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An Evaluation of the Effectiveness of E-Learning, Mobile Learning, and Instructor-Led Training in Organizational Training and Development

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ABSTRACT

Employee training is a strategic investment. While workforce training has depended on traditional, face-to-face, classroom delivery, new methods have emerged. Electronic learning (e-learning) is training via electronic medium. Mobile learning (m-learning) is a subset of e-learning modalities and specifically refers to electronic delivery of training via mobile devices such as smartphones, tablets, and laptops. The new generation of e-learning is delivered in a mobile environment. Yet, there has been little research to establish the efficacy of the newer training methods.

This study was among the first to fill this research gap through an experiment that tested the comparative effectiveness of the three modes of training: traditional face-to-face training (FTF), computer laboratory e-learning, and m-learning. The research question was: Are there differences in learning performance across these training modalities? The experiment involved a common training module delivered across the three formats: FTF, e-learning, and m-learning.

Study participants were divided into three groups. Each group completed training in one of the delivery formats. Learning effectiveness was measured by the change in score between the pre- and post-assessment. An ANOVA was performed to determine whether any difference in effectiveness was significant. Learners were also surveyed to capture demographic information. This research showed no significant difference in learning effectiveness among the FTF, e-learning, and mobile learning groups. Based on these findings, it was concluded that mobile learning and e-learning offer the same outcome as FTF training. Therefore, managers must consider other factors, such as cost and deployment time, when selecting a training delivery method.

Keywords: *employee training, e-learning, m-learning*

INTRODUCTION

Development of a well-trained workforce is a human capital investment activity that has always been a priority of management. This commitment has been substantiated by the fact that U.S. companies spent over $70 billion for training in the United States and $130 billion on training their employees globally (Bersin, 2014). Managers have faced the problem of determining which training delivery method is most effective in facilitating employee learning. The three training delivery methods examined in this study were face-to-face training (FTF), e-learning, and the newest training delivery method, mobile learning (American Society for Training and Development, 2006).

The research objective was to test learning effectiveness among these training modalities. Learning was measured using tests or quizzes that measured students' performance throughout a course (Walvoord, 2010). The research design was an experiment in which a common training module was executed with three groups.

Study-Specific Definitions

For the purpose of this study, the definitions of key terms are as follows:

Face-to-Face Training (FTF). FTF training, also known as traditional training, is delivered live, in-person, with learners and the instructor in a physical classroom setting. Learners' use of computers and mobile devices is precluded in FTF training sessions (Gaither, 2009).

E-Learning. E-learning is a self-paced, electronic training module taken on a stationary personal computer without the involvement of a live instructor or facilitator. Such training modules may include videos, quiz questions, or other interactivity between the learner and the computer interface that provides immediate feedback. These modules do not require any external party's evaluation of responses. This study's definition of e-learning excludes e-books and digital collaboration to limit the scope of this term to that which can be contained within an electronic training module (Welsh, Wanberg, Brown, & Simmering, 2003). Electronic learning is also known by other terms, such as computer-based learning, online learning, distributed learning, or web-based training. Most e-learning is asynchronous, pre-recorded, and available to employees at anytime anywhere. Synchronous e-learning is less common, delivered at a scheduled time and date with a live instructor, as in the case of webinars (Welsh, Wanberg, Brown, & Simmering, 2003).

M-Learning. Mobile learning, for the purpose of this study, is defined as e-learning taken via smartphone, tablet, or laptop. This study defines a mobile device as a portable, wireless computing or communication device, e.g.: smartphones, tablets, and laptops (Kansas State University, 2013; Moore, 2011). Mobile learning (m-learning) is a subset of e-learning. Although the same software is used, the development settings are different for mobile learning as opposed to regular e-learning. In development, m-learning applies a special format for delivery on mobile devices. The hardware is also different. Electronic learning is delivered via personal computer, and m-learning is delivered via such mobile devices as tablets, smartphones, and laptops. Mobile learning is the acquisition of knowledge using training content specially formatted for delivery via mobile device anytime or anywhere that results in an increase of knowledge. Mobile learning content accommodates limited multimedia delivery, including audio, images, animations/video, and text (Nash, 2007). Other differences between e- and m-learning include the average screen size of the device from which the training is accessed and the portability of the training. The primary advantage of m-learning has been the opportunity to provide training anytime, anywhere, at the user's convenience.

