of the Self-Help Console would be helpful.</td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>PU1 The training on the Self-Help Console has helped or will help you perform your job more effectively (achieve desired results).</td>
</tr>
<tr>
<td></td>
<td>PU2 The training on the Self-Help Console has helped or will help you perform your job more efficiently (faster).</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>PEU The training that you received on the Self-Help Console makes using the Self-Help Console easier to use.</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>E1 Since the training event, you have used the Self-Help Console to enter a service desk ticket.</td>
</tr>
<tr>
<td></td>
<td>E2 Since the training event, you called in a service desk ticket instead of using the Self-Help Console.</td>
</tr>
</tbody>
</table>

Note: This survey was adapted from Bradley and Lee (2007).
REFERENCES


Teo, T., Su Luan, W., & Sing, C.C. (2008). A cross-cultural examination of the intention to use technology between Singaporean and Malaysian pre-service teachers: An application of