Purpose of the Research

The research objective was to measure the comparative effectiveness of three different types of training delivery, all with common training content and developed under accepted instructional design methods adapted to suit the mode of delivery. The findings of this study would inform human resources training and development professionals facing the decision of selecting effective methods that are acceptable to users. This research tested whether training effectiveness differs among the three training delivery methods.

LITERATURE REVIEW

Each of the three training modalities have been researched individually. For FTF training, Russell (1999) reviewed 355 training related studies, spanning over 70 years of research, and identified a common theme among them, no significant difference in effectiveness despite variations to the training

delivery methods. However, those studies did not include examination of mobile learning, a very new niche within the realm of training and e-learning. This study addressed the gap in our knowledge of workforce training. Business and Legal Resources (2010) detailed the advantages of FTF training, and Anderson (2014) described the popularity of FTF training among corporations and preferred usage of FTF training by topic.

E-learning was examined by Welsh, Wanberg, and Simmering (2003), who explored current e-learning use and its future directions. Liu, Liao, & Peng (2005) analyzed e-learning user acceptance behavior by applying a theoretical framework. Selim (2005) examined critical success factors for corporate deployment of e-learning. Tzeng Chiang, and Li (2007) examined effectiveness of e-learning. O'Dell (2009) explored generational differences in satisfaction with e-learning. Andrews (2011) reviewed educational theories relating to e-learning, and Rao (2011) examined e-learning use globally in a phenomenological study that surveyed e-learning and corporate training experts worldwide.

Mobile learning has been examined by such researchers as Chang (2010), who studied the use of audio in m-learning and the resulting increase in m-learners' perceptions of ease of use and usefulness. The American Society of Training and Development (ASTD) explored corporations' use, spend and intentions for future use of m-learning. They also examined some barriers to m-learning implementation (American Society for Training & Development, 2013). Tan Oooi, Sim, and Phusavat (2011) determined that m-learning adoption is not affected by demographic characteristics like gender and age. Little (2012) and Terras (2012) in separate studies suggested best practices for m-learning design, and deployment.

Other studies have paired training modalities to form comparisons. Some studies have compared FTF and e-learning. Strother (2002) explored corporations' use of FTF in comparison to e-learning from an economic perspective. Burgess and Russell (2003) explored the cost benefits of e-learning in comparison to FTF. Derouin, Fritzsche, and Salas (2005) reviewed the benefits of FTF in comparison to e-learning.

FTF training was compared to m-learning in studies by Williams (2009), Brown and Haag (2011) and Moore (2011). Williams (2009) evaluated the effectiveness of FTF in comparison to m-learning and made suggestions for design and development. Brown & Haag (2011) evaluated the effectiveness and performance differences between FTF and m-learning at Merrill Lynch. Moore (2011) compared FTF training vs. m-learning for the U.S. Air Force Aerospace Ground Equipment training classes. Moore's study (2011) examined the effectiveness of training delivery methods for the purpose of organizational training. Moore focused on identifying the most effective hardware to make training content available electronically.

Lastly, there are studies that compared e-learning to m-learning. Ally (2009) detailed the evolution from e-learning to m-learning. The ASTD (2013) examined that evolution from a corporate perspective, and Roberts (2012) examined corporations' recent widespread push towards the creation of mobile learning content.

This study addressed the research gap in the assessment of worker training methods. As presented in Figure 1, previous studies have examined the effectiveness and comparative performance of three training delivery methods individually and in pairs. This study was among the first that compared all three training delivery methods and provided evidence as to comparative learning.

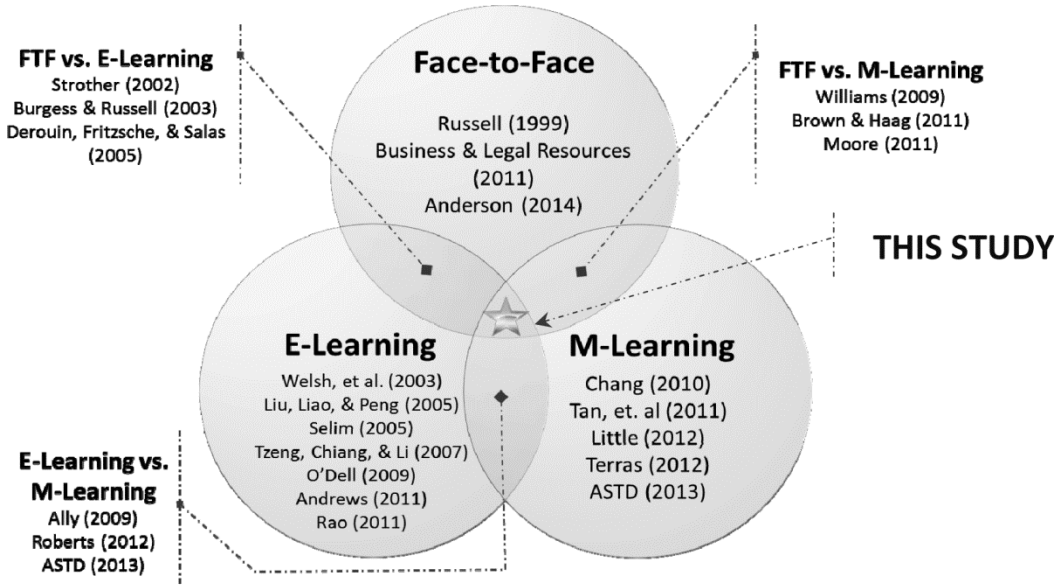

Figure 1: Research Gap

Organizational Training and Development

Organizational training and development has always been a priority of management. Wang, Sun, Li, and Xuejun (2008) discussed the needs gap that remains after companies hire qualified employees. After selecting employees with satisfactory and even exceptional levels of formal education, employer-provided training is still necessary. Employers recognize the difference in value between student learners and organizational learners. Formal schooling from traditional universities provides students with the general skills and knowledge that are portable to many employers. Most employers require firm- and industry-specific skills that cannot be provided by such general training. Additionally, new technology and organizational change make ongoing employer-provided training necessary. Employer-provided training can be substituted for traditional schooling in the labor market. Employees can achieve the same degree of occupational skill with less formal schooling and more on-the-job training or vice versa, less on-the-job-training and more formal schooling (Wang, Sun, Li, & Xuejun, 2008).

Workforce training and development has been a major commitment for corporations at a high cost. The Association for Talent Development (ATD), formerly known as the American Society for Training and Development (ASTD), estimated in its 2013 State of the Industry publication that organizations spent $164.2 billion on employee training in 2012, up from $125.9 billion in 2009 (Stern, 2011). Of the 2013 training expenditures, 61% or $100.2 billion was spent internally. Twenty-eight percent of the overall training expense, $46 billion, was applied to procuring external training services, and the remaining 11%, or $18 billion, was spent on employees' tuition reimbursement (ATD, 2013). See Figure 2. When considering the importance of training, Bolman and Deal (2008) examined the other end of the spectrum, the untrained worker. They described untrained and undertrained workers as harmful to the organization in four ways: "shoddy quality, poor service, higher costs, and costly mistakes" (Bolman & Deal, 2008, p. 148).

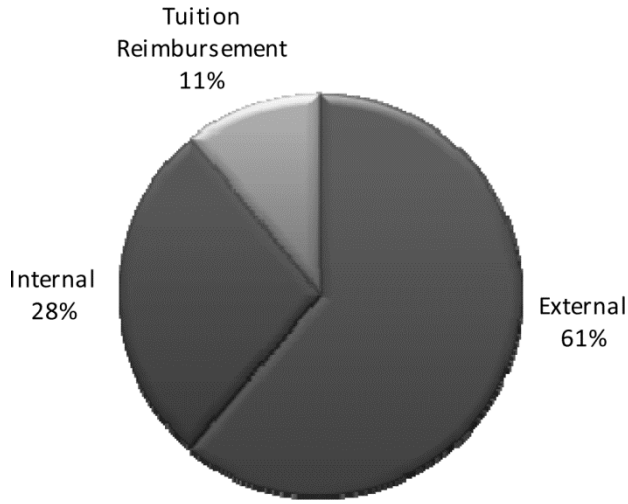

Figure 2: Organizational Training Expenditure

Organizations have become so committed to developing their workforce that many, like Caterpillar Inc., Bell Atlantic, Merrill Lynch, and Boeing, have developed internal corporate universities (Blass, 2005). These universities operated within organizations' training departments. Training departments are tasked with managing the development, acquisition and delivery of employee training. They must do so effectively, despite limited budgets, varying learner preferences, and often a geographically dispersed workforce (Welsh, Wanberg, Brown, & Simmering, 2003).

Corporations view commitment to workforce training as a key strategic activity that starts with top management. Companies increasingly demonstrate their commitment to organizational development by creating top management positions for the leaders of the learning and development unit and applying the title Chief Learning Officer (Jossi, 2002).

Benefits of a Well-Trained Workforce

By offering professional development opportunities, organizations can minimize turnover. "People are more likely to leave companies that don't provide them with good development opportunities and leadership" (Kelley, 2014, p. 2). Organizations are also able to optimize performance through workforce training. As George Selix, Senior Vice President and Chief Learning Officer (CLO) of Century 21 states, "There are experts and novices, and you have to transfer knowledge in such a way that the novices get the knowledge and skills they need to perform like an expert" (Jossi, 2002, p. 2).

Corporate training has also been treated as an economic and strategic factor. Providing training to employees gives firms monopsony power in the labor market. It trains workers to be exactly what the firm needs in a manner unique to that firm, which makes that firm the sole buyer of that product, the product being the trained worker. This minimizes competition among firms for the limited labor supply (Wang, Sun, Li, & Xuejun, 2008). One critical factor driving employers to offer training has been the decreasing shelf life of knowledge due to organizational, industrial, economic, and technological change. According to Meister (1998), this generates the need for not just one-time new hire training, but ongoing continuous training for employees. In some industries, the shelf life of knowledge is a mere one to two years. Existing and prospective employees find employer-provided training and formal corporate universities desirable. It creates for the firm a reputation of being an employer of choice in their respective industry (Meister, 1998). Ninety-seven percent of companies have viewed training and

development activities as an investment rather than an expense (American Supply Association, 2008). Companies have used their investment in employee education as evidence of their competitive advantage because they are able to recruit and retain the best and brightest talent (Meister, 1998). According to the American Supply Association (2008), other strategic reasons firms cited for providing training include improving the bottom line; keeping the company competitive; aligning employees, their skills and behavior to strategic initiatives; minimizing turnover; and increasing sales.

Electronic learning has evolved as a substitute to the traditional classroom-based training method. Electronic learning allows managers to deliver consistent training content quickly to a large number of learners who are geographically dispersed (Welsh, Wanberg, Brown, & Simmering, 2003). This method of training delivery has over time proven to be much less expensive than the face-to-face training that firms have historically offered their workforce (DeRouin, Fritzsche, & Salas, 2005).

Training as Human Capital Development

Organizations are willing to invest in training, understanding that it can be difficult to precisely measure the return on [that training] investment (ROI). Manufacturing and sales companies can often see a change in the number of units produced or accounts created as a consequence of employee training. For example, an internal study at Motorola identified a gain of $29 for each dollar invested in sales training (Bolman & Deal, 2008). In this increasingly knowledge-based economy, professional service companies find it difficult to measure return on investment for training because doing so would involve isolating training as the sole independent variable influencing changes to profit (Stern, 2011). When the company's product is intangible, as in knowledge-based or professional service companies, it is difficult to quantify ROI in a manner meaningful to that organization (Phillips, 2003). According to Bill Stetar of the University of Tennessee's Center for Industrial Service (2003), "There is no other workplace issue on which so much money is spent with as little accountability as training" (p.6) Despite the challenges with quantifying ROI of training, companies still recognize its value.

The value of training has been found in its effect on employee wages, productivity, and competitive advantage. Barron, Berger, and Black (1999) examined the relationship between starting wage, wage growth, and productivity growth. They found a weak correlation between wage growth and employer-provided training, but a high correlation between productivity growth and training. Studies have found that the effect of one hour of training on productivity growth is five times larger than its effect on wage growth (Wang, Sun, Li, & Xuejun, 2008).

Profiscience Partners' Chief Learning Officer Theresa Lundquist (2009) found that when a sample of legal secretaries at U.S. firms took employer-provided document production training, their rate of proficiency increased by 48%. Lundquist stated that by increasing the rate of proficiency to 95%, a firm can equip a team of 85 secretaries to handle the workload that previously required 100 secretaries. Profiscience Partners estimated that following assessment and targeted training, firms can realize a cost savings of $755,685 after the first year. Its calculated savings was a function of fewer salaries, less time lost formatting documents, fewer overtime hours, fewer calls to the Help Desk, and reduced document corruption (Lundquist, 2009).

Organizations have been reevaluating the historical in-person training delivery method. For example, Caterpillar University, the training and development unit of Caterpillar, Inc., in its 2005 study reported a 40% cost savings between traditional instructor-led training and less expensive e-learning (Stacy & Taylor, 2010). The U.S. Army National Guard decreased training costs by $1.6 million after introducing distance learning. Budget Rent-A-Car spent $2,000 per student for a two-week training

course; but, after implementing a distance learning program, reduced the cost per student to $156 for the same course. Upon examination of its computer-based learning program, Bell Atlantic realized an ROI of 366%. When Boeing deployed e-learning on business strategy to 17,000 geographically dispersed managers, it resulted in a costs savings of $9 million in travel expenses (Burgess & Russell, 2003).

Furthermore, new technologies offer innovative and cost effective ways to deliver enterprise-wide training programs. New technological methods also provide the advantage of delivering training more consistently to all employees, ensuring the uniformity of the content delivered, increasing the ease with which content can be updated, reducing travel costs, and providing on-demand training anytime, anywhere (DeRouin, Fritzsche, & Salas, 2005).

Statement of the Problem

The problem addressed by this study is that there is a scarcity of research on m-learning's effectiveness compared to other training delivery methods. Because the use of mobile devices for training is new, additional research is necessary for managers to have a basis from which to select the appropriate methods of training for their workforce. The questions to be answered for managers to make well-informed training decisions include: Do different training methods produce different outcomes? Are the technology-based training delivery methods superior to traditional FTF training? Which technology-based training method, e-learning or m-learning, is more effective?

Recent studies have shared one common idea that there is more research needed about e- and m-learning. In their research agenda, DeRouin, Fritzsche, & Salas (2005) put forth the following ideas:

1. There is a need for more theory to guide the design, delivery and implementation of e-learning.
2. Research should be less technology-focused and more learner-focused.
3. More research needs to be conducted in workplace settings.

In order to narrow the scope of prior research, m-learning should be studied to isolate the effectiveness of training when formatted for and delivered via different devices. Mobile learning should be examined from a workforce training perspective to further refine that scope and increase its applicability to the field of management rather than education.

METHODOLOGY

This study assessed three business training methods to determine which is more effective in the delivery of organizational training. Effectiveness was measured by the change in score between the pre- and post-assessment. An experiment was conducted to measure performance across these methods.

For $H_{1,}$ the performance (independent) variable was the method of training delivery, of which there were three types examined: FTF training, e-learning, and m-learning. The dependent variable in this study was training effectiveness as measured by learners' change in score from pre-to post-assessment.

Study Procedures

Business professors at a university were asked to allow their classes to participate in this study. One hundred three adult business students participated in the study. No study participant had participated in the prior pilot experiment. Face-to-face training was scheduled. Electronic and mobile learning modules were loaded to the study-specific course in the Blackboard Learning Management System. Learners were enrolled in the course, and all e- and m-learners were emailed instructions on how to access their training module online. Prior to beginning the study, the researcher directly communicated with participants. All

participants received and signed the IRB-approved consent form. The consent form was completed online for e- and m-learners.

The experiment consisted of four steps, and took approximately 30 minutes to complete. First, participants completed a 10-question pre-assessment to gauge their level of knowledge on the training topic. The pre-assessment scores also served as a baseline in determining the change in scores between pre- and post-assessment. Pre-assessment and post-assessment questions were different to avoid programming responses but were constructed as a split half instrument of twenty questions demonstrated to measure performance or learning.

For the second step, learners completed a training module of approximately 12 minutes in duration. The multimedia training module was published to Blackboard in both mobile and standard e-learning formats. The study materials were made available in Blackboard as part of a new course to which all study participants were enrolled. Participants who took the training from a desktop computer completed the standard e-learning module. Those who accessed the training from a mobile device (e.g.: smartphone, tablet, or laptop) completed the training module formatted for viewing on mobile devices. The training content was the same for all study groups despite the different methods of delivery.

For the third step, participants completed a 10-question post-assessment in the same format as the pre-assessment with different questions on the same training topics. Learners completed the steps of the study in sequence. Blackboard allowed learners to complete each assessment only once. All assessment questions and demographic questions were answered. Unanswered scale questions on the survey questionnaire were processed using list-wise deletion. Therefore, they were not included in the calculations of average ratings of survey dimensions.

For the fourth, and final, step, participants completed a survey questionnaire to capture demographic data, past experience with e- and m-learning, as well as feedback about learner preference. The questionnaire delivered to participants was largely based on Wang's E-learning Satisfaction Survey (Wang Y.-S. , 2003). The e- and m-learning groups completed the assessments and training on Blackboard. From Blackboard, a hyperlink brought them to the online survey. Throughout this study, FTF learners completed training in-person. All FTF training sessions were held after noon. The researcher delivered a live lecture presentation in a classroom environment. Participants completed both assessments and the survey in hardcopy form. E-learners in this study completed all study components: training module, assessments, and survey, on stationary desktop computers. Lastly, mobile learners completed all study components on laptops, tablets or smartphones.

ANALYSIS OF RESULTS

This research determined whether e-learning, m-learning or FTF training is more effective based on change in scores between pre- and post-assessment. This section of the study examines the output of the statistical test performed.

Descriptive Statistics

The 103 learners in this study earned a mean pre-assessment score of 52.91 and a mean post-assessment score of 80.49. The mean change in score was 27.57. Based on the descriptive statistics in Table 1, the mean post-assessment score by training method only varied by 3 points among the three sample groups. The FTF group had a mean post-assessment score of 81.09. For the e-learning group, the mean score was 79.57, and for the m-learning group it was 82.5. Table 1 details the mean assessment

scores and change in score for the three training methods. The descriptive statistics revealed modest differences across learning platforms. For instance, m-learners learned the least on average, with a change in score of 23, and e-learners learned the most, with a change in score of 33.

Table 1: Mean Assessment Scores by Training Treatment

Training Type	Pre-Assessment	Post-Assessment	Change in Score	N
FTF	51	76	25	35
E-Learning	48	80	33	42
M-Learning	64	87	23	26

Hypothesis Testing

Statistical tests were performed using SPSS. The primary test performed was a one-way between groups analysis of variance (ANOVA) to determine whether there was a difference in the mean change in score of the three study groups: FTF, e-learning, and mobile learning. The following hypothesis was tested at the 0.05 confidence level:

H_0: *There is no difference in performance among the e-learning, m-learning, and FTF groups.*

H_1: *The performance of at least one group differs significantly from the others.*

Test of Difference in Mean Change in Score

An ANOVA was performed to determine whether the mean change in score differed significantly among the training methods. The independent variable was the training method, and the dependent variable was the change in score.

The mean change in score by training method varied by 10 points among the three sample groups. The FTF group had a mean change in score of 24.86. The e-learning group's mean change in score was 32.86. For the m-learning group, it was 22.69. The change in score was calculated as the difference between the pre-assessment and post-assessment scores. The mean pre-assessment score was 50.86 for the FTF group, 47.62 for the e-learning group, and 64.23 for the m-learning group. The mean post-assessment scores were 75.71 for the FTF group, 80.48 for the e-learning group, and 86.92 for the m-learning group. A series of paired samples t-tests were conducted to conclude that these gains in learning were significant. The p-value of each test was 0.000. This indicated that learners' scores changed significantly from pre- to post-assessment; the participants learned. Table 2 shows the descriptive statistics for the performance of the FTF, e-learning and m-learning groups.

Table 2: ANOVA Descriptive Statistics for Change in Score

		N	Mean	Std. Dev.	Std. Error	95% Confidence Interval for Mean		Min.	Max.
						Lower Bound	Upper Bound		
Change in Score	FTF	35	24.86	28.837	4.874	14.95	34.76	-40	80
	E-Learning	42	32.86	22.118	3.413	25.96	39.75	-10	80
	M-Learning	26	22.69	22.549	4.422	13.58	31.80	-20	60
	Total	103	27.57	24.871	2.451	22.71	32.43	-40	80

The effect of training method on the mean change in score of each group was not significant; $p = 0.192$. See Table 3. These results failed to reject the null hypothesis, H_0. Additionally, the results of the ANOVA indicated that there is no significant difference in mean post-assessment scores among the three study groups. This analysis found that the there was no significant difference in performance among the

training groups. However, there was a significant difference in mean pre-assessment scores among the study groups, which suggested that learners' initial levels of knowledge on the topics varied. However, the training successfully increased learners' knowledge level to a similar degree.

Table 3: One-Way ANOVA for Training Performance Among Study Groups

		Sum of Squares	df	Mean Square	F	Sig.
Pre-Assessment	Between Groups	4655.408	2	2327.704	5.958	.004
	Within Groups	39070.806	100	390.708		
	Total	43726.214	102			
Post-Assessment	Between Groups	1874.263	2	937.131	1.859	.161
	Within Groups	50401.465	100	504.015		
	Total	52275.728	102			
Change in Score	Between Groups	2050.237	2	1025.118	1.679	.192
	Within Groups	61042.967	100	610.430		
	Total	63093.204	102			

CONCLUSION

This study found no difference in learning performance across the three typical modes of workforce training: classroom face-to-face instruction, laboratory-based e-training, and mobile learning. Across each instructional mode, subjects in the study acquired the intended knowledge. This finding was not significantly affected by age, gender, employment status, education level, incentives, or learner preference.

Implications for Managers

These research findings have implications for human resource managers and employee training investment decisions. Regardless of learner preference for one training delivery method over others, there was no significant difference in effectiveness, as measured by change in score and post-assessment performance among the three methods. Therefore, managers should invest in the training delivery method that is most effective for their firm. When considering which training method to invest in, managers must focus on convenience, cost, accessibility, development and deployment speed (Rao, 2011). Learners and employers might find that mobile learning is more convenient than the other modalities.

This study did not examine costs, but costs should be included in future research. Costs would certainly vary among worker training options and would be a consideration for business decision making. Research has already established that FTF training is most expensive (DeRouin, Fritzsche, & Salas, 2005; Stacy & Taylor, 2010; Welsh, Wanberg, Brown, & Simmering, 2003). It is likely that mobile learning will be on average more expensive than e-learning. The added expense of mobile learning may lie in the fact that most companies utilize one computer platform, or operating system, but may offer and support multiple different types of mobile device. The added expense could result from differences in design and deployment speeds. For instance, most organizations will provide, support, and maintain computers that utilize one operating system, either Windows or MacOS. On the other hand, many companies will often offer multiple mobile devices with different operating systems, such as RIM for Blackberry, iOS for iPads and iPhones, and Android for Samsung mobile devices. Thus, if a corporation decided to deploy e-learning, the development would require quality and assurance (QA) testing on one platform. If a company wished to deploy m-learning, they would need to perform QA testing on all of their different

mobile platforms. This would potentially multiply the development time and associated costs. The added QA, development, and deployment time could result in mobile learning being initially more expensive than e-learning, but still less expensive that FTF training.

Managers' exploration of mobile learning solutions continues to increase (ASTD, 2013). They face the decision of whether to build or buy e-/m-learning content. There may be cost differences associated with each option. Additionally, some may question whether the decision to procure e-/m-learning content would potentially displace current corporate trainers. That concern could be addressed by researching whether the emergence of e-learning and m-learning merely changes the nature of the corporate trainer job or if it makes the role of corporate trainer obsolete. Still, the impact of new technologies, such as mobile learning, on the future of organizational training and development cannot be predicted. As companies debate the merits of in-house versus outsourced training and development services, the merits and costs of different types of workforce training will change. Additionally, the future education and job requirements of training professionals will change. The implication of studies such as this one portends a future in which expertise in instructional technologies will be critical to those engaged in worker training.

Businesses also face the challenge of demonstrating a positive return on investment as a result of offering training (Phillips, 2003; Stetar, 2003). This study found that HR Managers can be confident in using mobile learning to train employees in the kind of non-technical business skills content used in this study.

Areas of Further Research

While there is confidence that among the available training technologies, mobile devices offer promise and in this study were demonstrated to be as effective as alternative training methods, there may be limitations. The results of this experiment may be affected by the subject matter of the training module. Therefore, future researchers should exercise caution when applying these findings to experiments involving training content of a more technical nature, e.g.: software application training, design training, mechanical training, etc. Content and learning objective complexity are subjects recommended for future research.

More research is recommended across a greater variety of professionals and non-professionals, service industries and manufacturing to test the generalization of this study's findings. For wide dissemination of mobile learning across businesses, a study of comparative cost is needed. Additional future research is recommended to examine any difference in mobile learning effectiveness based on hardware, software, and module functionality. Furthermore, research is recommended to explore the long-term human resource impact, in terms of policy and compensation, of offering mobile learning to all employees.

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